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Basic Science, Clinical & Translational Research

Alam, Ahmar

Preceptor
Harris Chengazi, MD
University of Rochester Medical Center
Department of Radiology

Co-Author
Michael J. Potchen, MD
University of Rochester Medical Center
Department of Imaging Sciences

Development of Portable Radiology Training and Retaining Radiologists for Africa

Objective: To develop an affordable and accessible radiology curriculum tailored to Zambian Radiologist residents in order to combat the current physician shortage.

Background: Zambia has been experiencing a major radiologist shortage, exemplified by both a lack of formal training in radiology along with a limited number of practicing radiologists for the public sector. Prior research has suggested that improvements in medical education could play a role in combatting physician shortages. In 2018, a group of radiologists at the University of Rochester developed PRACTERRA, a Portable Radiology Curriculum for Training, Evaluating, and Retaining Radiologists for Africa, in the hopes to improve radiology residency training in Zambia in order to effectively reduce the current shortage. Since its inception, the PRACTERRA team has begun case collection and module development for the curriculum, and has been actively working with institutes in Zambia to facilitate curriculum integration.

Methods: The primary task this summer was to continue curriculum development by collecting a set of radiology cases that covered a wide array of pathology commonly seen in Zambia. Radiology cases included MRIs, CT scans, and Ultrasound imaging. Following collection, the cases needed to be organized based on both their system pathology and integration into the overall curriculum design developed by the PRACTERRA team. Following case collection and organization, a literature review needed to be conducted for every case collected, so that residents would have access to supplementary readings and sources for each case analyzed. Along with case collection, the PRACTERRA team was also developing case modules for curriculum use. Furthermore, the team has planned to publish papers regarding the developmental process in order to contribute to the literature concerning international medical education.

Results: Over 300 cases were collected and organized based on system pathology and curriculum integration. A literature review has been conducted for almost 50 cases, and is still being conducted for the remaining cases.

Conclusions: There has been great development regarding case collection and organization for usage in the developing curriculum. Additionally, the literature review is still underway, which will serve as great additional resources for the residents as they utilize our curriculum cases. Future plans are to continue collecting and organizing cases, and disseminating primary literature regarding the development process. PRACTERRA representatives also plan on visiting Zambia in the coming year to further assess product compatibility prior to curriculum finalization. The goal is provide the curriculum in its entirety in 2020.

Basic Science, Clinical & Translational Research

Arora, Trisha

Preceptor
Lynn Fiellin, MD
Yale School of Medicine
Department of General Medicine

Co-Authors
Lindsay Duncan, PhD
Tyra Pendergrass
Yale School of Medicine

Physical Fighting Among Adolescents: The Role of Future Orientation and Anger

Rates of physical fighting differ between adolescent boys and girls, but it is not clear why. Previous studies have suggested that in boys, future orientation may predict weapon-related violence. However, this relationship has not been studied in girls. Anger has also been associated with overt aggression for both adolescent boys and girls. In this study, we analyzed secondary data collected from a two year randomized controlled trial studying a digital game intervention to understand whether adolescents' anger and future orientation were associated with their rates of physical fighting. Adolescents were asked about their anger (defined as "I got angry very easily with someone" and "I was angry most of the day" at least one day during the past 7 days), whether they had ever been in a physical fight, and questions to measure their future orientation.

Data was collected from 333 adolescents aged 11 to 14 at seven time points over 24 months. Logistic regression analyses, conducted separately for boys and girls, examined anger and future orientation as predictors of physical fighting. Of the participants, 177 (53.2%) were boys and the mean age was 12.9 years. Future orientation scores increased for boys and girls, but plateaued after 3 months. Boys reported higher rates of having been in a physical fight in the prior 24 months whereas girls reported higher rates of anger. For boys, a change in future orientation was a significant predictor of having been in a fight, whereas for girls, anger was a significant predictor of having been in a fight. These data suggest that factors associated with or predictive for being involved in physical fighting may vary by gender. Using targeted methods that address these specific differences for each gender group may improve the effectiveness of future violence prevention interventions.

Basic Science, Clinical & Translational Research

Bai, Heidi

Preceptor
JiaDe (Jeff) Yu, MD
Massachusetts General Hospital, Harvard Medical School
Department of Dermatology

Contact Allergens in Top-Selling Textile Care Products

Allergic contact dermatitis (ACD) is a type IV cell-mediated delayed-type hypersensitivity reaction induced by haptens contacting the skin. ACD affects approximately 20% of both the general adult and pediatric populations, leading to impairment of one's quality of life and ability to work due to symptoms, functioning, and appearance. Epicutaneous patch testing is the gold standard for detecting allergens responsible for ACD.

Clothing can induce ACD through the addition of disperse dyes for dying synthetic fabrics and formaldehyde resins for strength enhancement and shrinking and wrinkle prevention. While allergens corresponding to the textile production process itself have been recognized, washing and care products associated with textiles have been widely understudied, and are potentially relevant sources for triggering ACD in a similar pattern to textile dermatitis.

We conducted a comprehensive examination of potential allergens in commonly used laundering products, including 30 laundry detergents, 10 fabric softeners, 8 dryer sheets, and 17 stain removers. Fragrances and essential oils were the top potential allergens found in laundry detergents, fabric softeners, and stain removers, followed by preservatives benzisothiazolinone and methylisothiazolinone. Fragrance was the only potential allergen in dryer sheets. Other common potential allergens identified were emulsifiers such as propylene glycol, and surfactants such as alkyl glucosides and cocamidopropyl betaine. Many of these potential allergens were named Allergen of the Year by the American Contact Dermatitis Society.

These findings are particularly concerning since residues have been shown to linger after one wash. We recommend practitioners to recognize and consider the potential allergens in textile care products when evaluating patients with diffuse ACD.

Basic Science, Clinical & Translational Research

Bhagat, Rohun

Preceptor
Scott J. Swanson, MD
Dana-Farber Cancer Institute, Brigham and Women's Hospital
Department of Thoracic Surgery

Co-Authors
Emily Polhemus
Abby White, DO
Brigham and Women's Hospital
Department of Surgery

Suden Kucukak and Dan Lee
Harvard Medical School

Cardiothoracic Surgery Research

Project 1: Case Report

In this project, we identified a patient who was initially diagnosed with primary breast cancer and upon further workup was found to have an additional primary lung tumor. The primary lung tumor spanned much of the left thoracic cavity with involvement of the heart. We believed that conservative therapy would not provide the greatest outcome for this patient and chose to pursue aggressive chemoradiation therapy followed by pneumonectomy. Such a path led to severe mitral and aortic regurgitation months following pneumonectomy. This patient was subsequently treated with mitral and aortic valve replacement surgery. The patient has fully recovered and is currently alive and well to the best of our knowledge.

My role in this project was to read the patient's file and operative notes to fully understand why the patient was being treated and the obstacles to treatment. I then wrote a case report on this patient's treatment which is currently under revision for submission to a peer-reviewed surgical journal.

Project 2: Surgical Video

This project was focused on a surgical patient who presented with oligometastatic lung cancer. Prior to our institution treating this patient, the patient underwent gamma knife neurological surgery for metastatic findings related to the primary lung cancer. During thoracic operation for resection of the left upper lobe, it was found that this patient had unique vascular anatomy. Specifically, this patient presented with several pulmonary vessels not typically observed in the majority of patients. Such a finding required adjustment of case progression. Further, this patient had friable lung tissue which led to bleeding and air leak requiring significant intraoperative surgical repair.

My role in this project was to read the patient's file and operative notes to fully understand why the patient was being treated. Further, I was involved with taking the raw footage from the case and editing it down to a manageable amount (~7 minutes) for presentation. I then recorded audio narration over the video. Finally, I wrote an abstract to accompany this surgical video. This project is currently being reviewed by a national surgical meeting for possible presentation.

Project 3: Superior Segmentectomy vs. Lower Lobectomy

As our screening and diagnostic technology continues to improve, lung cancer is being diagnosed earlier and earlier. As such, patients are having treatments via resection earlier on in their lives. Given the possibility for a second primary lung tumor, metastasis from another primary cancer, or remission of the initial tumor, we aim to preserve as much lung function as possible during initial surgical resection for cancer. Therefore, this project aimed to analyze superior segmentectomy versus lower lobectomy to improve upon existing guidelines of when it is appropriate to use the lung sparing (segmentectomy) technique.

I came on to this project in its later stages. As such, my role in this project was primarily in chart review and data collection. Specifically, I collected 15+ variables for hundreds of patients which required in depth review of histopathology reports, vitals data, and lung function. At present, I am assisting with revisions of the abstract and manuscript as needed.

This project was presented by Dr. Abby White at the American Association for Thoracic Surgery International Thoracic Surgical Oncology Summit in September of 2018. The manuscript associated with this project is being submitted to a peer-reviewed surgical journal.

Project 4: Signet-Ring Cell Esophagectomy Analysis

This project was conducted to understand the implications of signet-ring cell histology on the prognosis of esophageal cancer. I joined this project once it had already been started. My role in this project was primarily chart review and data collection similar to that of the superior segmentectomy vs. lower lobectomy project. I collected 15+ variables for 100+ patients which required in depth chart review of oncology, radiology, and surgical notes and further chart review of histopathology reports and vitals data. At present, I am assisting with revisions of the abstract and manuscript as needed.

This project was presented by Dr. Abby White at the American Association for Thoracic Surgery International Thoracic Surgical Oncology Summit in September of 2019. The manuscript associated with this project is being submitted to a peer-reviewed surgical journal.

Basic Science, Clinical & Translational Research

Cisneros, Rafael

Preceptor
Christopher Tarolli, MD
University of Rochester Medical Center
Department of Neurology

Knowledge and Opinions of Palliative Care Among Patients with Parkinson Disease: Results of a National Needs Assessment

Objective: To characterize overall care utilization and knowledge and opinions of palliative care among patients with Parkinson disease.

Background: Palliative care (PC) focuses on providing relief from suffering in patients with chronic illness. While traditionally associated with end-of-life care, PC can be beneficial throughout the course of chronic illness. There is rising recognition of the role of PC in the care of patients with Parkinson disease (PD), yet utilization remains low.

Methods: We conducted an online national needs assessment of individuals with Hoehn and Yahr stage II-V PD of at least 5 years duration. The survey evaluated: 1) overall care utilization; 2) types of advance directives completed; and 3) perceived goals of current PD care. We invited respondents to provide free text responses on potential barriers to PC utilization and assessed for emergent themes. We also assessed baseline willingness to see a PC provider. We then provided a brief explanation of PC services and evaluated post-education willingness to see a PC provider; we compared pre- and post-education responses using a one-tailed McNemar test ($\alpha=0.05$).

Results: A total of 612 individuals completed the survey. Respondents reported seeing an average of 2.7 providers for their PD with only 2.1% seeing a PC specialist. The majority of respondents (93.0%) felt the goal of their current PD care was to feel better, though 11.6% felt the goal was to cure PD. We identified 11 emergent themes in the assessment of barriers to PC utilization; the most common were provider availability, cost, and lack of understanding. 45.6% of respondents indicated a baseline willingness to see a PC provider. This increased to 71.7% following the brief education ($p<0.001$).

Conclusions: In this national survey of individuals with PD, we identified a high use of the medical system with limited utilization of PC services. Systems and stigma barriers likely limit PC utilization, and simple education may help address some of these barriers.

Basic Science, Clinical & Translational Research

Cleary, Shannon

Preceptors
Nancy Wood, MPA
David Adler, MD, MPH
University of Rochester Medical Center
Department of Emergency Medicine

Understanding the Possibilities of Community Paramedicine in Partnership with Local Indigenous Communities

BACKGROUND:
Community Paramedicine (CPM) is a mechanism to deliver supportive health care services to people in their own communities, typically through the actions of local emergency medical services (EMS) personnel with the goal of bridging the gaps between primary care, emergency medicine, and community health. This type of medicine is inherently community-based and community-driven and would likely thrive in partnership with indigenous communities. Native populations experience significant health disparity in many different areas of healthcare[1]. Specifically, Haudenosaunee communities of New York (including Mohawk, Oneida, Onondaga, Tuscarora, Cayuga, and Seneca Nations) experience statistically significant differences in mortality related to unintentional injury, diabetes, and chronic liver disease as compared to whites[2]. The Indian Health Service has used innovative strategies such as telemedicine and health information technologies to address some of the disparities experienced by Native populations[1]; CPM could be another successful innovative approach.

METHODS:
A literature review was performed to better understand potential applications of community paramedicine, and to gain an understanding of important aspects of partnering with indigenous communities as an academic medical center. Urban and suburban ambulance services were also observed as well as CPM visits and chart reviews from an ongoing project targeted at reducing return ED visits among older adults in a suburban community. Community outreach efforts were made to connect with Onondaga Nation community members and leaders in order to gauge interest in partnership on a CPM project. Fire Departments in Onondaga and the neighboring town of Nedrow as well as their associated ambulance service, TLC, were contacted and possibilities for CPM and next steps were discussed.

RESULTS AND DISCUSSION:
The literature review revealed CPM to be an adaptable strategy with the potential to address a variety of community health concerns, particularly amongst underserved populations. While there is a significant body of literature with valuable information on partnering with indigenous communities and many examples of community health projects, there are few examples of CPM being used by an indigenous community. Laguna Pueblo in New Mexico offers an example of a

successful CPM project targeting wound care in a rural Native community[3]. Community paramedicine is a viable option for addressing community-identified health needs in indigenous communities.

Outreach efforts are ongoing, and members of the Onondaga Nation and Nedrow fire departments have discussed some challenges that a more traditional, EMS-focused CPM intervention may encounter. Members discussed hosting community education and skills sessions at Onondaga and Nedrow fire departments as a preliminary step in understanding community needs. Community Health Representatives from Onondaga Nation Health Center were also brought up as possible partners, and future discussions will include representatives from the Health Center. If a potential project idea is developed, the team will reach out to Onondaga Nation Council Members for approval to elicit community member input in order to develop a final project proposal.

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Basic Science, Clinical & Translational Research

Cybulski, Luke

Preceptor
Peter Prieto, MD
University of Rochester Medical Center
Department of Surgery, Oncology

Effects of the Microbiome on Cancer Development and Response to Therapy

Cancer constitutes a major cause of morbidity and mortality in the United States, and as such there has been tremendous strides in treatments, including targeted therapies (e.g. BRAF inhibitor) and immune checkpoint inhibitors (e.g. PD1 blocks). However, despite these improvements, it has been shown that resistance to these agents in some melanoma patients is mediated by both direct and indirect effects of the gastrointestinal microbiome. This microbiome effect on therapy is further demonstrated in other melanoma patients, where intra-tumor gamma-proteobacteria can degrade chemotherapeutic agents, and segmented filamentous bacteria can promote Th17-polarized responses that affect tumor growth and response to therapy. Moreover, in cases of breast cancer, triple negative and triple positive tumors show differences in microbiota, and the Blautia species is associated with a more severe grade in clinical staging. Additionally, in relation to hepatocellular carcinoma, Bacterioides administration to germ-free mice increases potency of therapeutic antibodies against CTLA4, while Bifidobacterium demonstrates improved CD8+-T cell function against tumor tissue. Hence, based on the results of this previous work, the aim of this study is to analyze the microbiome in patients with various cancers (melanoma, sarcoma, breast, hepatobiliary, renal, and bladder) in order to elucidate the role of the microbiome on cancer development and response to therapy. The methodology will include collecting samples of tissue, blood, fecal, buccal, and skin swabs from 1000 patients over ten longitudinal time points. From this data, microbial diversity will be assessed on α-diversity and β-diversity, and this diversity will then be correlated with the clinical response to therapy. A current hypothesis for this study is that greater diversity of the microbiome is associated with better prognosis.

Davis, Adam

Preceptor
Irvin Oh, MD
University of Rochester Medical Center
Department of Orthopaedics

Co-Authors
Eric Vess, MD and Emma Knapp
University of Rochester Medical Center

Biomechanical Analysis of Hindfoot Motion after Talonavicular Joint Arthrodesis

Introduction:
Isolated talonavicular joint (TNJ) arthrodesis has been described in the treatment of a multitude of conditions including talonavicular arthritis and adult acquired flatfoot deformity (AAFD). Clinically, TNJ arthrodesis provides powerful flatfoot deformity correction and pain relief for the arthritic joint. However, many opponents argue that it significantly limits motion through the remaining hindfoot joints because the TNJ, subtalar joint (STJ) and calcaneal cuboid joint (CCJ) are coupled through a close kinematic relationship; this can have significant clinical consequences, as hindfoot motion is critical for ambulation on uneven surfaces. Previous biomechanical studies have demonstrated almost complete elimination of motion through the STJ after TNJ arthrodesis. However, these studies were performed in specimens with normal anatomy and do not necessarily reflect the biomechanics seen in AAFD. Furthermore, arthrodesis in these specimens was carried out in-situ and the position of the TNJ arthrodesis was not considered in regards to its impact on residual hindfoot motion. In this study, we attempt to elucidate the effects of isolated TNJ arthrodesis in three different positions (abducted, neutral, adducted) on STJ motion in an established flatfoot model.

Methods:
Eight fresh-frozen cadaveric foot specimens were employed for this study. We created the flatfoot model by incising the medial and inferior talonavicular interosseous ligaments and then applying a cyclic 800N ground reaction force with an Instron machine until a tarsal-1st metatarsal abduction angle of at least 10 degrees was achieved. STJ motion was analyzed after each arthrodesis condition using reflective markers attached to the specimens and an OptiTrack multiple camera capture system; MATLAB software was used to calculate the change in joint angles. In the first five specimens, STJ motion was measured while applying an 800N ground reaction force to simulate physiologic loading. Based on preliminary results, modifications were made to better capture the full range of motion of the STJ. In the final three specimens, STJ motion was measured by applying a tension force to the posterior tibial tendon and peroneus brevis tendon successively, while the foot was fixed in an inverted position.

Results:
There was no significant difference in STJ motion among the three arthrodesis conditions (abducted, neutral, adducted) for the first five trials. In the modified inverted foot model, one trial showed STJ motion of 6.23° for the neutral position, 2.38° for the adducted position and 8.82° for the abducted position.

Conclusion:
The initial results of this study are inconclusive as the original model was unable to capture the full range of motion of the STJ as compared to prior experimental data. Results from the modified inverted model are promising and warrant further research to determine whether there is a significant difference in STJ motion dependent on the position of STJ arthrodesis.

Basic Science, Clinical & Translational Research

DeSousa, Alexandra

Preceptors
Anthony Pietropaoli, MD
University of Rochester Medical Center
Department of Critical Care

Co-Authors
Casey Robinson, Amy Rovitelli, and Susan Mroczek
University of Rochester Medical Center

(-)-Epicatechin as a Potential Vasodilatory Agent to Treat Sepsis-Associated Microcirculatory Dysfunction

Sepsis is a common clinical presentation in critically ill patients that is associated with a significant mortality of 15-30% in the United States[1]. Sepsis is highly associated with organ dysfunction, which has been hypothesized to be a result of defects in microcirculation[2]. Microcirculation is defined as the flow of blood through arterioles, capillaries, and venules <100 microns in diameter. Microcirculatory defects, then, can lead to decreased oxygen delivery to tissues which may lead to organ failure. Nitric oxide is an endogenous vasodilator and the concentration of its metabolites in the body can be used as an indicator for microcirculatory functioning. One such metabolite is nitrate (NO_3). We find that that urinary nitrate levels are significantly lower in critically ill patients compared to healthy controls, in hospital non-survivors compared to survivors, and in critically ill patients with confirmed sepsis compared to critically ill patients without infection (Figures 1-3).

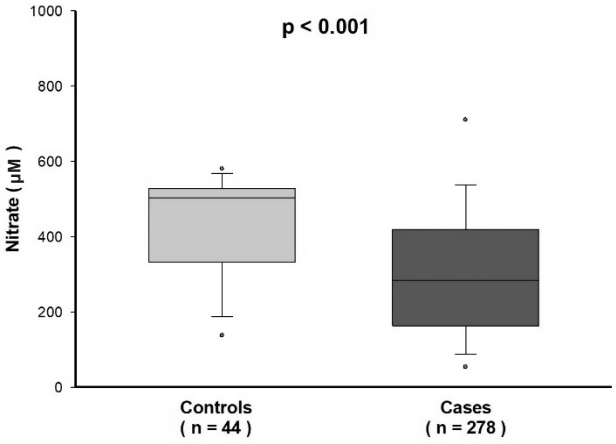

Figure 1. Urinary nitrate levels are significantly higher in healthy controls (502 [358 - 526] n = 44) compared to ICU patients (283 [163 – 417] nM n = 278], $p \leq 0.0001$ by Kruskal-Wallis.

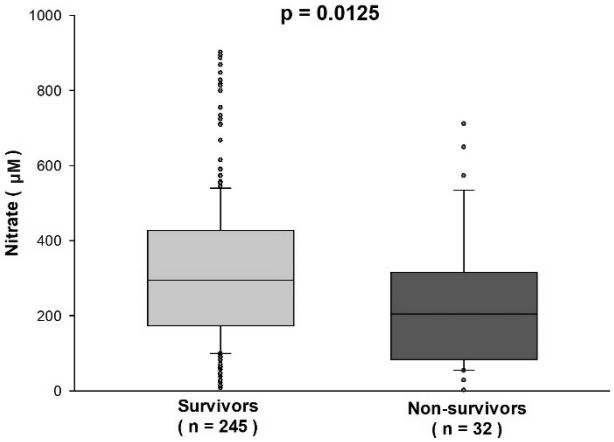

Figure 2. Urinary nitrate levels are significantly higher in hospital survivors (295 [174 - 425] n= 245) compared to hospital non-survivors (204 [84 - 310] n = 32) p = 0.012 by Kruskal-Wallis.

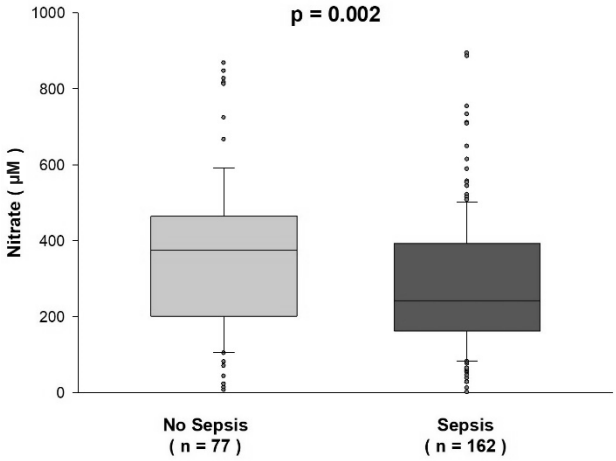

Figure 3. Urinary nitrate levels are significantly higher in ICU patients without infection (375 [205 – 462] n = 77) compared to ICU patients with confirmed sepsis (242 [163 – 389] n = 162) , p = 0.002 by Kruskal-Wallis.

We therefore propose that a vasodilatory agent may be of clinical use for improving microcirculation in this patient population. One proposed vasodilatory agent is (-)-epicatechin, a flavanol that is present in cocoa. It has been found to have beneficial effects on flow-mediated dilation (FMD), arterial stiffness, and measures of nitric oxide metabolites[3]. We initiated a systematic literature review to assess the current state of randomized clinical trials examining the effects of cocoa, or its proposed active components, on these measures of microcirculatory health. This review is currently in progress and being performed according to the PRISMA[4] standards for systematic literature reviews.

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Thank you to Casey Robinson for assistance with data analysis and figure production.

Basic Science, Clinical & Translational Research

Diamond, Alexander

Preceptor
Anton Porsteinsson, MD
University of Rochester Medical Center

Evaluating a Minimal Clinically Important Difference (MCID) in Behavioral Assessments for Alzheimer's Disease

Background: Neuropsychiatric symptoms are a prominent feature of Alzheimer's disease. Treating agitation remains a significant challenge to patients and caregivers as the disease progresses. While several treatments are available off-label, none have been FDA approved for this purpose. Citalopram was shown to be efficacious for agitation in the Citalopram for Agitation in Alzheimer's Disease (CitAD) study, and behavioral scales used to assess its efficacy met statistical significance. One aspect not analyzed was whether a minimal clinically important difference (MCID) exists. This is important since some assessments do not inherently take clinical significance into account. Something that shows statistical significance may or may not have a real, tangible benefit to a patient. This study set to determine if MCID values can be assessed for the CitAD behavioral scales that do not directly measure clinical significance.

Methods: Using the anchor-based method of obtaining MCID values, the modified Alzheimer Disease Cooperative Study-Clinical Global Impression of Change (mADCS-CGIC) served as the reference anchor. The other behavioral scales analyzed were the Neurobehavioral Rating Scale—Agitation subscale (NBRS-A), Cohen-Mansfield Agitation Inventory (CMAI), Neuropsychiatric Inventory (NPI), and the agitation/aggression and caregiver distress subscales of the NPI. Patients who were found to be either "moderately improved" or "markedly improved" on the mADCS-CGIC were determined to have a clinically significant improvement. The mean values of change for these patients from their other assessments were used to determine MCID values for each individual scale.

Results: The mean value of scale change for patients with moderate-to-marked improvement on the mADCS-CGIC were as follows: NBRS-A had a mean change of -5.0 with standard deviation (SD) of 2.6 and range (-12, 2), CMAI mean change of -5.5, SD 5.7 (-20, 14), NPI-total mean change of -20.3, SD of 16.1 (-70, 12), NPI-A mean change of -4.7, SD 3.2 (-12, 4), and NPI-caregiver distress mean change of -8.4, SD 8.9 (-41, 10). The area under the curve (AUC) for receiver operator curves (ROC) of each scale were as follows: NBRS-A 0.83, 95% confidence interval (0.79, 0.87), CMAI 0.71 (0.66, 0.76), NPI-total 0.73 (0.68, 0.77), NPI-A 0.70 (0.66, 0.75), and NPI-caregiver distress 0.67 (0.62, 0.72).

Table 1: Change in continuous agitation measure for first rating of marked or moderate improvement for mADCS-CGIC

Change from baseline to first rating of marked or moderate improvement in CGIC (78 participants had a rating of marked or moderate on at least one visit)

NBRS – agitation subscore			CMAI			NPI total score			NPI – agitation subscale			NPI – caregiver distress		
Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
-5.0	2.6	-12.2	-5.5	5.7	-20.14	-20.3	16.1	-70.12	-4.7	3.2	-12.4	-8.4	8.9	-41.10

Table 2: Receiver Operator Curve for marked or moderate improvement in CGIC versus each continuous measure (area under the curve)

NBRS – agitation subscore		CMAI		NPI total score		NPI – agitation subscale		NPI – caregiver distress	
AUC	95% CI	AUC	95% Ci	AUC	95% CI	AUC	95% CI	AUC	95% CI
0.83	(0.79, 0.87)	0.71	(0.66, 0.76)	0.73	(0.68, 0.77)	0.70	(0.66, 0.75)	0.67	(0.62, 0.72)

Conclusion: Data for the NBRS-A, CMAI, NPI-total, and NPI-A indicate convincing MCID results. Values obtained for the NPI-caregiver distress scale show lower chance of validity, likely due to other confounding factors that can affect caregiver distress besides patient agitation levels. The MCID values obtained for these scales help bolster the results of the CitAD trial. They also provide useful templates and reference points for future studies looking to analyze clinical benefit of treatment for neuropsychiatric symptoms in Alzheimer's disease.

El Charif, Omar

Preceptor
Sarah Kerns, PhD
University of Rochester Medical Center
Department of Radiation Oncology

Functional Polygenic Analysis of Radiation-Induced Late Effect Genitourinary Toxicities

Introduction: Prostate cancer (PCa) accounts for approximately 20% of new cancer diagnoses each year and has a 5-year survival rate of 98.2%. Approximately half of all PCa patients receive radiation therapy in their treatment regimen. Thus, long lasting, potentially irreverisble radiotoxicities constitute a growing challenge for survivors. Frequent toxicities include dysuria, nocturia, hematuria, incontinence, and bladder or rectal ulceration. Associated factors include age, and smoking, but they only account for a fraction of the total variance observed. It has been postulated that the genetic background of normal tissues could help predict their disposition to toxicities. Several candidate gene studies and genome-wide association studies (GWAS) have been performed to identify associated single nucleotide polymorphisms (SNPs). A recent meta-analysis GWAS identified several novel SNPs and replicated some previously discovered SNP associations with phenotypes like hematuria, rectal bleeding, and reduced stream. The function of this project was to functionally characterize the sub-threshold SNPs associated with rectal bleeding.

Methods: SNPs associated with rectal bleeding ($P < 0.001$) were annotated using expression quantitative trait loci (eQTL) in the Genotype-Tissue Expression (GTEx) project. Enrichment of GTEx eQTLs was assessed in each tissue with permutation resampling, following linkage disequilibrium pruning ($R2 < 0.8$) using SNPsnap. A subset of tissues were selected a priori for a postulated role, including Whole Blood, Esophageal Muscularis, Esophageal Mucosa, Sigmoid Colon, Transformed Fibroblasts, Lymphocytes, and Tibial, Coronary, and Aortic Arteries. Overall enrichment of eQTLs in all tissues was assessed using an empirical Brown's combined p-value using a SNP effect size correlation matrix of tissues. Tissue-specific pathways based on eQTL mapping was performed to identify implicated genes.

Results: GTEx eQTL tissue enrichment analysis of the rectal bleeding phenotype revealed a marginally significant enrichment of eQTLs in all GTEx tissues ($p = 0.053$), and a significant enrichment in a priori tissues ($p = 0.002$). The most significantly associated tissues from within the a priori group were Whole Blood ($p = 0.004$), Esophageal Muscularis ($p = 0.02$), Cultured Transformed Fibroblasts ($p = 0.02$), and the Aorta ($p = 0.03$). Tissue-specific pathway enrichment implicated several immune-mediated pathways including Graft vs. Host Disease (corrected $p = 0.0004$, Whole Blood), MHC II protein complex (corrected $P = 3.4 \times 10\text{-}6$,, Esophageal Muscularis), regulation of cysteine-type endopeptidase activity in apoptotic pathways (corrected $P = 0.0085$,

Fibroblasts), and natural killer cell mediated cytotoxicity (corrected P = 0.0004, Aortic Artery). Genes implicated in this analysis include many HLA genes (HLA-A, B, C, G, DBQA1 and DBQB1), caspases (CASP8, CASP3), DAP, PAK1, MICB, and others. SNPs meeting genome-wide significance for their association with autoimmunity traits did not demonstrate significant enrichment in the meta-GWAS of rectal bleeding (p = 0.32).

Conclusion: Our functional analysis of radiotherapy-induced rectal bleeding revealed an array of implicated tissue functions, including in whole blood and transformed fibroblasts, and suggested an inflammatory pathophysiology, although autoimmunity-predisposing SNPs did not significantly associate with rectal bleeding. Further analysis of implicated genes and their functions as well as in vitro or in vivo validation of findings is warranted.

Englert, Calvin

Preceptors
Mark Buckley, PhD
University of Rochester Medical Center
Department of Biomedical Engineering

Evaluation of Corneal Endothelial Cell Viability after Phacoemulsification: Comparing Conventional Phacoemulsification with the Novel Xport Handpiece

Introduction: Cataracts are one of the leading causes of age-related vision loss, and nearly three million cataract surgeries are performed annually in the United States[1,2]. Surgical removal of cataracts utilizes phacoemulsification, which delivers ultrasound (US) energy via a cannulated handpiece tip to pulverize and remove the diseased lens. This procedure has become the preferred and most efficient technique in cataract extraction surgery. However, phacoemulsification can result in loss of corneal endothelial cells (CEC) both intraoperatively and postoperatively. The amount of US energy applied during surgery is directly related to the degree of CEC damage, and pseudophakic corneal edema is still a leading indication for endothelial keratoplasty[2,3]. Conventional phacoemulsification tips vibrate at US frequencies (nearly 40,000 Hz) with small amplitude (approximately 75 microns), which can induce CEC damage via local heating, mechanical force on CECs from cavitation bubbles, and generation of hydroxyl radicals (·OH) from sonolysis[4-11]. The novel Zeiss Iantech Xport phacoemulsification handpiece employs lower frequency vibrations (approximately 1 Hz) and a larger amplitude of tip travel (1 mm) to decrease power generation during phacoemulsification. This reduced power delivery is hypothesized to decrease CEC loss by reducing production of heat, cavitation bubbles, and eliminating formation of hydroxyl radicals (·OH) via sonolysis. The aim of this study is to (i) evaluate CEC viability after phacoemulsification using the Xport phacoemulsification handpiece, and (ii) compare these data to CEC viability data obtained using a conventional phacoemulsification device: the Bausch & Lomb Stellaris phacoemulsification tower.

Methods: A single surgical incision was created at the limbus of fresh porcine globes with a 2.65 mm slit knife. CECs were stained with hexidium iodide and calcein-AM to label CEC nuclei and viable cells, respectively. Subsequently, ophthalmic viscoelastic device (OVD) was injected into the anterior chamber as is currently done in phacoemulsification procedures. The globe was then placed into a custom 3D-printed device that holds the globe cornea-downward for imaging. Pre-treatment CEC images were then obtained using inverted epifluorescence microscopy, capturing 25 axial images of the curved cornea to ensure focused images of the full endothelium were obtained. Specimens were then treated with 20 seconds of conventional phacoemulsification (US 100% power, vacuum 200 mmHg, IV pole 100 cm), Xport phacoemulsification (IV pole 100 cm), or a sham treatment (which consisted of insertion of the phacoemulsification tip in

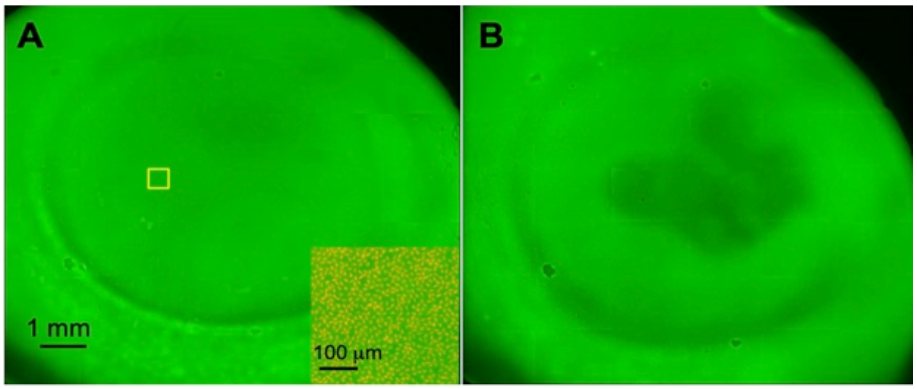

*Figure 1: Fluorescence images of specimen before (**A**) and after (**B**) 20 seconds of Bausch & Lomb Stellaris phacoemulsification. Inset image is the region of the yellow square magnified, demonstrating resolution of CEC nuclei visualized with hexidium iodide stain. Figure courtesy of Dr. Mark Buckley.*

specimen for 20 seconds without application of phaco power). Post-treatment imaging was performed in the same manner as pre-treatment fluorescence imaging. Microscopy images were processed using ImageJ and custom MATLAB scripts to create a single, in-focus image of the endothelium (Figure 1). These processed images were analyzed for changes in CEC viability after each treatment as represented by decrease or loss of calcein-AM signal. Data were subsequently analyzed via unpaired t-test.

Results: The conventional Bausch & Lomb Stellaris phacoemulsification treatments were found to cause significantly more CEC loss after 20 seconds of phaco power relative to sham phaco treatments (Figure 2). The Xport phacoemulsification handpiece was found to cause significantly less CEC loss compared to the Bausch & Lomb Stellaris phacoemulsification (Figure 3). Figure 4 demonstrates side-by-side comparison of Stellaris sham, Stellaris phaco, and Xport phaco treatments.

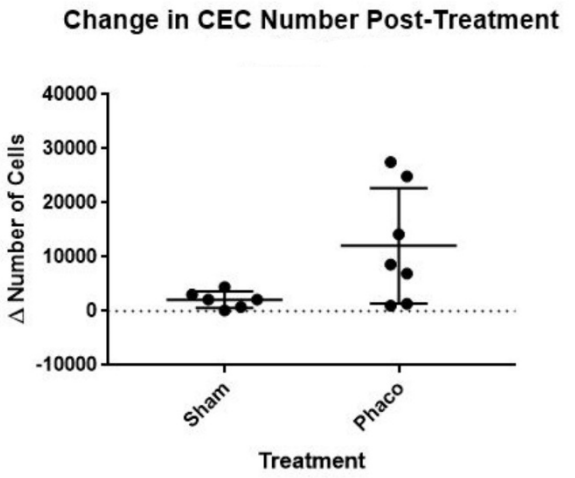

Figure 2: Comparison of Bausch & Lomb Stellaris sham and 20 second phacoemulsification treatments. Bar indicates significant differences ($p<0.05$). n_{sham} = 6, n_{phaco} = 7.

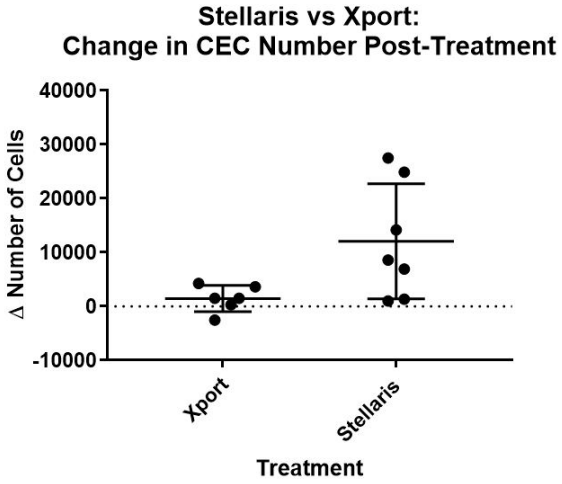

Figure 3: Comparison of Bausch & Lomb Stellaris and Xport 20 second phacoemulsification treatments. Bar indicates significant differences ($p<0.05$). n_{Xport} = 6, $n_{Stellaris}$ = 7.

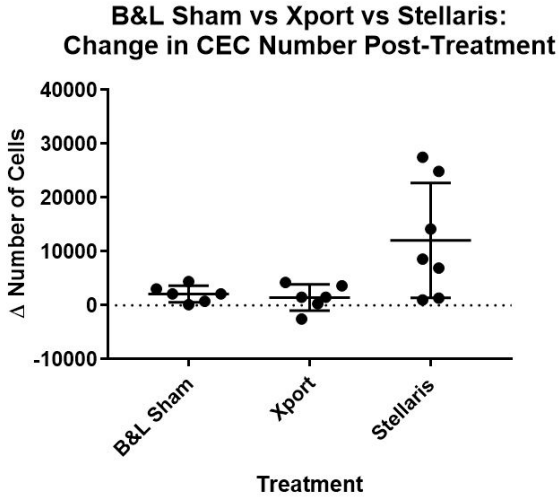

Figure 4: Comparison of Bausch & Lomb Stellaris sham, 20 second phacoemulsification, and Xport 20 second phacoemulsification treatments. Bar indicates significant differences ($p<0.05$). $n_{sham} = 6$, $n_{Xport} = 6$, $n_{Stellaris} = 7$.

Discussion: Drawing on previous work in the Buckley lab investigating CEC loss after mechanical trauma to the cornea[12], this work employs a novel *ex vivo* method for evaluation of CEC loss in response to phacoemulsification across large regions of corneal endothelium. The resulting visualization of endothelium is larger than previous studies: nearly 16 mm^2 versus less than 0.5 mm^2. By avoiding dissection of the cornea, dissection-induced CEC damage is minimized. The result is a platform ideal for evaluating and isolating the effects of varying phacoemulsification handpieces on CEC viability. Our comparison of the Xport handpiece demonstrates a significant reduction in CEC loss compared to a conventional phacoemulsification setup: the Bausch & Lomb Stellaris. More replicates of Xport phacoemulsification will be needed to reinforce this conclusion, but our experimental method will allow for further studies to characterize the nature underlying the observed differences between conventional and Xport phacoemulsification.

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Erlick, Mariah

Preceptor
Megan Moore, PhD
Harborview Medical Center
University of Washington

Co-Author
Monica S. Vavilala, MD
Harborview Medical Center
University of Washington

Incorporating Psychosocial Intervention into a Treatment Algorithm for Severe Pediatric Traumatic Brain Injury

Background: The PEGASUS (Pediatric Guideline Adherence and Outcomes) protocol sought to increase adherence to national guidelines for severe traumatic brain injury (TBI) in pediatric patients by providing an evidence-based algorithm. Severe TBI has major immediate impact on family structure and long-term sequelae for surviving pediatric patients. While the PEGASUS protocol has measurably improved measures of survival to discharge and Glasgow outcomes at discharge for children with severe TBI, quality of life measures and family experience measures have not been formally addressed in the context of this pathway.

Aim: Using provider insight, this project suggested specific psychosocial interventions to improve experiences and outcomes for caregivers of pediatric patients in the Pediatric Intensive Care Unit (PICU) with severe TBI.
Methods: Study design: cross-sectional qualitative study with directed content analysis. Twenty-four (24) healthcare providers were selected using a purposive sampling model based on known involvement in the care of children with severe traumatic brain injury. Providers were selected from the Emergency Department, Pediatric ICU, Acute Care Hospitalization, and Inpatient Rehabilitation. Interviews followed a semi-structured format addressing communication topics, communication process, prognostication, possible interventions, and connecting with vulnerable families. Interview transcripts were qualitatively analyzed using Dedoose.

Results: Healthcare providers across all stages of PEGASUS pathway care reflected opportunities for improvements in psychosocial care in three general domains: (1) presenting a coordinated, clear message to caregivers; (2) improving logistical and emotional burden of care transfers; (3) addressing specific needs and concerns impacting psychosocial outcomes. Within these domains, potential interventions could be further subdivided into structural interventions and interventions involving direct family care.
Conclusions & Recommendations: The three domains should inform the design of an intervention to strategically improve psychosocial care specific to each stage of treatment for PEGASUS patients. Interventions should include systematic prompts to address interdisciplinary care coordination, to prepare caregivers for transfers to the next stage of care, and to formally assess and address psychosocial

needs for every caregiver involved with a PEGASUS pathway patient. Interventions should also include suggestions for methods of family-centered care and trauma-informed, patient-centered communication. Next steps include a pilot study integrating suggested interventions into the PEGASUS pathway.

Farooq, Shamroz

Preceptor
Ahmed Ghazi, MD
University of Rochester Medical Center
Department of Urology

Co-Authors
Michael Witthaus, MD
Patrick Saba
Rachel Melnyk
Jean Joseph, MD

Validation of Clinically Relevant Performance Metrics of Simulation (CRPMS) into a Novel Simulation Platform for Nerve-sparing Robot-assisted Radical Prostatectomy (NS-RARP)

Introduction: Currently, there is limited haptic training for full-procedures in surgery; consequently, many surgeons train on patients in live surgeries to gather experience. This study created a training platform for a nerve-sparing robot-assisted radical prostatectomy (NS-RARP) to provide Urologists a platform to train and evaluate themselves on the performance of the procedure. The goal of this project was to validate clinically relevant performance metrics (CRPMS) in a hydrogel model for the NS-RARP.

Methods: In order to create the simulation platform, anatomically accurate models of the human pelvis, bladder, prostate, urethra, neurovascular bundle (NVB) and relevant adjacent structures were created from a patient MRI using polyvinyl alcohol (PVA) hydrogels and three-dimensional-printed injection molds (Figure 1). Four parts of the procedure were simulated: bladder neck dissection, seminal vesicle mobilization, nerve-sparing prostatectomy and urethrovesical anastomosis (Figure 2). Five experts (>500 caseload) and 14 novices (<50 caseload) completed the simulation. CRPMS evaluated during the simulation included: forced applied to the NVB, surgical margin status, UVA weathertightness, estimated blood loss (EBL), and time of the procedure.

Results: Experts applied less average force (3.00N ± 0.86 vs. 4.13N ± 2.3), and maximum force (11.24N ± 4.38 vs. 13.63N ± 7.78) on the NVB during the simulation than novices. Positive surgical margins were less for experts than novices (20% vs. 77%). UVA leak rates and level of leakage was also lower in experts than novices (80% for experts vs 62% for novices) (86% retention vs. 79% retention). EBL was lower for experts than novices (697mL vs. 732mL). Furthermore, time of the procedure was lower in experts than novices (48min vs. 135min).

Conclusion: This study provides a realistic, feedback-driven, full-immersion simulation platform for NS-RARP that can develop and evaluate surgical skills pertinent to NS-RARP. This model allows for a novel method of training and real-time assessment for surgeons. Further work is being done to assess the ability

of novices to improve on CRPMS with a series of uses of this model. Additionally, further work is being done to correlate the ability of this model to predict live surgical outcomes.

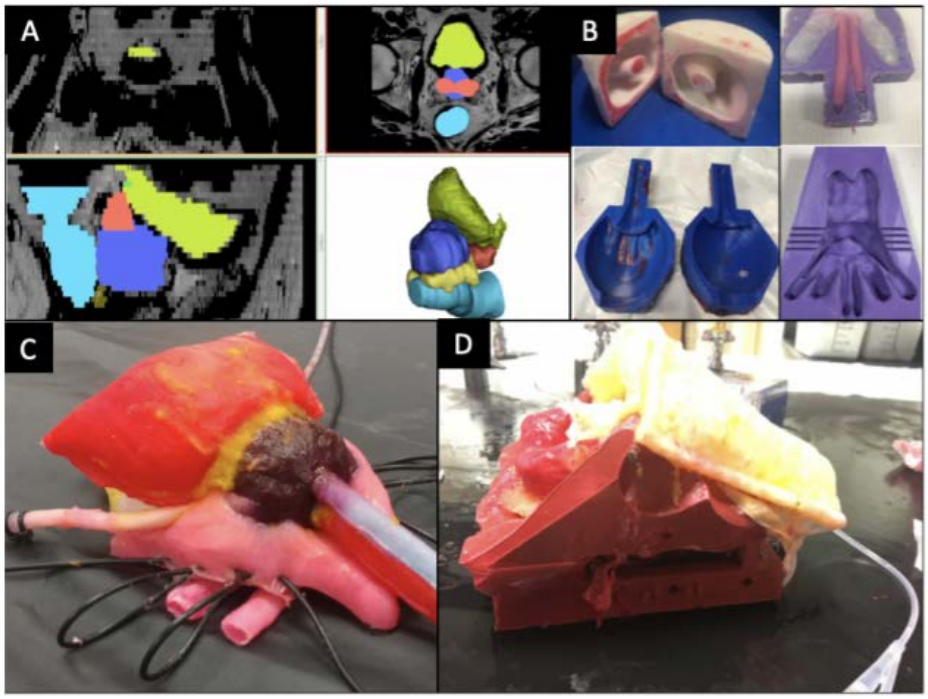

Figure 1: A) Patient-specific computer-aided design (CAD) anatomical model of the prostate and relevant structures.
B) 3D-printed negative molds of the relevant anatomy.
C) PVA organs cast in series to replicate anatomical relationships between various organs.
D) Prostatectomy organ complex fitted with additional PVA hydrogel pelvic floor muscles, pelvic fat, and more relevant structures.

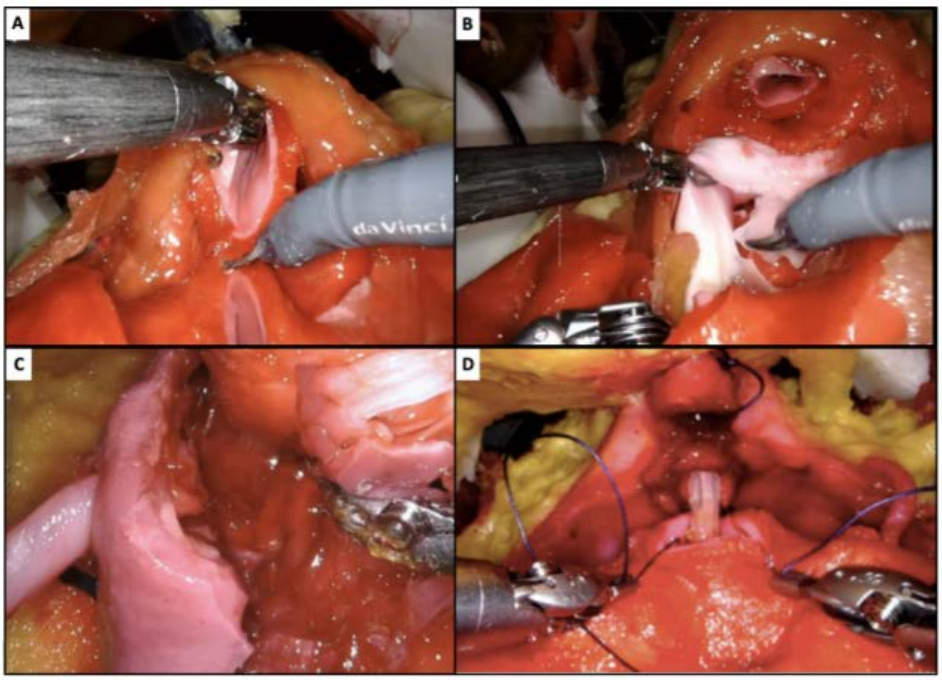

Figure 2: NS-RARP Simulation Tasks.
A) Bladder neck dissection.
B) Seminal vesicle mobilization.
C) Left nerve-sparing prostatectomy.
D) Urethrovesical anastomosis (UVA).

Freter, Robert

Preceptor
Marc Schermerhorn, MD
University of Rochester Medical Center
Department of Vascular Surgery

Co-Authors
Kirsten D. Dansey, MD
Chun Li, MD
Patrick Joslin
Anthony Lim
Beth Israel Deaconess Medical Center
Department of Vascular Surgery

Chronic Limb Threatening Ischemia (CLTI): Validating Survival Predictions in CLTI Patients Who Have Undergone Infra-inguinal Revascularization

Background: Acceptance to post-graduate programs is challenging. Studies have found that participation in specific extracurricular activities, such as emergency department research associate (EDRA) programs, is associated with medical school acceptance. However, little is known about the impact of EDRA program participation to other educational and professional outcomes. We sought to characterize the academic and professional outcomes of participants of an EDRA program and their perception of program influence on career goals and utility to post-graduate program and job applications.

Methods: We conducted a cross-sectional study of graduates of the University of Rochester (UR) EDRA program who graduated from the program between May 2010 and May 2017. EDRAs were recruited by email and/or phone call to fill out a secure, de-identified, online survey. Standard descriptive statistics were used to characterize participant demographics, extracurricular activities, and academic and professional outcomes. National acceptance rates were referenced from online sources.

Results: A total of 88 EDRA program graduates were surveyed with 56 consenting and completing the survey (64% response rate). Forty (71%) identified as female and 17 (30%) identified as non-White, and 3 (5%) identified as Hispanic or Latino. Of 51 respondents, 20 (39%), 4 (8%), 5 (10%), and 3 (6%) are pursuing or have completed MD, DO, physician assistant, and nursing degrees, respectively, after graduating. Four (8%) respondents have occupations in clinical research. Acceptance rates to MD programs, DO programs, PhD programs, and Master programs were 88% (22/25), 92% (12/13), 100% (2/2), and 100% (9/9), respectively. Nationally, acceptance rates are 41%, 34%, 33%, and 42% to MD, DO, physician assistant, and Master and PhD programs, respectively.[1-4] Eighty-three percent (30/36 responses) spoke about the EDRA program during post-graduate program interviews, 78% (35/45 responses) included the EDRA program in their personal statement to post-graduate programs, and 74% (37/50 responses) spoke about the EDRA program during job interviews. Of 55 respondents, 18 (33%) changed their career goals after

participating in the EDRA program. Nine (50%) of these 18 respondents switched their goals from medicine to a different career and 5 (27%) switched their goals to medicine.

Discussion: Many EDRA graduates pursued medicine and related careers and the majority of EDRA graduates used their EDRA program experiences directly in their post-graduate program applications or interviews and job interviews. Acceptance rates of EDRA program graduates to post-graduate programs were higher than national averages. Some EDRA graduates changed their career goals after program participation.

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Gonring, Dakota

Preceptor
John Markman, MD
University of Rochester Medical Center
Neuromedicine Pain Management Center

Co-Authors
Jennifer S. Gewandter, PhD
Maria Frazer, BS, CCRC
Stephanie Northwood, BA
University of Rochester Medical Center

Simplified Pain Evaluation and Communication Tool utilizing the Electronic Record (SPECTER): A Cluster Randomized Quality Improvement Analysis of Electronic Record Communication between Patients and Clinical Staff

The goal of this study was to improve pain assessment quality in the primary care setting by asking patients about the tolerability of their pain. Primary care providers (PCP) in the Rochester hospital network were randomized to either active or control groups. The active group included clinicians whose patients received the pain tolerability question while control group patients did not. Active group patients were asked: "have you been experiencing pain for at least 3 months?". If they responded "no", no other questions appeared; if they responded "yes", the question "Is your pain tolerable?" appeared. The response rate to the tolerability question was too low to evaluate the effects it had on communication. A secondary analysis was performed to evaluate whether opioid prescriptions were related to chronic pain patients' satisfaction with communication. 894 patients with a chronic pain diagnosis in the electronic medical record (EMR) in 2017 were included. Satisfaction with communication regarding pain (0-5 Likert scale) and pain duration (≤3 months vs. >3 months) were obtained via self-report one week after a PCP visit. Chronic pain diagnoses, active prescriptions, and numeric rating scale (NRS) pain scores were obtained from the EMR. An active opioid prescription was not associated with patient satisfaction (opioids were prescribed to 26%, 29%, and 22% of patients who reported they were satisfied, neutral, and unsatisfied, respectively, $p=0.47$). Increased pain severity and duration of >3 months were associated with poorer satisfaction with communication (OR 1.2 95% CI [1.1, 1.3], $p<0.001$; OR 3.1 95% CI [1.2, 7.9]).

Gore, Emily

Preceptors
Tanya Bruckel, MD
Brandon Sprung, MD
University of Rochester Medical Center
Department of Gastroenterology and Hepatology

Co-Authors
Danielle Marino, MD
Krystle Bittner, MPH
University of Rochester Medical Center
Department of Gastroenterology and Hepatology

A Patient-Driven Approach to Improving the Bowel Preparation Experience in Outpatient Colonoscopy

Background: While colorectal cancer (CRC) is the third leading cause of cancer-related deaths in the US, CRC screening with colonoscopy is associated with a 50% reduction in CRC development and a 60-67% reduction in CRC deaths. The diagnostic accuracy of colonoscopy is in part predicated upon adequate bowel preparation quality to ensure satisfactory visualization of colonic mucosa. The patient experience with bowel preparation can be influential in achieving successful population-wide screening program utilization and improving the diagnostic accuracy of screening colonoscopy.

Objectives: We aimed to assess whether the patient experience with bowel preparation influences preparation quality and determine patient-perceived challenges to the preparation process, as well as patients' suggestions for future avenues of improvement.

Methods: We administered post-preparation pre-procedure surveys at the Sawgrass outpatient endoscopy center. Patients rated their experiences using a 5-point Likert scale in response to a series of statements. Patients were then able to select from a list of suggested resources, voice concerns about their preparation, and provide open-ended recommendations for URMC staff. We then retrospectively reviewed electronic health record procedure-related data.

Results: In the sample size of 95 patients, overall bowel preparation quality was excellent (mean total Boston Bowel Preparation Scale (BBPS) score = 8.58/9.00). Most patients were successful in achieving adequate preparation and reported good understanding of the written preparation instructions (mean: 4.65 (on a scale of 1-5)). Patients reported less ease remembering the various components of the preparation instructions (mean: 4.39) and integrating the regimen into their schedules (mean: 4.01). When asked whether additional resources would have improved patients' experiences, text message and phone reminders constituted 61% of reported suggestions. A total of 34.7% of participants responded that they would have appreciated reminders.

Conclusions: Though objective measures of bowel preparation (as assessed via the BBPS) in this generally healthy outpatient population were better than anticipated, the self-reported data suggest that implementing a system of text message and phone reminders could be a beneficial avenue for improving the convenience of bowel preparation instructions and overall patient experience with colonoscopies, hopefully contributing to wider utilization of CRC screening colonoscopies.

Griffin, Christian

Preceptor
Scott Hartman, MD
University of Rochester Medical Center
Department of Family Medicine

Co-Authors
Jennifer Rutz, MD
Alexandra Licona, MD
Adrian Martinez, MD
University of Rochester Medical Center
Department of Family Medicine

Primary Care Education: Management of Pre-Exposure Prophylaxis for HIV
A Survey of Healthcare Providers' Knowledge of PrEP

Based on HIV Pre-Exposure Prophylaxis (PrEP) prescriptions that are filled by commercial pharmacies in the United States, a CDC 2018 analysis demonstrated that only a small percentage of the individuals who could benefit from PrEP are actually receiving this important intervention.1 When PrEP is taken consistently, the drug combination has been shown to reduce HIV transmission among high risk populations by 92%.2 Additionally, a study in 2017 demonstrated that clinicians have been slow to utilize PrEP, and that concerns surrounding efficacy and long-term safety of PrEP and perceived barriers to prescribing PrEP could possibly limit prescribing behaviors and intentions.3 We performed this study to assess healthcare providers' knowledge of PrEP, as well as their concerns and perceived barriers to offering PrEP.

Methods:
We administered a 31-question "PrEP Survey" to 33 clinicians in the Rochester, New York area that provide primary adolescent and adult care, of whom none are involved in HIV care on a regular basis. This survey was completed within the context of educational presentations given to the providers on PrEP prescription and management in the primary care setting. We will use descriptive statistics to describe the following outcomes:

1. Determine the extent of healthcare providers' knowledge and utilization of PrEP or the lack thereof
2. Identify healthcare providers' barriers to prescribing PrEP

Results:
Of the 33 clinicians surveyed, we found that 18.8% had prescribed PrEP before but only 3 (9.7%) were currently managing PrEP patients. 45.2% had recommended PrEP before and 32.3% had been asked for PrEP by a patient. While 41.9% report having discussed safer sex practices with 6-25 patients in the past month, 96.8% had discussed PrEP with fewer than 5 patients, indicating that PrEP may not be a regular part of these discussions. Providers reported that the most challenging obstacles in providing PrEP in

their practice were provider training, short appointment times, and difficulty determining appropriate PrEP candidates. When asked what they would do if a patient required PrEP, 16.1% were unsure of how to proceed. The most commonly reported patient barriers to accessing PrEP were a lack of awareness and misconceptions about PrEP, fear of judgement or for personal safety, perceived cost, finding a PrEP provider, and potential side effects.

Conclusions:
Provider training was cited as the largest barrier to providing PrEP in these practices. After a brief 20-minute presentation outlining the management of PrEP patients, providers performed well on a quiz designed to check their knowledge. Once the basic clinical knowledge is shared, the remaining barriers to providing PrEP lie in integrating the care into the standard procedures of the practice. Our results indicate that PrEP may not be a regular part of sexual health conversations in many practices. Regularly taking full and non-judgmental social and sexual histories is a way to ensure that patient fear of judgement does not prevent the identification of a PrEP candidate. In 2019 the USPSTF implemented an A rating for the use of PrEP in patients at high risk for contracting HIV.4 No one screening device has been authenticated, but even simple questions such as "Are you worried about becoming HIV positive?" or "Did you know that there was a pill you take every day that can help prevent HIV infection?" can be an easy entry into a conversation about PrEP. Other members of the care team must also understand PrEP management, so that navigating insurance and appointment scheduling can become part of the full workflow of a practice. If a clinician does not feel comfortable prescribing PrEP, a workflow to refer patients to an available PrEP provider can be established in the practice. The results above suggest that continued efforts to educate primary care providers in the management of patients using PrEP are needed to connect PrEP candidates to access. The results will be used to identify gaps in the information presented to make adjustments in future presentations. We will continue to identify new practices in the Rochester area to whom we could give our presentations with the aim of expanding access to PrEP among at-risk populations.

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Hancock, Sarah

Preceptor
Jason Rotoli, MD
University of Rochester Medical Center
Department of Emergency Medicine

Co-Authors
Courtney Jones, PhD, MPH
Steve Barnett, MD
Jeremy Cushman, MD
Kristen Larsen
Kevin Dillion
University of Rochester Medical Center

Pre-hospital EMS Communication Barriers and the Deaf ASL User

In the prehospital setting, the Emergency Medical Services (EMS) personnel are tasked to quickly and effectively evaluate the patient while communicating with him or her to gather necessary information for proper treatment and transitioning to the hospital setting. For this transfer to occur effectively, communication between the EMS personnel and the patient is critical. The Deaf American Sign Language (ASL) user—like any patient with limited English proficiency (LEP)—face barriers of communication, resulting in suboptimal care. Due to the lack of access to translators in the pre-hospital setting, we aimed to develop a communication tool that EMS providers could use in their practice to help improve communication with the Deaf patient.

Utilizing focus groups comprised of EMS providers and Deaf Health community partners, we created a set of bound laminated cards that allows for bidirectional communication. The cards are designed not only to help gather information from the Deaf patient, but also help the EMS provider explain to the patient what interventions may be required (e.g. blood pressure, oxygen mask) (Figure 1). Each set of laminated cards is accompanied by a dry erase marker to allow for written notes if that is the preferred communication strategy as determined by the Deaf patient. In addition to this communication tool, we developed a multimedia, educational training module that provides information regarding general knowledge of Deaf culture, communication strategies, and a demonstration of proper utilization of a communication tool (Figure 2). The educational module utilizes several teaching modalities, including text, audio, videos, and knowledge checkpoints.

In this study, we aim to assess the comfort level of EMS providers when they are caring for Deaf patients in the prehospital setting along with analyzing the effectiveness of a subsequent training module and communication tool for these providers. After completing a pre-survey of initial comfort level, EMS providers were prompted to complete the training module and were then prompted to take an immediate post-module survey (Figure 3). Upon completion of the two surveys and training module, the EMS providers were asked to utilize the communication tool (i.e. laminated cards), which had been distributed

to EMS agencies in the greater Rochester area, for the following three months. After the three-month trial period, a third survey was administered to assess comfort level along with the effectiveness of the communication tool and educational module.

To compare the baseline knowledge, comfort, and communication methods, data from general EMS providers are compared to EMS providers from Rochester Institute of Technology Ambulance (RITA)—an agency that cares for a higher proportion of Deaf ASL users because of their affiliation with Rochester Institute of Technology and the National Technical Institute for the Deaf.

The initial surveys, educational module, and communication tool were sent out to EMS agencies in the month of August 2019. Data have been continuously collected but have not yet reached our goal sample size of 150 EMS providers; therefore, data analyses have not yet commenced as to avoid data peeking. Once all the data are collected following the three-month trial period with the communication tool, we will conduct bivariate analyses to compare knowledge and comfort between the general EMS providers from RITA. Additionally, we will conduct paired analyses to assess differences in knowledge and comfort pre- and post-intervention among only non-RITA EMS providers.

Harrison, Bailey

Preceptor
Ajay Kuriyan, MD, MS
University of Rochester Medical Center
Flaum Eye Institute

Refractive outcomes of anterior chamber intraocular lens implantation

Purpose: The purpose of this study was to evaluate refractive outcomes after anterior chamber intraocular lens (IOL) implantation.

Methods: This was a single center, retrospective series of consecutive patients who underwent anterior chamber IOL implantation. Patients who had undergone anterior chamber IOL implantation at the Flaum Eye Institute/Strong Memorial Hospital in the E-record system between 10/28/11 and 2/28/18 were identified using CPT codes. Clinic charts, operative reports, and pre-operative IOL calculations were reviewed. Post-surgical data was collected at the 1-month follow up. In patients with longer follow up periods, additional data was collected at the 3, 6, and 12-month intervals. The pre-operative IOL targets and post-operative spherical equivalent refractive outcomes were collected and compared. The pre-operative IOL targets were identified based upon the IOL power calculation formula used and the power of the IOL implanted. Post-operative refractive outcomes were collected using the spherical equivalent of the last manifest refraction. The main study outcome was the prediction error, defined as the difference between the pre-operative refractive target and the post-operative refractive outcome.

Results: Seventy-one patients who underwent anterior chamber IOL surgery were identified to meet inclusion criteria. Of these 71 subjects, 35 had a post-operative refraction in the medical records. Average postoperative spherical equivalent (SE) was -0.35 +/- 1.25 diopters (D). Average prediction error (postoperative SE refraction minus target refraction) was 0.31 +/- 1.00 D. Of the 35 subjects, 13 (37%) had post-operative refractions that were within +/- 0.5 D of the pre-operative target refraction, and 24 (69%) were within +/- 1.0 D of the target. Three subjects (9%) had outcomes more than -1.00 D more myopic from the target post-operative refraction. Eight subjects (23%) had outcomes over +1.00D more hyperopic than the pre-operative target refraction.

Conclusions: In the current series, 13 subjects (37%) had a more myopic refractive outcome than anticipated. Twenty-two subjects (63%) had a more hyperopic result than the target pre-operative refraction. Thirteen subjects (37%) had a postoperative SE refraction within 0.5 D of the target, and 24 (69%) were within 1 D of the target refractive error.

Haynes, Joseph

Preceptor
Edward Vates, MD
NYU Lagone Medical Center
Department of Neurosurgery

Co-Authors
Omar Tanweer, MD and Monica Mureb

Middle Meningeal Artery Embolization for Chronic Subdural Hematoma: A Novel Analysis of Treatment Effectiveness

Background: Standard surgical interventions for chronic subdural hematomas (cSDH) have high recurrence rates. We now know that inflammatory processes as well as neovascularization of the dural membrane play a significant role in the maintenance of cSDH. Studies of the hematoma capsule show that the outer membrane has a network of rapidly growing microcapillaries and abnormally dilated sinusoids which leak and facilitate the hematoma formation and maintenance. This neovascularization has been shown to be connected to dural branches of the middle meningeal artery (MMA). Thus, theoretically MMA embolization would reduce the maintenance of the hematoma membrane. Recently, MMA embolization for cSDH has become a popular treatment proving to be more therapeutically effective than conventional surgical and medical management. Several studies show significantly reduced recurrence rates of cSDH in patients who are treated with MMA embolization. In diagnosis of cSDH, non-contrast head CT is often used. In practice and so far in the literature, the size of the infarct is typically reported as a measurement of maximum diameter or as a volume calculated using maximum diameters, the ABC/2 method.

Objective: The manual tracing method has been traditionally held as a gold standard in the precise calculation of volumes on CT but it proves to be time consuming. We describe our experience with using MMA embolization for the treatment of cSDH and a precise analysis of hematoma volume reduction using the manual tracing method.

Methods: We conducted a retrospective chart review of all patients who underwent MMA embolization for cSDH. Patient demographics and hematoma volume were collected. Hematoma volume was measured before and after MMA embolization, as well as at 3- and 6-month follow-ups using a manual tracing method. Hematomas were manually outlined on each slice of the axial non-contrast head CT and the sum of measurements were multiplied by the thickness of CT slices.

Results: 30 patients with cSDH were treated via MMA embolization. The mean reduction in volume at last follow-up after treatment was found to be 70.4%.

Conclusion: MMA embolization for cSDH continues to be safe, feasible, and effective.

Hyun, Jinsol

Preceptor
Igor Gosev, MD
University of Rochester Medical Center
Department of Surgery

Implementing a Healthy Living Program at Local High Schools to Address Preventative Care in Adolescents

In the 2017 "Youth Risk Behavior Survey Report" for the Rochester City School District, only 16% of students reported an hour of physical activity daily for the last seven days. There is growing evidence that higher levels of physical activity and healthy diets are important factors associated with a decrease in risk all-cause mortality for adolescents. Additionally, there has been a rise in the last few decades in incidence of chronic health conditions, such as diabetes and hypertension, in school-aged children. The goal of this project was to create a curriculum that addresses topics that include not only those regarding the current daily requirements of diet for adolescents, but also those related to sexual health and substance abuse. Topics covered in the curriculum were determined largely after communicating with various leaders from community organizations working with adolescents, school nurses, educators, and from the results of the "Youth Risk Behavior Survey". The curriculum follows national guidelines provided by the CDC and the American Institute for Cancer Research (AICR), and is closely adapted from the current Promote Health, Prevent Cancer curriculum sponsored by Wilmot Cancer Institute. A pilot program will be implemented at East High to assess the efficacy of a school-based, preventative health program. At the end of the program, participants will be asked to complete a post-survey, which assesses the amount of changes that were implemented in their daily habits. This will be compared to the initial, pre-survey that will be administered at the start.

Jiao, Cindy

Preceptor
Holly Russell, MD
University of Rochester Medical Center
Department of Family Medicine

Co-Author
Amy Harrington, MD
University of Rochester Medical Center
Department of Obstetrics & Gynecology

Menstrual Stigma and Alternative Menstrual Products Across Socioeconomic Backgrounds

Statement of rationale and objectives: Many women do not speak with their families, friends, or doctors about how menstruation impacts their life.[1] Studies have shown that society normalizes women's pain and stigma around menstrual issues, and health care providers may sometimes lack awareness about menstrual health issues in patient discussions.[2] There is very little research surrounding patients' and health care providers' knowledge of menstrual cups and reusable menstrual products, resulting in an information gap where counseling about menstruation and menstrual products during routine appointments could be a beneficial intervention.

Objective: To understand more about women's knowledge and attitudes around reusable menstrual products and to study if there is any correlation between various socioeconomic factors (including age, race, education, income, zip code, gender identity) and beliefs surrounding menstruation and reusable menstrual products.

Methods: *Question survey asking about socioeconomic factors (age, race, highest level of education, household income and size, zip code) and menstrual stigma. Questions focused on subjects' opinions on reusable menstrual products and behaviors surrounding conversations about menstruation. We use a mixed method of quantitative survey questions with space to expand and an option for an interview.

Findings:
Preliminary Data: 65 participants completed the survey, 1 participant completed the interview. Age range 18-over 60, median age 30-44. 36.9% of patients had income below $20,000. 1.5-9.1% of subjects had used reusable menstrual products in their lifetime, despite 59.1% of subjects having heard of them. 74.6-77.8% of subjects were not interested in using reusable menstrual products, and of the subjects that answered accordingly, 30.4-35.3% of subjects cite the primary reason as, "Don't want to try anything different." 37.3%-48.9% of subjects also expanded on their reasoning with common themes such as, "Sounds gross," and, "Don't want to risk the money if it doesn't work."

Conclusions: Despite increased options and availability of reusable menstrual products, preliminary data suggests that there is a reluctance across socioeconomic backgrounds to use reusable menstrual products. This reluctance could be due to general lack of knowledge, lack of need or incentive to change products, or related to the cultural stigma surrounding menstruation. Further studies could address this by educating more on products, or subsidizing for the cost of products which may be a prohibiting factor.

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Kazi, Basil

Preceptor
Fahad Saeed, MBBS
University of Rochester Medical Center
Department of Medicine

Educational Disparities in Goals of Care among Patients Receiving Maintenance Dialysis

BACKGROUND: Nearly 500,000 US adults receive maintenance dialysis each year. Many of these patients experience diminished health-related quality of life and limited life expectancy raising questions about the wisdom of dialysis initiation. Patients with lower educational attainment are more likely to choose aggressive, burdensome treatment near their end-of-life. However, there is scarcity of literature on dialysis patients' attitudes and preferences towards palliative versus life-extending approaches and if they receive goal-concordant care.

METHODS: We surveyed 171 patients (response rate = 171/305 i.e. 56%). One hundred sixty-five responded to all the questions needed for analyses. To assess treatment plan preferences, we asked: "If you had to make a choice at this time, would you prefer a plan of medical care that (a) focuses on extending life as much as possible, even if it means having more pain and discomfort, or would you want a plan of medical care that (b) focuses on relieving pain and discomfort as much as possible, even if that means not living as long?" To assess goal-concordant care, we asked: "How strongly do you agree or disagree that your current treatment plan meets your preference indicated above?" Response options were (1) strongly disagree, (2) disagree, (3) slightly disagree, (4) slightly agree, (5) agree or (6) strongly agree. A Multivariable regression analysis examined the association of education level (above or below high school) with the two questions while controlling for gender, race, and age.

RESULTS: Nearly 68.3% of patients preferred a palliative approach. A higher proportion of patients with low education wished to receive a palliative approach (78%) compared to those with high education levels (58%) (OR:2.59, CI:0.34-0.56, p=0.006). This association was significant after controlling for confounding factors. Only 43.8% of patients who preferred a palliative care approach perceived their current treatment plan to align with their preferences. However, the association between education and treatment plan preferences was not significant after controlling for confounding factors (OR:0.974, CI: -0.15-0.905, p=0.16).

CONCLUSIONS: We found educational attainment is associated with dialysis patients' preferences for a palliative approach but not with the receipt of goal-concordant care. Our study raises questions if patients with low education level were truly informed about a palliative approach. Future studies are needed to compare symptom burden and palliative care knowledge between the patients with high vs. low educational attainment.

Knight, Leanna

Preceptor
Katherine Greenberg, MD
University of Rochester Medical Center

Co-Authors
Christopher Mooney, PhD
University of Rochester Medical Center

Frank Dowling, MD
Amy Wiser, MD
Oregon Health Science University

Danielle Satow, PA-S
University of Washington

Caring for Patients that Identify as Transgender: Lab Values and the Role of Patient Encounter Documentation in Enabling Research and Patient Care

Background: The number of patients who are self disclosing their gender identity to providers is growing. While guidelines for transgender health have been published (e.g., WPATH), reference intervals for individuals on hormone replacement therapy have yet to have been established, despite the increasing need. Hematological and lipid labs are critical values whose reference intervals are based on the gender of the patient. Hemetological and lipid values can be affected by the introduction of exogenous sex hormones like hormone therapy (HT). Current research in HT suggests MtF patients higher triglycerides (TG) are recorded relative to cisgender women while red blood cell count (RBC), hemoglobin concentration (HGB), hematocrit (HCT) are decreased. For FtM patients increases RBC, HGB, HCT, serum TG levels and LDL-C were seen. Research on men has shown a possible increase in cardiovascular incidence, hospitalization, and death. It is not clear if this data can be used to make conclusions about this population given their differences in physiology and dose. The concern is that if the hematological, lipid, and other laboratory values exceed an unknown acceptable range patients may experience poor health outcomes. The question asked by this study is, is the mean laboratory range for hematological labs for a person on HT the same as their affirmed gender's reference range? This research will attempt to answer the question of what if any reference intervals could be created for these populations.

Experiments/Methods: Researchers performed a retrospective chart review of Oregon Health Science University patients who had received care in a family medicine clinic in the last 5 years. 861 patients were identified in the OHSU system. Patients were then screened against inclusion and exclusion criteria. 3 of the patients most recent labs were collected per patient and correlated with hormone levels and confirmed HT within 7 days of lab draw.

For the hematological study a total of 150 FtM patients and 57 MtF patients were included. A total of 271 FtM and 76 MtF hematological labs were collected. For the lipid study a total of 77 FtM patients and 63 MtF patients were included. A total of 113 FtM and 82 MtF lipid labs were collected. For the prolactin study a total of 3 FtM patients and 43 MtF patients were included. A total of 3 FtM and 53 MtF prolactin labs were collected. Reason for exclusions are being split into 5 categories: smoked during time of blood draw, does not appear to identify as transgender or nonbianary, hormone therapy (examples: dose outside accepted range, not on HT during lab draw), disease or is on a medication that is exclusionary, or insufficient charting.

Surprisingly, insufficient charting made up the largest portion of our exclusions. Numerous patients often qualified for our study, but were not included because of what we call common errors of documentation. Common errors in documentation include no listed HT start date; missing medication dosage information for lab value time period; and conflicting documentation. The information and location within the chart of patient information varied substantially between providers. This lead to unanticipated difficulties in collecting the data. Team members were required to read years of chart notes to find inclusion and exclusion criteria, if present, due to this disparity in charting.

Results: Data for this study is still being analyzed and preliminary results will not be as specific as final results. One of the largest factors identified so far effecting this study is the completeness of documentation of transgender patients charts. Assessing the quality of documentation, while not the goal of our study, has become a secondary objective for our team. When the details of a patient's medical condition and treatment are not documented or not documented clearly, it may hinder future care of that patient. The results of the laboratory values research will be used to inform the current guidelines and will be of use to those seeking gender affirming care as well as their providers.

Table 1. Female to Male and Male to Female: Number of patients enrolled and values collected per study.

FtM	*CBC*	*Lipid*	***MtF***	*CBC*	*Lipid*
Total #patients	150	77	Total #patients	57	62
Total # Labs	271	113	Total # Labs	76	82

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Kozakiewicz, Lauren

Preceptor
Katherine Jackson, MD
University of Rochester Medical Center
Department of Surgery

Co-Authors
Luis Ruffolo, MD
Alexander C. Chacon
Rachel Jewell
Brian Belt
David C. Linehan
Glynic A. Scott
Peter A Prieto
Shuyang S. Qin
University of Rochester Medical Center
Department of Surgery/Department of Pathology/Wilmont Cancer Institute

"Picomets": Assessing Single and Few Cell Metastases in Melanoma Sentinel Lymph Node Biopsies

Background:
Lymph node involvement is a significant prognostic factor for melanoma. Both the number of positive nodes and nodal disease burden affect survival, and clinically occult disease (micrometastases) imparts a better prognosis than grossly abnormal nodes. However, the significance of degree of micrometastatic disease is less clear. Additionally, the designation of a "positive" node is sometimes uncertain. The frequency and appropriate management of nodes with single or few potential tumor cells has remained largely undescribed, and without general consensus. Some have advocated for treating these patients as node negative (N0). In the era of observation in lieu of completion lymph node dissection (CLND), there is a need for accurate prediction models in these unique patients. Gene expression profiling (GEP), which utilizes tumor cell genes expression to predict risk of recurrence or metastasis in early stage melanoma patients, may be able to further augment clinical decision making in this cohort.

Methods:
We reviewed 752 patients with melanoma who underwent lymph sampling at the time of primary melanoma resection at our institution between 2004 and 2018. We deemed patients who had one single lymph node with 1-4 cells staining positive for either Melan-A or Sox-10 as having "picomets." We examined the initial pathological features, subsequent management and clinical outcomes. GEP results, if performed, we're noted.

Results:
Thirty-three patients met criteria for having picomets. The mean follow up was four years. Nodal staging varied, and overall stage ranged from IA to IIIB. No patients had metastatic disease at time of diagnosis. One patient received radiation therapy and three received adjuvant systemic therapy, two of whom underwent a CLND. No patients who underwent CLND had subsequent recurrent disease. Of the 29 patients undergoing observation only, 3 experienced disease recurrence at 273, 593 and 2245 days. One patient had local recurrence, and was treated with surgical excision. One patient had nodal and distant recurrence, and was treated systemically with immunotherapy, and has since progressed. One had distant recurrence and died of disease two days after detection of recurrence. Gene expression profiling (GEP) was performed on two patients, who were deemed Class I low risk, and neither has had recurrent disease.

Conclusion:
Although patients with sentinel node "picomets" had seemingly better outcomes than reported stage matched cohorts with N1 disease, not all had a benign natural history. Some may have benefited from CLND. There may be a role for GEP testing in this cohort. A larger population of patients that meet criteria for picomets is needed to draw further conclusions.

Kruger, Joel

Preceptor
Clive S. Zent, MD
University of Rochester Medical Center
Department of Pathology and Laboratory Medicine & Wilmont Cancer Institute

Co-Authors
Philip J. Meacham, MS
Mushal Noor, MD
Andrew Evans, MD, PhD
University of Rochester Medical Center

Histoloagic and Cytologic Changes Associated With Ibrutinib Failure or Partial Response in CLL Patients

Introduction: In the United States, the most prevalent lymphoid malignancy is chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL). Previous studies report that approximately 2% to 20% of all CLL patients develop a more aggressive lymphoid neoplasm, the most common (~90%) of which is histological transformation to diffuse large B-cell lymphoma (DLBCL) at a rate of 0.5% per year. However, accelerated CLL is an understudied histologic manifestation of clonally related CLL marked by diffuse proliferation centers in lymphoid tissue and bone marrow. Anecdotal data suggest that CLL patients treated with Bruton's tyrosine kinase inhibitors (BTKi) could be at increased risk of developing clonal accelerated phase CLL. We aimed to identify cases of accelerated CLL from a larger database and to describe the mutational and demographic characteristics.

Design: Of 587 CLL patients who visited our cancer center (May 1, 2000 - July 1, 2019), we identified 221 patients treated with at least one BTKi. We identified two treatment response groups: ibrutinib stopped due to treatment failure (17 patients), and partial response (56 patients). In these groups, we identified 13 and 12 cases, respectively, where peripheral blood, bone marrow, or lymph node biopsy specimens were available after initiation of ibrutinib therapy, in which any atypical or aggressive histologic features had been identified. The slides were re-reviewed by 2 pathologists and histologic and molecular findings were correlated with demographic, clinical, treatment, and outcome data.

Results: In the treatment failure group, 2/13 patients were excluded due to Richter's transformation to DLBCL. Of the remaining 11 CLL patients, molecular data on ibrutinib resistance mutations in BTK or phospholipase C gamma2 (PLCG2) genes was available for 10 patients; only 2 had mutations in the BTK gene. Common histologic findings in the ibrutinib failure group were: increased number of large cells/prolymphocytes, diffusely expanded and/or coalescent proliferation centers, and high mitotic rate/Ki67 index.

Conclusion: In CLL patients treated with ibrutinib, histologically aggressive features of "accelerated" CLL may occur with disease progression. These features can cause diagnostic uncertainty, especially with

regards to distinguishing potential Richter transformation. How these morphologic features should be classified in the setting of ibrutinib failure is an area warranting further investigation to better inform prognosis and management decisions.

Lambrych, Matthew

Preceptor
George Edward Vates, MD, PhD
University of Rochester Medical Center
Department of Neurological Surgery

Co-Authors
Darren Orbach, MD, PhD
Leopold Arko, MD, PhD
Boston Children's Hospital
Department of Neurointerventional Radiology

Early Predictive Indicators of Clinical Course for Patients with Vein of Galen Aneurysmal Malformation

Background: Vein of Galen aneurysmal malformations (VGAM) are rare cerebrovascular malformations characterized by arteriovenous fistulae that arise principally from choroidal arteries draining directly into a persistent prosencephalic vein of Markowski. Neonates born with VGAM may present with significant cardiac distress and early parenchymal brain injury. In this cohort of patients, the mortality rate is 50%, and urgent embolization is required. Persistent adverse neurological sequelae in survivors are common. In this study, vascular dimensions on fetal and neonatal MRI scans were evaluated for predictive indicators of urgent neonatal intervention or death in patients with VGAM.

Method: Patients with VGAM who received fetal and/or early neonatal MRI from 2007-2018 at a single tertiary referral center were evaluated. 18 anatomic vessel parameters were measured to identify possible correlation with neonatal death or urgent embolization (neonatal at-risk cohort, NAR) versus survival of treatment in infancy (infantile treatment cohort, IT). Backward elimination (likelihood ratio) binary logistic regression was applied to identify predictors of placement into the NAR cohort, with area under the curve (AUC) used to determine predictive accuracy. Univariate and multivariate analyses for fetal and early neonatal MRI parameters were completed separately and together.

Results: Patients with early neonatal MRI included 21 patients in the NAR cohort, and 11 patients in the IT cohort. Maximal diameter (AUC = 0.838, 95% CI: 0.692-0.984, $P<0.001$) and circumference (AUC = 1.00, 95% CI: 1.00-1.00), $P<0.001$) at the narrowest point of the straight/falcine sinus were found to be highly predictive. RICA diameter (AUC = 0.840, 95% CI: 0.697-0.983, $P<0.01$) was also found to be predictive. ROC curves demonstrated the maximal diameter (>7.5mm) and circumference (>33.9mm) at the narrowest point of the straight/falcine sinus, as well as diameter of the RICA (>3.4mm), predicted placement in the NAR cohort based on early neonatal scans. Of the 32 patients with early neonatal MRI, 16 patients also had available fetal MRI scans, with 11 NAR patients and 5 IT patients. Vascular parameters were attained when possible, though there were notable difficulties attaining measurements for multiple parameters due to skull base artifact. The maximal diameter (AUC = 0.964, 95% CI: 0.877-1.00, $P<0.001$) and circumference (AUC = 1.00, 95% CI: 1.00-1.00, $P<0.001$) at the narrowest point of the straight/falcine

sinus were found to be highly predictive. Using a ROC curve, predictive cut-offs for maximal diameter (>7.87mm) and circumference (>38.01mm) at the narrowest point of the straight sinus were assessed.

Conclusion: Measurement of select vascular parameters on fetal and early neonatal MRI revealed significant differences between the NAR and IT cohorts. On both fetal and neonatal MRI, maximal diameter and circumference at the narrowest point of the straight/falcine sinus was found to be highly predictive of placement into the NAR cohort, and should be considered for use in early prognostication.

Lander, Richard

Preceptor
Christopher Mooney, PhD, MPH
University of Rochester Medical Center

Grit Assessment in Medical School Students

Introduction
The medical school curriculum is a challenging and laborious four years, which includes rigorous course work and United States Medical Licensing Examinations (USMLE). There are different ways to measure students' abilities, intellectual and grit, amidst the inherent challenges of medical school. Intellectual talent is garnered through the medical school application process. Medical school has long emphasized the importance of knowledge assessment as a means of determining student readiness and resiliency needed for medical school. Grit, which is not knowledge assessment but is a psychological construct that combines elements of passion and perseverance to achieve long term goals, can now be measured. A grit score will add merit and an additional dimension to a student's application. Additionally, grit is a malleable construct that is able to be changed throughout life. This study sought to examine grit in medical school students at the University of Rochester School of Medicine and Dentistry (URSMD). Despite emerging evidence linking grit with performance success in medical education training, no studies have shown that grit is a fluid value that is possible to change over time in medical school education. In this study we looked to examine the fluid grit score between different medical school classes. This would allow for the understanding of how medical school education influences grit score. As graduate students tend to have more grit than undergraduate students, it is hypothesized that grit in medical students may change significantly over the four years of education.

Methods
To assess grit in medical students, we distributed a survey to all URSMD students in the classes of 2019, 2020, 2021, and 2022. The survey included a 12-item grit scale–adapted from www.angeladuckworth.com. The survey also included relevant socio-demographic measures and education-related variables (e.g., specialty area of interest, degree program, etc.). Descriptive statistics (means, standard-deviations) were utilized to describe and summarize the grit score between classes. Bivariate analysis was used to understand associations amongst different variables in the survey. The other variables allowed for the comparison of grit with students taking a year out for research compared to currently enrolled students, students having another degree besides a BS or BA degree, and students' future interest in specialty, specifically comparing surgical to non-surgical interests.

Results
The data was analyzed using RStudio. For all students that participated in the study (N=146) the mean (SD) grit score was 3.75(0.5). The breakdown of each medical school class is as follows: class of 2022(N=68) 3.74(0.54), class of 2021(N=25) 3.60(0.42), class of 2020 (N=35) 3.80(0.44), class of 2019 (N=6) 3.85(0.57), MD/PhD year (N=4) 4.08(0.12), and research year (N=12) 3.94(0.58). It was determined that grit was not significantly different between medical school classes (P=0.315) or by student age. Analysis comparing

grit scores by procedural and non-procedural interest revealed no variations in grit scores (P=0.825). Students who are currently taking a year out to conduct research (P=0.096) displayed no evidence of a different level of grit from students who were are currently enrolled. Students with another degree additional to a BS or BA showed a nonsignificant difference in grit score (P=0.18).

Discussion

Contrary to prior studies (Duckworth, 2016) that have shown that grit should significantly increase in groups of people with multiple degrees and increase with age, our study revealed that this may not apply to medical students in different classes and of different ages. Additionally, our population was more homogenous with respect to age and education when compared to prior studies. Also noteworthy is that our results indicated that scores are consistent across classes and there does not appear to be grit differences in specialty interest areas. While the results were not what the researchers hypothesized the researchers are looking to expand the project to multiple medical schools to examine whether results are generalizable to other institutions. Furthermore, work is ongoing to enhance our understanding of how grit changes over time in a defined sample.

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Lennon, Clare

Preceptor
Bala Bhagavath, MBBS
University of Rochester Medical Center
Strong Fertility Center

NovaSure Global Endometrial Ablation Reduces Menses Blood Loss Similarly with Preoperative Hysteroscopy as with Pre-op and Post-op Hysteroscopies

Menorrhagia, defined as blood loss equal to or greater than 80 mL per menstrual cycle, disrupts quality of life and is linked to comorbidities. An estimated two-thirds of adult women with menorrhagia have anemia as a direct result. [1] Clinicians are advised to consider menstrual bleeding as abnormal if it affects the patient's quality of life. [2] Therapies that aim to address this include hysterectomy, levonorgestrel-releasing intrauterine devices (IUDs), uterine fibroid embolization, radiofrequency volumetric thermal ablation, high intensity focused ultrasound and endometrial resection or ablation. Endometrial ablation is indicated to treat menorrhagia or heavy bleeding in remenopausal patients with normal endometrial cavities who do not desire future fertility. [3] It offers reduced institutional stay, fewer postoperative complications and faster return to normal life than hysterectomy does. [1] Nonresectoscopic endometrial ablation (NREA) devices are designed to destroy the endometrium without using a resectoscope. Within this category, the NovaSure device uses radiofrequency and a probe with two bipolar electrodes, which, after insertion into the uterus, can vaporize endometrial tissue in less than two minutes. [4] Surgeons usually perform hysteroscopy before the ablation and some perform hysteroscopy at the end of the procedure as well. However, no studies have been conducted to examine the usefulness of performing hysteroscopy before or after ablation to view the uterine cavity. This is generally up to the surgeon's discretion. Our hypothesis was that a post-operative hysteroscopy would yield greater reductions in patient's bleeding during menses, based on the idea that the surgeon could check to determine that all endometrial tissue was ablated.

With IRB approval consenting adult patients with uteri who underwent NovaSure Global Endometrial Ablation procedures were included in a prospective study. Data was collected regarding patient characteristics, indications for surgery, effectiveness in alleviating symptoms as well as the long-term failure rate of the NovaSure device from patients undergoing these procedures at Strong Memorial Hospital, Highland Hospital and URMC affiliated private practices. Subjects were asked to complete three questionnaires and a pain score preoperatively, 6 months post-operatively and annually for up to 3 years post-operatively. A Day of Surgery questionnaire was completed by the study coordinator or the surgeon. This study compared bleeding heaviness reported by patients before the procedure and during fixed time intervals afterward.

Results were analyzed using a Wilcoxon-Mann-Whitney test through IBM SPSS software. Change in bleeding was graded and compared between two groups: hysteroscopy only pre-op and hysteroscopies both pre-op and post-op. Data from a total of 207 individual research subjects was analyzed, although some subjects only answered surveys for some of the time periods. An insufficient number of subjects

underwent ablation without hysteroscopy to generate control data. The statistical test was run to compare "pre-op" and "pre- and post-op" groups' changes in menorrhea heaviness at 6 months, 12 months, 24 months and 36 months after the NovaSure Global Endometrial Ablation procedure. No significant change was found between any of these groups.

We conclude that performing both pre-operative and post-operative hysteroscopies in the setting of a NovaSure Global Endometrial Ablation procedure is unnecessary when compared with just a pre-operative hysteroscopy. This can help to limit the duration of the procedure, a benefit to healthcare providers and patients.

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Lin, Jennifer

Preceptor
David Auerbach, PhD
SUNY Upstate Medical University
Department of Pharmacology

Co-Authors
Giuseppe Erba, MD
Sushma Yerram, MBBS
University of Rochester Medical Center
Department of Neurology

Autonomic Biomarkers for Seizure Disorders

Background: Epilepsy is characterized by recurrent seizures and is caused by electrical abnormalities in the brain that are shown on electroencephalography. Some patients with recurrent seizures are unresponsive to conventional anti-seizure medication therapy, resulting in a greatly diminished quality of life. 30-40% of these drug-resistant patients have Psychogenic Non-Epileptic Seizures (PNES) such that their seizures are not due to demonstrable electrical abnormalities. Because PNES are difficult to distinguish from Epileptic Seizures (ES), the current gold-standard diagnostic test for distinguishing the two conditions is Long-Term inpatient video/EEG/ECG Monitoring (LTM). LTM, however, is expensive, intrusive, often inconclusive and not readily accessible.

Accurate and early diagnosis of PNES versus ES guides patient care in life-threatening situations. Poorly-controlled ES events that last > 5 minutes, for instance, are a risk factor for sudden death, but PNES events that last > 5 minutes do not have this comorbidity. We are studying whether certain autonomic nervous system (ANS) changes can be used to reliably distinguish PNES from ES in an outpatient setting. This methodology would improve upon existing limitations of LTM.

The ANS includes sympathetic and parasympathetic activity, which provides a direct neural connection between the brain and heart. Autonomic changes and dysfunction have been found in patients with epilepsy, particularly in the time period surrounding seizures. Using Heart Rate Variability (HRV) metrics, we are able to quantitatively represent different aspects of ANS function by measuring the beat-to-beat variability in sinus (normal) cardiac rhythm.

Methods: The ABSD study is an ongoing multi-year prospective study that began in fall 2018 and aims to enroll at least 130 participants from the LTM unit at the University of Rochester Medical Center (URMC). Enrolled participants are LTM patients aged 18-65 who do not have comorbidities (e.g. diabetes & acquired cardio-respiratory disease), health behaviors (e.g. active smoker), or pharmacological/device therapies (e.g., beta blockers & vagal nerve stimulator) that may alter ANS function. Enrolled participants gave researchers permission to access their EEG and ECG recordings for the full duration of their LTM admission at the time of consent. The neurology team extracted two EEG & ECG (ECG-Lead II) recordings

from each patient through Natus database: a 5-hour event file containing 2.5 hours of recording leading up to clinically-defined seizure onset (preictal) and 2.5 hours following seizure end (postictal), and a 24-hour recording containing no seizures to serve as a baseline for comparison. Information on seizure type, semiology and pertinent medical history (e.g. anti-seizure medication) for each participant was inputted into RedCap database and used to categorize events into PNES or ES.

Cardiology analysts who were blinded to the study group received and annotated/adjudicated the ECG recordings for non-sinus beats, and generated HRV values in 5-minute epochs for time-domain, frequency-domain, and non-linear domain HRV measurements. Time-domain HRV measurements included the Standard Deviation of Normal-Normal R-R intervals (SDNN), a measure of global autonomic activity, as well as Root Mean Square of Successive Differences (RMSSD) and pNN50, two measures of parasympathetic activity. Frequency-domain measurements included Low Frequency (LF), a rough estimate of sympathetic activity; High Frequency (HF), a measure of parasympathetic activity; and LF/HF ratio, which corresponds to sympathovagal balance. Non-linear domain measurements included Approximate Entropy (ApEN), a measure of signal predictability. We used GraphPad Prism to graphically compare time versus HRV measurements between the ES and PNES groups for each HRV metric, using a normalized time scale of +/- 150 minutes before and after an event.

Preliminary Findings and Future Directions: Five ES and four PNES recordings are processed with HRV measurements. Because of the relatively small sample size and the high degree of standard deviation, no formal statistical analyses were conducted. However, we made the following observations: there is a trend for preictal SDNN to rise more sharply and abruptly in ES in the 10-minute timeframe leading up to seizure onset compared to PNES, and SDNN is significantly higher in the Epileptic group than in the PNES group during the event.

To further increase the resolution of ANS measures surrounding the seizure, the cardiology team generated smaller HRV epochs (e.g. 1-minute). Furthermore, a subset of patients enrolled in the study will receive Equivital (EQ02 Life Monitor) belts. They provide cardio-respiratory, temperature, activity, and oxygen saturation recordings, which will be used to explore the concordance of and dynamics of multi-system changes surrounding seizures. Equivital measurements will also enable the team to assess the reliability of using wearable technology to monitor potential ANS markers for seizure-type in the outpatient setting. The risk of sudden death was also calculated using the SUDEP-7 inventory score for participants with epileptic events. By subcategorizing epileptic events into either low or high-risk categories, it is possible that there may be within-group differences in ANS function pre and postictally in low versus high SUDEP risk patient groups. Finally, several participants had both PNES and ES events. These participants were excluded from preliminary analysis to avoid overrepresentation. Yet, they provide a valuable group to confirm that the ANS markers are specific to seizure-type and not patient groups. These recordings will useful to investigate whether within-individual differences in ANS function exist before and after these two types of events.

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Morehouse, Savannah

Preceptor
Brent Foster, MD, MSc
McLean Hospital, Division of Geriatric Psychiatry

Perceived Impact on Alzheimer's Disease Clinical Trial Participants After Study Termination (The IMPACT Study)

Objective: To identify and characterize the impact that sponsor-initiated Alzheimer's clinical trial termination has on study subjects and their caregivers at McLean Hospital by collecting mood, memory, function, and study satisfaction measures.

Background: Alzheimer's Disease (AD) is a progressive neurodegenerative illness that affects an increasingly large number of older adults as they age. To combat this growing epidemic, pharmaceutical companies are developing novel disease-modifying treatments for AD. These treatments are tested through the use of multi-site clinical trials. Throughout the duration of the trial, study subjects with AD attend monthly research visits with their study partner (sometimes referred to as their caregiver). If these clinical trials do not meet their endpoints during planned data analysis, the companies that sponsor them must begin to shut down the studies. Study termination may occur after the final study visit has taken place or during the interim analysis, in which case study subjects are immediately discontinued from any treatment they may be receiving. This abrupt discontinuation breaks the pattern of visits that study participants have come to expect. The effect of study termination on subjects and caregivers has not previously been investigated, and may provide insight into potential benefits of regular interaction with a consistent research care team.

Methods: This study was conducted in the Geriatric Psychiatry Research Department (GPRP) at McLean Hospital. Study subjects were eligible to participate if they has previously participated in select AD clinical trials in GPRP as a study subject or study partner. Subjects also had to be active in the research study when it was terminated by the clinical trial sponsor. Reliability was ensured by enforcing a Montreal Cognitive Assessment (MoCA) score cutoff of 14 or higher for participation. In addition to the MoCA, subjects completed mood scales (PHQ-9 and GAD-7), general functioning scale (EQ-5D-3L), social support scale (MSPSS), and a study site satisfaction survey (SSSS) developed for the IMPACT study. Data collection will occur through September 2019. Survey responses will be compared between Biogen Emerge study subjects and study partners, as well as between study partners from Eli Lilly LZAO/LZAX trials and the Biogen emerge trials. Comparison will be done using a paired T-test.

Results: Data analysis will be completed in Fall 2019. Upon initial review, multiple study participants indicated that the end of study transition may have been easier if the clinical trial sponsor had informed the study sites/participants of study termination before the general public, if the sponsors had indicated clearly why the study was closing at the time of termination, and if study participants had access to their PET scan data from the trial.

Conclusions: Conclusions may be drawn once data analysis is complete.

Ngo, Vivy

Preceptors
John Markman, MD
University of Rochester Medical Center
Department of Neurosurgery

Co-Authors
Kathi Heffner, PhD; Maria Quinones-Cordero, PhD; Jennifer Gewandter, PhD, MPH; Shannon Smith, PhD; Armando Villarreal, MD, MBA; Maria Frazer, CCRC; Allie Diehl; Leanne Cook; Nicholas Olin
University of Rochester Medical Center

Protective Benefit of Executive Function of Buprenorphine vs. Pure Mu Opioid Agonists

Background: Cognitive deficits, particularly in executive function, in patients with chronic pain treated with pure mu opioid agonists are well described, and may reflect accelerated cognitive aging. The extent to which buprenorphine, a partial mu opioid agonist that is indicated for use as an analgesic as well as for the treatment of opioid use disorder, reduces these deficits or age-related decline is not well understood. Thus, the purpose of this study was to explore differential associations between executive function and treatment with buprenorphine versus pure mu opioid agonists in patients with chronic pain.

Methods: In this study, the executive function of 30 age-matched and indication-matched patients with chronic pain taking buprenorphine was compared to 30 patients with chronic pain taking pure mu opioid agonists. Executive function was measured using the NIH EXAMINER subtests: Flanker, which measures inhibition, Set Shifting, which measures cognitive flexibility, and Categorical Fluency.

Results: Patients treated with buprenorphine (mean age = 57.07, sd = 9.36) were younger than those treated with mu opioid agonists (mean age = 63.23, sd = 9.86; $p < .05$). The groups did not differ on education; however, analyses controlled for education given its influence on cognitive testing outcomes. There were no significant differences in performance on the cognitive tests between the two groups (all p's > .05), possibly due to the smaller sample size. However, patients in the pure mu opioid agonist group showed moderate to large and significant associations between higher age and poor performance on the Flanker (rp= -.42, p=.02), Set Shifting (rp= -.53, p=.003), and Categorical Fluency (rp= -.58, p=.001), tests, whereas those in the buprenorphine group showed weaker and non-significant associations on the Flanker (rp= -.29, p=.13), Set Shifting (rp= -.20, p=.31), and Categorical Fluency (rp= -.14, p=.47) tests.

Conclusion: These novel and preliminary findings suggest that chronic pain treatment with buprenorphine may lessen the drug-induced or accelerated age-related cognitive decline observed in patients treated with pure mu opioid agonists, and suggest further exploration of potential effects of buprenorphine on cognitive outcomes in patients with chronic pain.

Nimmagadda, Sai

Preceptor
Ajay Kuriyam, MD
University of Rochester School of Medicine and Dentistry
Flaum Eye Institute

Outcomes in Treatment of Rhegmatogenous Retinal Detachments and the Impact of Face-down Positioning

Rhegmatogenous retinal detachments (RRDs) are the most common type of retinal detachment and are caused by tears or holes in the retina with subsequent migration of fluid into the subretinal space. Retinal detachments can be repaired by pars plana vitrectomy, pneumatic retinopexy, or/or scleral buckling. Pars plana vitrectomy is an effective surgical procedure that involves removal of vitreous gel from the eye, followed by drainage of subretinal fluid, laser photocoagulation around the tears and finally filling the vitreous cavity with a gas or oil. This tamponades the retinal breaks while the laser energy induces a permanent chorioretinal scar to prevent re-detachment. Traditionally, patients are instructed to keep their head in either face down or decubitus positions to allow for optimal positioning of the gas and optimal healing. This positioning is thought to be especially important for tears at the inferior portion of the retina as the gas rises to the top of the vitreous cavity, preventing adequate tamponade for inferior retinal breaks. However, a recent study by Chen et al. compared face-down vs. non-face down positioning after pars plana vitrectomy in repair of RRDs, found similar anatomic and visual outcomes.

The focus of our study is twofold. First, we will compare the outcomes of patients with inferior break rhegmatogenous retinal detachments treated with pars plana vitrectomy who were instructed to do face-down positioning versus those not instructed to do face-down positioning. This would allow us to determine whether the restrictive, uncomfortable face down positioning regimen has a significant impact on risk of re-detachment or other outcomes. Second, our goal is to compile some general descriptive statistics about the rhegmatogenous detachment patient population encountered during the six year period of 2011-2017.

We used ICD-9 and ICD-10 diagnoses and CPT codes to identify all patients who underwent surgery for retinal detachment repair at the Flaum Eye Institute/Strong Memorial Hospital in the EPIC system between 07/1/2011 and 07/10/2017. Charts and surgical notes were reviewed to determine location of the retinal tear, surgery performed, and positioning instructions (face-down or not face-down). Snellen visual acuity, re-detachment rates, epiretinal membrane formation and other ocular pathologies were recorded. Data analysis is ongoing. Preliminary results showed that the average age for a patient presenting with a rhegmatogenous retinal

detachment was 56.7 years, 65% being male and 35% female. Average number of tears was 1.55 and 8.5% of detachments involved some traumatic component. 18.6% of all rhegmatogenous detachments presented with pre-operative proliferative vitreoretinopathy which is a risk factor for failure of retinal reattachment procedures (Wickham et al. 2010). Out of 306 rhegmatogenous detachments evaluated, 50 (16.3%) required further treatment following re-detachment. Out of the patients who were successfully followed for 36 months following vitrectomy, 95.7% remained attached. Further analysis is still being performed to compare the outcomes between the positioning groups.

O'Hanlon, Deirdre

Preceptor
Nitian Jain, MD
Vanderbilt University
Department of Physical Medicine & Rehabilitation

Co-Authors
Ayush Giri, PhD
Vanderbilt University
Department of Obstetrics and Gynecology

Etiology of Rotator Cuff Tears: A Systematic Review and Meta-Analysis of Diabetes and Rotator Cuff Disease

Rotator cuff disease is a common painful shoulder syndrome, with rotator cuff tears leading to high health care costs in industrialized countries1. As rotator cuff tears are a leading cause of pain and loss of function, it is important to isolate etiologies and define risks in the general population to improve tear prevention and decrease pain, productivity loss, and functional loss for rotator cuff tear patients. A systematic review of relevant primary literature regarding risk factors and etiology of rotator cuff tears was performed. Databases including: PubMed, CINAHL, Embase, and Sciencedirect were used to identify relevant records. 7,332 records were screened for eligibility, including duplicates, with 7,120 records excluded for not meeting relevant eligibility criteria. 212 full text articles were assessed for eligibility, with 41 articles included for assessment. Age, BMI, Diabetes, tobacco use, critical shoulder angle, work and hypercholesteremia were found to be the most investigated risk factors.

A meta-analysis was performed to investigate diabetes prevalence and rotator cuff disease using 9 studies reporting 11 independent effect estimates. The systematic review and meta-analysis suggests a positive association between diabetes prevalence and rotator cuff tear disease. According to fixed effects meta-analysis, having diabetes is associated with a 48% higher odds of having rotator cuff disease (OR: 1.48; 95% CI: 1.43, 1.55) compared to those without diabetes. Three of the nine studies specifically evaluated rotator cuff tears, and according to fixed effects meta-analysis, having diabetes is associated with a 19% higher odds of having rotator cuff disease (OR: 1.19; 95% CI: 0.88, 1.61). Larger studies evaluating the relationship between diabetes and rotator cuff tears to establish the temporal relationship are still needed.

Paton, Casey

Preceptor
Kartik Mangudi Varadarajan, PhD
Massachusetts General Hospital

Co-Authors
Sourabh Boruah
Orhun K. Muratoglu
Massachusetts General Hospital

Brandon Scott
Warren Alpert Medical School, Brown University

Analyzing Bone Remodeling Stimulus After Cementation in Hip Resurfacing

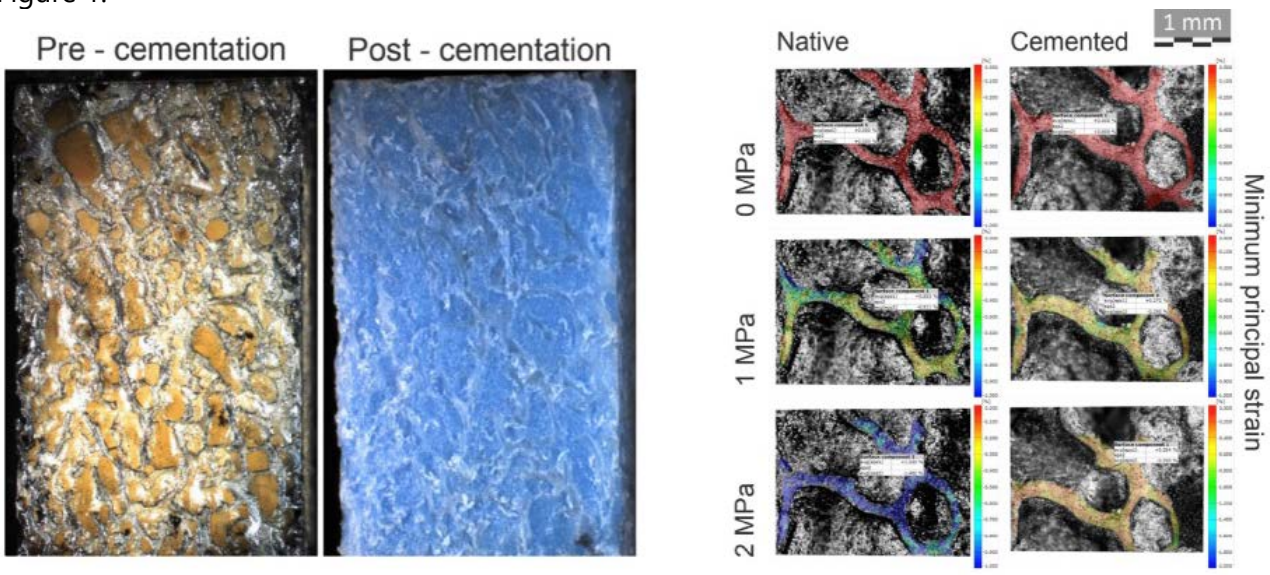
INTRODUCTION: Hip resurfacing is emerging as an attractive alternative for younger and more active patients considering hip replacement because it provides greater joint stability and preserves more of the original bone. However, undesirable outcomes such as loss of fixation and periprosthetic femoral head and neck fractures may lead to revisions (1). Fixing the resurfacing femoral head can be accomplished with precise surgical techniques involving careful cement placement around the area and meticulous bone preparation (2). Presumably, an increased volume of cement fixture would provide increased mechanical strength and decrease the compression force on the trabecular bone around the joint. Scientists Radcliffe et al. used the "finite element method" to deduce that a thicker cement mantle increased strain shielding within the femoral head (3). But more cement fixture does not continuously enhance strength. We sought to analyze the stress shielding associated with the amount of cement placed, possible bone resorption and weakening of the trabecular bone; this may predict failure of implant fixture or even fracture of periprosthetic bone.

METHODS: Eight trabecular bone samples (8.0 x 8.0 x 15.0 mm) were cut from the left and right femoral heads of an adult male cadaver. A speckle pattern was produced on the trabeculae by blowing graphite powder on a single side of the bone surface (Fig. 1). The sample was then loaded to a compressive stress of 1 MPa then 2 MPa, representing large physiological loading. Images were captured at each load and deformation of the trabeculae was measured using Digital Image Correlation Engine (v1.0) (4) and an 8 x optical microscope. Each sample was cleaned and filled with blue dental cement (BOSWORTH FASTRAY). The graded compressive experiments and subsequent analysis were again completed, allowing a direct assessment of noncemented and cemented samples.

RESULTS and DISCUSSION: Ten trabeculae were imaged on two sides for each of the eight samples, at loads of 0, 5, and 10 kg, so the digital image correlation and statistical analysis includes about 480 images. The cemented trabeculae show decreased strain energy density, compared to the natural bone. The reduction in strain energy density was proportional to the level of cementation within the bone, suggesting that the strain shielding is dependent on the depth of cementation. Therefore, with our

analysis thus far we conclude that there is a significant difference in strain energy density between the natural state and the cemented bone, especially at higher stress conditions. Since strain energy reduction is a negative bone remodeling signal, the cement quality used is critical for long term stability of cemented implants.

Figure 1:



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Pope, Eleanor

Preceptor
Julie Ryan Wolf, PhD, MPH
University of Rochester Medical Center
Department of Dermatology

Novel Provider-reported Outcome Measure for Quality of Care in Dermatology

Background: An accurate perspective on quality of healthcare requires an assessment tool that captures both disease severity and treatment response, and is valid across different dermatologic diagnoses and for different providers.

Objective: To assess the validity and reliability of a novel provider-reported outcome measure (PROV-RO).

Methods: A cross-sectional analysis of surveys conducted at the University of Rochester Medical Center from December 2015 to May 2017. The PROV-RO, comprised of 4 questions: Q1) disease severity, Q2) disease change, Q3) treatment harm, and Q4) treatment response, was completed within the electronic medical record (EMR) by three dermatologists during 1,330 clinic visits for 1,138 patients. For follow-up visits, the dermatologists completed all four questions; whereas for new patient visits, the dermatologists completed disease severity (Q1) only. The PROV-RO generated a composite score, where lower composite scores reflect better clinical outcomes. Composite scores for follow-up visits ranged from 1 to 20, whereas new patient visits ranged from 1 to 5. A retrospective systematic chart review was completed in the electronic medical record (EMR) for each clinic visit. Clinical documentation in the chart note was used to answer the four questions on the PROV-RO. Spearman's rho measured validity to assess the extent the PROV-RO correlated with chart note documentation. Cronbach's alpha measured reliability of the PROV-RO. Test-retest reliability was evaluated for the severity question (i.e., Q1) in follow-up visits using the intraclass coefficient (ICC).

Results: The majority of patients were Caucasian with a mean age of 54 years (range 7-98 years) and equal representation of males and females. There was significant correlation between the PROV-RO and chart note documentation for overall composites scores for all providers (rho=0.856, $p<0.001$). These significant correlations were consistent for overall composite scores between follow-up visits (rho=0.723, $p<0.001$) and new patient visits (rho=0.749, $p<0.001$). Disease severity (i.e., Q1) showed the greatest correlation (rho=0.708, $p<0.001$) for all providers, followed by change (rho=0.645, $p<0.001$), response (rho=0.635, $p<0.001$), and harm (rho=0.630, $p<0.001$). Similarly, there were significant correlations between overall composites scores and chart note documentation across providers (A: rho=0.786, $p<0.001$; B: rho=0.889, $p<0.001$; C: rho=0.856, $p<0.001$). The PROV-RO indicated excellent internal consistency (Cronbach's alpha=0.735) and was valid across different dermatologic diagnoses. The PROV-RO instrument also demonstrated excellent test-retest reliability between three visits (ICC=0.71, 95% CI [0.69, 0.90]).

Conclusions: Our results validate a novel provider-reported outcome measure (PROV-RO). This tool can serve as a robust "global assessment" in evaluating quality of dermatologic care for all patients across both diagnosis and provider.

Table 1: Spearman correlations between PROV-RO and Chart Note by Provider

	All Visits (n=1,330)	Provider A (N=326)	Provider B (N=615)	Provider C (N=389)
Overall Composite Score				
rho	0.856	0.786	0.889	0.856
p-value	<0.0001	<0.0001	<0.0001	<0.0001
Severity Q1				
rho	0.708	0.683	0.743	0.683
p-value	<0.0001	<0.0001	<0.0001	<0.0001
Change Q2				
rho	0.645	0.432	0.764	0.547
p-value	<0.0001	<0.0001	<0.0001	<0.0001
Harm Q3				
rho	0.630	0.172	0.809	0.468
p-value	<0.0001	0.014	<0.0001	0.0001
Response Q4				
rho	0.635	0.435	0.778	0.502
p-value	<0.0001	<0.0001	<0.0001	<0.0001

Purington, Ella

Preceptor
Valerie Lou, MD
University of Rochester Medical Center
Department of Emergency Medicine

Medical Training Retention in Corps Members

Objectives: To determine the efficacy of a Wilderness First Aid (WFA) course in teaching non-medical staff proper first aid techniques pertinent to their jobs in austere environments.

Background: Wilderness First Aid is the most popular wilderness medicine course for the average non-medical person due to the short class time at only 16 hours. Johnson et al, 2013 described participants of a WFA course as those for whom first aid is a secondary responsibility. The course itself consists of skills that require minimal equipment and include basic life saving techniques such as the Patient Assessment System, CPR, wound management, head injury stabilization, and thermic emergencies 1. This is exceedingly important in conservation work because crews go out by themselves, with little to no access to higher care if something goes wrong. Travel time to the nearest care facility is dependent on access to vehicles and location of job site.

Methods: An AmeriCorps conservation organization, Utah Conservation Corps, based out of Logan, Utah was recruited to participate in the study. 70 subjects were initially recruited. An initial survey was administered one day after completion of the WFA course. The pre-season survey included self- reported confidence levels in eight areas (scene size-up, initial assessment, physical exam, vital signs, patient history, splinting, spinal assessment, and verbal patient reporting) of WFA training, and a multiple-choice assessment that tested information covered in the WFA course. A post-season survey with the same composition of questions was then administered two months after completion of the WFA course and after the conservation organization's summer season. The two surveys were then compared via paired t-test to determine any differences in results. In addition, medical incident reports were administered to the medical officers of the different sites of the organization to collect data on incidents that occurred during the season and the subjects' responses.

Results: 18 subjects successfully completed both the pre- and post-surveys. Paired T-test analysis of this data showed no statistical differences in confidence levels in any of the eight areas one day after the course compared to two months after the course with P-values of .2910, .2320, .2958, .3011, .5142, .1083, .2150, and .1050. Paired T-test analysis of number of incorrect answers for the multiple-choice portion was .0079. 14 medical incidents were reported.

Conclusions: Survey results showed continued confidence levels but showed decreased first aid knowledge two months post WFA course, suggesting the need for continued education on first aid skills after the initial course. This was especially evident in the knowledge on the care of heat and cold injuries. Completed medical incident forms showed three episodes of friction injuries, two episodes of penetrating

trauma, two foreign bodies in eyes, two musculoskeletal injuries, two general illness, and one acute asthma exacerbation.

Porterfield, Lee

Preceptor
Vincent Silenzio, MD, MPH
University of Rochester Medical Center
Department of Psychiatry

Co-Authors
Anis Zaman
Henry Kautz
Raiaan Ullah
University of Rochester Medical Center

Exploring Online Search Queries as a Mental Health Screening Tool

The purpose of this research is to ascertain whether analysis of search histories can provide a scalable, reliable screening tool for various mental health states.

Previous research conducted through this project targeted college students and individuals at family court. When connected through a Google services account, every search query is logged and can be accessed through an application called Google Takeout. Participants needed to be at least 18 years of age and have an active Google services account. After obtaining consent, participants then completed a questionnaire that included clinically-verified metrics of mental health. The questionnaire also asked questions concerning demographics, life stressors, and research readiness. Upon completion, participants logged into their Google services and allowed a one-time, de-identified download of their search history linked to their survey answers. Using a Hybrid Bayesian Regression model, textual analysis was used to create an algorithm that could detect different mental health phenomena using both psycho-linguistic attributes and search categories. In these trials, the data suggested the ability to detect, in college students, low self-esteem in a statistically significantly manner (average F1 score of 0.86) and, in family court, the presence of interpersonal violence. To further explore the possible real world applications in different settings, participants were recruited from the URMC Strong Behavioral Health Services at the University of Rochester Medical Center during the summer of 2019. During this time period, 14 participants were recruited at BHS. Recruitment will continue until recruitment goals are met. Once more data is collected, the efficacy and plausibility of implementation as a screening tool will need to be explored more extensively. Additionally, the ethics of data mining and privacy will be a focus of future analysis in this project.

Reuter, John

Preceptor
Brian Giordano, MD
University of Rochester Medical Center
Department of Orthopaedics

Co-Authors
Benjamin Kuhns, MD
Gillian Soles, MD
Cheryl Ackert-Bicknell, PhD
University of Rochester Medical Center

Differences in Gene Expression between Femoroacetabular Impingement (FAI) and End-stage Hip Osteoarthritis.

Introduction.
Femoroacetabular impingement (FAI) is a disease of the hip joint characterized by abnormal shapes of the femur and acetabulum. Clinically, this presents with limited range of motion and concomitant pain about the hip and groin. The incongruent morphology and altered biomechanics can subject the hip joint to increased forces, which may induce an inflammatory state in the articular cartilage. Though FAI has long been proposed as a precursor to osteoarthritis (OA) of the hip, whether the aforementioned inflammation underlies the progression of OA remains to be elucidated. The present study seeks to use RNA whole genome sequencing to compare expression profiles in hips undergoing surgery for FAI to those with end-stage OA. We hypothesize that there will be significant differences in expression profiles of inflammatory pathways known to be associated with inflammation and subsequent OA between hips with FAI and those with end-stage OA. Please note that the following data are preliminary results. Final data collection with a larger cohort is presently underway.

Methods.
20 patients were included in the preliminary analysis. Ten patients (5 male and 5 female) underwent hip arthroscopy for FAI, and 10 (5 male and 5 female) underwent total hip arthroplasty (THA). Patients in the FAI cohort were excluded from the study if they had undergone prior hip surgery or had radiographic evidence of hip dysplasia. Patients in the THA cohort were excluded if they had radiographic evidence of hip dysplasia, or if their OA was the result of trauma or any inflammatory/autoimmune conditions. Following intra-operative tissue harvesting, RNA was isolated and subjected to Next Generation RNA sequencing to evaluate gene expression. Expression data was then analyzed using Ingenuity Pathway Analysis (IPA) to identify differences in canonical signaling pathways associated with OA.

Results.
IPA analysis showed 3531 genes with significantly differential expression between the FAI and THA groups. Notably, patterns of differential expression emerged in recognized gene pathways related to

cartilage metabolism (Table 1) and osteoarthritis (Table 2). The FAI group also demonstrated up-regulation of the EGF-ERBB pathway (Table 3).

Conclusions.

These preliminary results fail to disprove our hypothesis that hips with FAI will show differential expression patterns compared to those with end-stage OA. As expected, hips with end-stage OA showed up-regulation of genes typically associated with cartilage destruction. However, hips with FAI actually demonstrated increased expression of chondroprotective genes. Our future analyses will seek to better delineate these differences and begin to define their clinical significance.

Cartilage Metabolism			
Upregulated OA	p_{adj}	**Upregulated FAI**	p_{adj}
COL10A1	0.0001638	COMP	0.034951
COL24A1	0.0117991	COL4A3	5.96E-33
COL8A1	0.0274064	COL4A4	9.46E-14
COL9A1	0.0004479	COL4A5	1.49E-14
COL9A2	0.0090092	COL6A6	9.56E-05
ADAMTS4	0.0003928	COL6A6	2.23E-08

Table 1: Differential gene expression in genes related to cartilage metabolism. Osteoarthritic samples had elevated COL10, 24, 8 and 9 genes while FAI had elevated COMP, COL4 and COL6 genes.

Canonical Osteoarthritis Pathway			
Upregulated OA	p_{adj}	Upregulated FAI	p_{adj}
GREM1	3.32E-12	SMAD4	0.002188
MMP1	3.24E-05	C/EBPβ	2.32E-04
COL10A1	1.64E-04	WNT16	0.001925
FRZB	3.32E-08	PGC1	2.11E-07
MMP13	2.77E-04	FGF18	9.67E-09
MATN3	0.00205	VEGFD	1.03E-12
MMP3	0.007351	SOX10	0.000216
ADAMTS4	3.93E-04	NOS1	1.87E-34
Osteopontin	0.006119	DKK2	0.007801
MMP9	0.004763	GDF6	1.08E-07
S1PR3	0.003633	BMPR1B	1.31E-22
TNF	0.001382		
RUNX2	1.19E-04		
SPHK1	8.83E-05		
TGFB1	3.44E-04		
CTR	0.012398		
RANK	3.77E-06		

Table 2: Differential expression of genes previously implicated in osteoarthritis. Osteoarthritis samples had elevated markers of end stage cartilage breakdown (ADAMTS4, MMP13, TNF) while FAI samples had increased expression of chondroprotective genes (FGF18, WNT 16, BMPR1B)

EGFR-ErbB Signaling			
Upregulated OA	p_{adj}	Upregulated FAI	p_{adj}
NRG1	6.46E-06	c-Raf	0.006002
SHC	0.009153	c-Jun	0.006745
		HBEGF	0.001769
		ErbB4	0.011828
		NRG4	0.0001
		BTC	6.93E-05
		ErbB3	0.001842
		EGF	4.53E-10
		AREG	1.32E-09

Table 3: General upregulation EGF-ErbB signaling pathway in FAI samples compared to osteoarthritic samples.

Ricci, Nilsa

Preceptor
Caroline Silva, PhD
University of Rochester Medical Center
Department of Psychiatry

Co-Authors
Kim Van Orden, PhD
Yeates Conwell, MD
University of Rochester Medical Center
Department of Psychiatry

The Feasibility/Acceptability of Using Smartphone Technology to Assess Mental Health Symptoms among Spanish-Speaking Outpatients

Background: Geographic and linguistic isolation among ethnic/racial minorities are associated with negative mental health outcomes, including increased suicide risk (Silva & Van Orden, 2018). This research study explores the feasibility and acceptability of using smartphone technology with active (surveys) and passive (GPS/ambient sound recording) sensing to assess mental health symptoms and social behavior among at risk Spanish-speaking outpatients.

Method: Participants were 13 Spanish-speaking adult outpatients recruited from Lazos Fuertes (a URMC Spanish-language behavioral health clinic) who reported hopelessness or passive/active suicide ideation within the last month. Participants completed an in-person baseline interview (clinical diagnostic interviews and self-report symptom measures) and then 2-weeks of ecological momentary assessments (EMA; 4x a day) to assess mood and behavior using a smartphone with optional passive sensing (GPS; ambient sound recording). Afterwards, participants completed a final in-person interview. All participants identified as Hispanic/Latino (84.6% female; 15.4% male). The majority was either born or grew up in Puerto Rico (92.3%). 53.8% identified as White/Caucasian and 46.2% identified as "Other" (e.g., Indio, Trigueña). The average age was 42.24 years (*SD* = 10.51 years; range 24-57 years). On average, participants had lived in the United States (mainland) for 6.56 years (*SD* = 12.63 years; range 1-40 years) and in Rochester, New York for 5.56 years (*SD* = 10.04 years; range 1-32 years). Most were single/never married (30.8%), married/living with spouse (23.1%), or divorced/annulled (23.1%). The majority of participants met for Major Depressive Episode Current (69.2%), with another 7.7% meeting for Dysthymia Current. 23.1% of participants met for Psychotic Disorder Current; overall, 38.5% had a Lifetime History of Psychotic Disorder. The next most common diagnoses were: Panic Disorder with Agoraphobia Current (23.1%), Social Anxiety Disorder Current (23.1%), and Post Traumatic Stress Disorder Current (23.1%). At baseline, 84.6% of participants reported a lifetime history of passive suicide ideation and 53.8% reported passive suicide ideation in the past month. 53.8% of participants reported a lifetime history of active suicide ideation and 23.1% reported active suicide ideation in the past month. 46.2% of participants reported a previous suicide attempt (*M* = 1.00, *SD* = 1.73; range 0-6); 7.7% reported a history of non-

suicidal self-injury. Based on past month ideation and history of attempts, 23.1% of participants were considered to be at high suicide risk, 46.2% at mild risk, and 30.8% at no risk.

Results: The majority (84.6%) of participants consented to all passive data collection (GPS tracking and ambient sound recording). One participant did not consent to either GPS tracking or ambient sound recording. One participant did not consent to GPS tracking alone. One participant dropped out of the study after baseline and did not complete the EMA study portion. Participants completed an average of 76.93% of the EMA survey instances (*SD* = 18.01%; range 51.79-100%). Symptoms of depression and anxiety at baseline were significantly and positively associated with symptom severity at the 2-week follow-up ($p < 0.01$); however, suicide ideation at baseline was not significantly associated with suicide ideation severity at follow-up ($p > 0.05$). Participants did not report significant changes in depression, anxiety, or suicide ideation from baseline to the 2-week follow-up ($p > 0.05$). Symptoms of depression, anxiety, and suicide ideation at baseline were not associated with the percent of EMA instances completed. The percent of EMA instances completed were also not associated with depression, anxiety, and suicide ideation severity at follow-up, controlling for baseline symptom severity.

Conclusion: The results support the feasibility and acceptability of using smartphones to assess mental health symptoms and behaviors in real time and real world setting among Spanish-speaking adult outpatients. The majority of participants consented to active and passive remote assessments. Adherence to remote EMA assessments was good and study attrition was minimal. Implications and future directions will be discussed.

Reference:

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Rosenthal, Emily

Preceptor
Kathi L. Hennfer, PhD
University of Rochester Medical Center
School of Nursing

Cognitive Training to Protect Immune Systems of Caregivers: The CTC Project (Brain Training to Promote Health in Family Dementia Caregivers)

Caregiving for a family member with dementia is a chronic stressor that can impact the physical, mental, and emotional health of older adults. Research shows that relative to non-caregivers, dementia caregivers have worse physical health outcomes, higher levels of stress, anxiety, and depression, poor cognitive function, and further report greater social isolation and loneliness. Moreover, evidence suggests that caregivers have a weakened immune system, and higher rates of infection. Older caregivers have a reduced antibody response to vaccination, with an inverse relationship between the antibody response and the daily stressors the caregivers were exposed to. The purpose of this study is twofold: first, to determine if cognitive decline accelerates aging of the immune system – termed immunosenescence - in older adults exposed to the chronic stress of caregiving; and second, to identify interventions for older adults that reduce the immunological decline of chronic stress. Caregivers are randomly assigned to a computerized cognitive training or no-training control group. Cognitive (i.e., processing speed, attention, executive function), emotional wellbeing, and immunological measures are assessed at baseline, immediately following 8 weeks of the training or control period, 6 months post-intervention, and 12 months after training or control. Study participants also complete an exercise meant to induce brief mental stress, and cardiac assessment is collected prior to, during, and after the task. Data collection is still in progress, and thus there is no data yet on our hypothesis. Preliminary ancillary study: Preliminary analysis of collected data was conducted using linear regression to explore associations among social connectedness and executive function in caregivers. Greater perceived loneliness was associated with worse performance on an inhibition task ($r=0.22$, $p = 0.03$); however, this association disappeared after controlling for age, gender and education. Further, after controlling for age, gender and education, greater perceived social support was associated with faster reaction times on the inhibition task. These findings indicate further exploration on the role of social connectedness and loneliness in cognitive function in chronically stressed older caregivers is warranted, as it may provide insight into therapeutic targets.

Sapunor, John
Wang, Patrick

Preceptor
Roma Kaur, MD
University of Rochester Medical Center

Open-Conversion Rates in One Surgical Practice's Early Experience with Robotic Colorectal Surgery for Treating Diverticulitis

Introduction: Typically, patients suffering from diverticulitis requiring elective surgical intervention undergo minimally invasive procedures like laparoscopy. However, the introduction of robotic-assisted colorectal surgery offers another minimally invasive approach with superior dexterity and visualization of the surgical field. Given that diverticulitis can be a disease marked by significant inflammation of involved and surrounding structures, and given the ease of use of robotic surgery compared to laparoscopy, a natural question was whether there were any differences in conversion rates for robotic as compared to laparoscopic surgery. Our hypothesis was that robotic surgery would have a lower conversion to open rate than laparoscopic surgery. We attempted to address this question by examining the early robotic surgery experience of a colorectal surgery practice with cases performed for diverticular disease between 2008 to 2015 to assess the rate of conversion to open surgery.

Methods: Data abstraction was carried out for a prospectively maintained database of robotic surgery cases performed by a six-surgeon colorectal surgery practice in New York State with varying experience with robotic surgery with abstraction completed between mid 2008 to mid 2015. Variables collected by the practice since the onset of the study, for all indications for surgery, included patient demographic and comorbidity data, extensive perioperative and post-operative care delivery data, as well as information on follow-up. Bivariate analyses were carried out at a practice and individual surgeon level. Multivariate analyses were not possible at this time given the small sample size of converted cases but is a goal of the study once chart abstraction is complete. Results: Of the 812 robotic surgery cases for which conversion information was available, 269 patients had undergone surgery for an indication of diverticulitis. Of those who had surgery for diverticulitis, 43 cases (16.0%) were converted to an open procedure compared to 58 converted cases (10.7%) for all other indications, showing an all-indication combined conversion rate of 12.4%. Those who had diverticulitis were found to have 1.59 times greater odds for conversion to open than those who had surgery for an indication other than diverticulitis (p-value=0.0311). At a practice level, the bi-variate analysis of surgeon versus conversion for diverticulitis cases yielded a nearly statistically significant p-value of 0.0721.

Discussion: The early experience of one colorectal surgery practice showed a robotic-to-open conversion rate of nearly sixteen percent for diverticular disease which is slightly higher than the reported allcolorectal procedure laparoscopic-to-open conversion rate of 15.38% that was found by a large metaanalysis. Conversion for diverticulitis with laparoscopy ranged between 8% and 61% with the higher estimate owing to early experience with the minimally invasive technique. Subsequent reports with further experience with laparoscopy showed the upper range for conversion for complicated diverticulitis to be

around 26%. Comparing these raw estimates shows that, even with an early experience with robotic surgery, conversion for diverticulitis was lower than with laparoscopy for complicated diverticular disease. This may owe to better visualization and dexterity with robotic procedures as compared to laparoscopy.

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Schattenkerk, Jared

Preceptor
Jonathan Drezner, MD
University of Washington

Co-Authors
Kristen Kucera, PhD, MSPH, ATC
University of Washington

Socioeconomic Factors and Outcomes from Sudden Cardiac Arrest in US High School Athletes

Introduction: Sudden cardiac arrest (SCA) is the leading cause of death in young athletes during sports. Improvements in the prevalence of public-access automated external defibrillators (AEDs), cardiac arrest emergency action plans (EAPs) and cardiopulmonary resuscitation (CPR) training have led to improved survival outcomes following SCA in the young. Despite these improvements, past research has identified racial differences in exercise-related SCA survival in young athletes. It therefore has been speculated that socioeconomic disparities exist that impact SCA survival in schools located in low-income communities with a greater proportion of minority students. The purpose of this study is to examine the relationship between socioeconomic status (SES) indicators in high schools and survival from SCA occurring in student-athletes on a high school campus. Other factors affecting survival from SCA such as witnessed arrest, the presence of an athletic trainer, bystander CPR, and use of a public access AED are also analyzed.

Methods: From July 1, 2014 to June 30, 2018 cases of exercise-related SCA in high school student-athletes occurring on school campus were prospectively identified through an ongoing surveillance program led by the National Center for Catastrophic Sports Injury Research. Demographic information and SES indicators were obtained for each high school where a student suffered a SCA event. SES indicators included median household income and median family income based on the school's zip code using publicly available date from the United States Census Bureau American Community Survey 5-Year Estimates, and the number of students on free/reduced lunch acquired from the National Center for Education Statistics. Schools in the 90th percentile and above of the SES indicators were designated as higher SES, while schools in the 10th percentile and below were designated as lower SES. Other measures included in the analyses were public/private status, enrollment by race/ethnicity, locale of the school, the school's employment of a full or part-time certified athletic trainer, and resuscitation details. The primary outcome measure was survival to hospital discharge. Comparisons were analyzed using a t-test with significance set at $P < 0.05$.

Results: A total of 116 cases were identified during the 4-year study period. Overall survival was 68.1% (79 survivors, 37 deaths). Survival rates appeared higher in the in the 2016/17-2017/18 (42/55; 76.4%) school years versus the 2014/15-2015/16 (37/61; 60.7%) school years (difference, 15.7%; $P = 0.0687$). Overall, survival was higher in white non-Hispanic/Latino (42/56; 75%) versus all minority (26/49; 53.1%) student-athletes (difference, 21.9%; $P = 0.02$). In the 2014/15-2015/16 school years survival was also

higher in white non-Hispanic/Latino (21/30; 70%) versus all minority (11/26; 42.3%) student-athletes (difference, 27.7%; P = 0.03853). In the 2016/17-2017/18 school years the difference in survival between white non-Hispanic/Latino (21/26; 80.8%) and all minority (15/23; 65.2%) student-athletes was not statistically significant (difference, 15.6%; P =0.233). There were no significant differences in survival rates between public (64/94; 68.1%) versus private (15/22; 68.2%) schools, or between rural (13/20; 65%), town (10/15; 66.7%), suburb (36/51; 70.6%) and city (20/29; 69%) schools. According to the proportion of students on free/reduced lunch, the overall survival rates appeared higher among the higher SES (8/10; 80%) schools versus the lower SES (5/10; 50%) schools (difference, 30%; P = 0.1777). In the 2014/15-2015/16 school years survival was higher in higher SES (4/5; 80%) schools versus the lower SES (0/5; 0%) schools (difference, 80%; P = 0.01613). In the 2016/17-2017/18 school years there was no difference in survival between higher SES (4/5; 80%) and lower SES (4/5; 80%) schools. According to the median household income, the overall survival rates trended higher among the higher SES (10/12; 83.3%) schools versus the lower SES (5/12; 58.3%) schools (difference, 30; P = 0.1944). In the 2014/15-2015/16 school years survival appeared higher in the higher SES (5/6; 83.3%) schools versus the lower SES (3/3; 50%) schools (difference, 33.3%; P = 0.2618). In the 2016/17-2017/18 school years there was no difference in survival between higher SES (4/6; 66.7%) and lower SES (4/6; 66.7%) schools. Survival rates appeared higher at schools that employed an athletic trainer (70/99; 70.7%) versus those without an athletic trainer (6/12; 50%), (difference, 20.7%; P = 0.2114) There was no difference in survival whether the employed athletic trainer was full-time (50/71; 70.4%) versus part-time (20/28; 71.4%). The vast majority of SCA events were witnessed (96.6%) and bystander CPR was performed during the majority of cases (80.2%). If a certified athletic trainer was on site and involved in the resuscitation, 82.6% of athletes survived. If a public access AED was used in the resuscitation, 85.9% of athletes survived.

Conclusion: The overall survival rate from SCA in high school student-athletes has improved over the 4-year study period; however there remains a significant difference in SCA survival between white non-Hispanic versus minority student-athletes. Overall, socioeconomic indicators included in the study suggest a positive relationship between a school's SES and SCA survival. The positive relationship between a school's SES and SCA survival was more apparent in the 2014/15 and 2015/16 school years than in the 2016/17 and 2017/18 school years. Further research is needed to understand racial differences in outcomes from SCA in student-athletes.

Shinaman, Gregory

Preceptor
Jean Bidlack, PhD
University of Rochester Medical Center
Department of Pharmacology and Physiology

Co-Authors
Louben Dorval
Olufolake Majekodunmi
Brian Knapp

Fibroblast Growth Factor 21 (FGF21) Decreases Preference for Morphine and Inhibits the Development of Morphine Dependence in Mice

Fibroblast growth factor 21 (FGF21) produces major metabolic effects, and analogues are currently in clinical trials for use in treating type 2 diabetes and obesity. In addition to its metabolic effects, it has been proposed that FGF21 functions in the central nervous system, namely, the ventral tegmental area and nucleus accumbens, which regulate reward behavior. Specifically, FGF21 administration has been shown to reduce the levels of dopamine and its metabolites in the nucleus accumbens. Additional studies have shown that FGF21 decreases sweet and alcohol preference in mice. In our research, we investigated opioid preference and dependence in FGF21-Tg (Transgenic) and wild-type mice. Specifically, morphine, a full opioid agonist was studied. First, a serum ELISA showed that the FGF21-Tg mice had 2400-fold higher levels of FGF21 in serum than their wild-type littermates. Tissue ELISA showed that the liver of FGF21-Tg mice had significantly higher levels of FGF21 while the pancreas had lower levels of FGF21 than their wild-type littermates. To study preference, a biased conditioned place preference (CPP) assay was used. FGF21-Tg mice had significantly decreased preference for morphine. The male FGF21-Tg mice had 56% lower preference for 10 mg/kg morphine compared to wild-type littermates. Female FGF21-Tg mice had 65% lower preference for 10 mg/kg morphine, and at 3 mg/kg morphine, the female FGF21-Tg mice showed no preference for morphine at all. Dependence was measured using naloxone to induce withdrawal in mice that had been treated with a high dose of morphine. Jumping is an easily noticeable withdrawal symptom in mice, so the number of jumps over a 15-minute period was observed. The male FGF21-Tg mice jumped 82% less than the wild-type male mice, and the female FGF21-Tg mice jumped 44% less than the wild-type female mice. These results show a reduction in the development of morphine dependence in FGF21-Tg mice compared to their wild-type littermates. These findings suggest that FGF21 analogues could potentially be prescribed with opioid medications to decrease patient preference and dependence for the opioid.

Torrez, Stephanie

Preceptors
Joshua Bobko, MD, FAAEM
FirstCareProvider.org

David Adler, MD, MPH
University of Rochester Medical Center
Department of Emergency Medicine

Tourniquet Application by Children

Acts of violence, car accidents, and natural disasters can affect people of all ages, sex, and race. According to the American Association for the Surgery of Trauma (AAST), trauma is the leading cause of death in people under the age of forty-five years old in the U.S.. Following events, such as the massacre at Sandy Hook Elementary in 2012 and the Boston Marathon bombing in 2013, the Stop the Bleed campaign was founded in efforts to improve outcomes to such events. Their goal is to educate the general public about how to react in emergency situations and increase the number of bystanders who are equipped and empowered to help those injured, prior to EMS arrival. One such technique that civilians should become familiar with is tourniquet application. According to the American College of Surgeons, tourniquets can save a person bleeding who would otherwise die of blood loss within five minutes. Children encounter such tragedies as frequently as adults and are thus, not excluded from those who should be trained in tourniquet application. An animated training video was created for the instruction of tourniquet application. The objective of this study is to determine whether watching this video could improve application time and whether the video would improve application accuracy. Thirty-one children, between the ages of 5 and 16, were recruited for the study. Subjects were randomly placed into 1 of 2 groups (manufacturer's instructions vs video). Each subject was then able to attempt tourniquet application on a volunteer. Time began once the tourniquet was picked up and ended when the subject indicated completion. Emergency room nurses were present to assess correct tourniquet placement. Results indicate that there was not sufficient statistical power to detect a treatment effect. Fifty-three percent of subjects, who were read the manufacturer's instructions, were able to apply the tourniquet correctly. Thirty-one percent of subjects, who watched the training video, were able to apply the tourniquet correctly. Five data points were excluded from analysis due to incomplete recording of data or previous tourniquet experience. This study had several confounding variables, including unknown previous tourniquet experience in the "non-video" group and the high likelihood of cross-chatter among children regarding techniques to accomplish the task. Although the current study did not have enough subjects to arrive at a statistically significant result regarding the effectiveness of the training video, outside research indicates that current tourniquets are not intuitive and require training beyond the plain manufactured instructions (Dennis, et al., 2019). Our training video created cannot be ruled out as ineffective and should be studied further with a bigger population of subjects.

Vo, Kevin-Kien

Preceptor
Minsoo Kim, PhD
University of Rochester Medical Center
Kornberg Medical Research

Co-Authors
Patrick Reagan, MD
Andrea Amitrano
John Roy Lozada
University of Rochester Medical Center

BII Spectrin Decreases CAR-T Toxicity

CAR-T cells represent a promising new therapy for cancers: by training the immune system to eliminate cancer, future doctors may be able to achieve remissions for patients that are both complete and sustained. However, current CAR-T treatments have been limited to leukemias and lymphomas due to toxicity. Based on in vitro and mouse experiments, we propose that activated T cells aberrantly traffic to the pulmonary circulation, due to an LFA-1/ICAM-1 interaction. Furthermore, we hypothesize that the cytoskeletal protein βII spectrin prevents the LFA-1/ICAM-1 interaction from occurring, and that the process of activating CAR-T cells downregulates βII Spectrin.

Previous work indicates that activated mouse T cells in vitro upregulate a number of proteins relative to naïve T cells, including LFA-1, myosin, αII spectrin, and βII spectrin. However, of the four proteins, only βII spectrin shows a drop-off in expression with increased time post-activation, which correlates with the drop-off with interferon levels seen clinically. Thus, healthy human donor T cells were activated, and at different points post-activation, βII spectrin levels were measured using Western blots. Like their mouse counterparts, the healthy donor cells showed a drop-off in βII spectrin levels post activation. Finally, four CAR-T patients being treated for diffuse B cell lymphoma had their CAR-T cells compared to naïve T cells from healthy donors. Compared to their naïve, healthy counterparts, the CAR-T cells showed a decrease in βII spectrin levels, though the results were not statistically significant. Further experiments with a greater pool of CAR-T patient samples should lead to more significant results.

If βII spectrin is indeed capable of decreasing aberrant trafficking, then CAR-T cells could be modified to increase βII spectrin levels. The potential change could lead to decreased CAR-T toxicity, and allow CAR-T treatment to become available to a vast new set of patients.

Wong, Gordon Siu Lok

Preceptor
Steve Georas, MD
University of Rochester Medical Center
Department of Microbiology and Immunology
Department of Medicine
Division of Pulmonary and Critical Care Medicine

Co-Author
Janelle M. Veazey
University of Rochester Medical Center
Department of Microbiology and Immunology

The Role of Protein Kinase D in Airway Barrier Integrity and Inflammation in Asthma and Infection

Asthma is a chronic respiratory disease, affecting nearly 300 million people worldwide. Patients with asthma suffer from symptoms of mucus production, inflammation, and airway hyper-responsiveness. A number of studies suggest that the integrity of airway epithelium in patients with asthma is often disrupted. Disruption to this protective barrier will enhance foreign matter passage, such as inhaled allergens, particles, and viruses, into the subepithelial space, facilitating inflammation in lung and asthma exacerbation. We have previously shown that protein kinase D (PKD), a serine/threonine protein kinase family, promotes barrier disruption in 16HBE cells in vitro. Here, we examined the impact of PKD inhibition on airway epithelial barrier integrity and inflammation in wild type (WT) and house dust mite (HDM)-treated allergic mice. Acute challenge with inhaled dsRNA induced airway barrier leak in WT mice. However, pharmacologic inhibition of PKD reversed dsRNA-induced airway barrier leak potentially due to attenuated level of peribronchial neutrophil infiltration. Decreased neutrophil recruitment to lung was attributed to reduced chemokine (CXCL1) and lower neutrophil surface integrin (CD11b and CD18) expression. Despite its protective role seen in WT mice, PKD inhibition was surprisingly not able to prevent airway barrier dysfunction and inflammation in HDM-treated allergic mice. Collectively, although our results demonstrate that PKD does not play a role in asthma, PKD inhibitor is still an attractive novel antiviral therapeutic for its ability to promote airway barrier integrity and limit dsRNA-induced neutrophil accumulation in lung. Furthermore, our work suggests that allergy-induced leak and viral-induced leak are dramatically different. Future work will explore the mechanism behind leak in different inflammatory contexts.

Yao, Christopher

Preceptors
Jonathan S. Steinberg, MD
Ronald A. Altman, MD
Summit Medical Group
Cardiology

An Unusual Cohort of Millennials with Atrial Fibrillation: Clinical Characteristics, Ablation Findings, and Outcomes

Background: The prevalence of atrial fibrillation (AF) is largely limited to those >60 years and is rare among the young. Data in the subgroup of millennials is unknown and may differ from the usual older cohorts.

Objective: To describe the clinical and ablation characteristics of millennials presenting with AF.
Methods: All AF patients ≤ 40 years evaluated since mid-2016 were retrospectively identified and case records summarized.

Results: Twenty-four patients were included with age of AF onset 32.2±7.4 years (range 16-40) (79% male). Seventeen (71%) had paroxysmal AF. At least 1 underlying comorbidity was found in 9 (38%): 6 sleep apnea, 2 hypertension, 1 tachycardia mediated cardiomyopathy; and 2 repaired congenital lesions (1 with TAPV with pacemaker and pacing induced cardiomyopathy; 1 with ASD). Nine patients (37.5%) had non-AF supraventricular arrhythmias, either by prolonged ECG monitoring (n=7) or EP evaluation (n=2): typical atrial flutter (AFL) (n=1), reentrant SVT (n=4), and atrial tachycardia (AT) (n=4). Two patients with AT were mapped to the pulmonary veins (PV). Among the 10 patients (42%) who underwent PV isolation ± ablation of non-PV foci, 4 required ≥ 1 repeat procedure and 3 required multiple procedures. Over a median follow up of 11 months, 80% of these were free of AF. One patient had no AF following SVT ablation alone.

Conclusions: Young millennials are being diagnosed with AF and require a comprehensive approach to arrhythmia management. They had a diverse clinical presentation including conventional co-morbidities, tachycardia mediated cardiomyopathy and repaired congenital lesions. Importantly, concomitant supraventricular arrhythmias were very common, including reentrant SVT and focal AT, which strongly suggests that younger patients with AF should routinely undergo prolonged ECG monitoring and comprehensive EP evaluation.

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Zhou, Kina

Preceptor
Mia T. Minen, MPH, MD
NYU Langone Medical Center
Department of Neurology

A Brief Look at Urgent Care Visits for Migraine: the Care Received and Ideas to Guide Migraine Care in this Proliferating Medical Setting

Objective – There has been a rise in urgent care centers throughout the country over the past ten years, leading to an increase in patients accessing medical care in these locations. These centers advertise an alternative to the Emergency Department (ED) for the evaluation and treatment of urgent medical conditions. Migraine accounts for more than 1.2 million visits to EDs in the United States annually. The goal of this analysis was to examine the use of urgent care visits for migraine within two urgent care centers within a large academic medical system in New York City. We examined the trends in management and treatment of migraine in these urgent care settings, as well as prescriptions and instructions given to this patient population upon discharge. We paid particular attention to whether the medications administered and prescribed on discharge were those recommended by American Headache Society migraine management guidelines.

Methods – We conducted a retrospective chart review of patients with migraine diagnoses at two different urgent care locations within one large urban medical center. We determined baseline patient demographics, previous migraine characteristics, frequencies of reasons for urgent care visits as well as various medications administered, medications prescribed on discharge, and characteristics of patient outcomes post-discharge.

Results – Of the 78 patients who visited urgent care with a migraine diagnosis, 20 (25.6%) had a known primary care provider within the urgent care centers' healthcare system. More than three-fourths of all patients (78.2%) had a self-reported history of either recurrent headache or migraine prior to the urgent care visit. Of those with a documented frequency of prior headaches, 79.4% (27/34) had episodic migraine. Of those with a current attack, 12.3% (9/73) were given intravenous metoclopramide and none were given subcutaneous sumatriptan or intravenous prochlorperazine. Of those with reported nausea or vomiting with their migraine, 46.2% (18/39) received an anti-emetic at the visit, and 39.3% (13/39) were given an anti-emetic prescription. Only 11.1% (6/54) patients who did not have a record of having received a prior triptan prescription were given a triptan prescription at the urgent care visit.

Conclusion – The majority of patients in our study who sought medical treatment for migraine in these two urgent care centers were not established patients within the urgent care centers' healthcare system. While 93.6% (3/78) of patients were experiencing current pain upon presentation to the urgent care centers, only 12.3% (9/73) received administration of the medications with the highest level of evidence by the American Headache Society (Level B) for acute migraine treatment in an ED. In addition, the majority of patients with a migraine history presenting to the urgent care setting were not given triptans

or anti-emetic prescriptions upon discharge from their urgent care visit, which may enable improved self-treatment at home should a migraine attack recur.

Key words: migraine, headache, urgent care, acute migraine care

Benassai, Michelle
Iyengar, Mahima
Liu, Michelle

Preceptor
Elizabeth Naumburg, MD
University of Rochester Medical Center
Department of Family Medicine

Pilot of Active Bystander Training Model for Medical Students

Introduction: At the University of Rochester School of Medicine and Dentistry (URSMD) diversity education programming in year one includes a session in which students take implicit bias association tests and then participate in follow-up discussion, as well as a one-day workshop on microaggressions in clinical practice. As students interested in diversity education, we were interested in developing a workshop to further diversity-related education into the second year curriculum to better prepare students for clinical rotations during years three and four. Many US medical schools have cultural competency training in their curricula to prepare students to provide care to a diverse population of patients and to work with diverse patient care teams. We developed the Active Bystander Workshop to review real situations experienced by third and fourth year students during their clinical rotations related to explicit and implicit bias and to encourage students to practice different strategies for being an active bystander for their colleagues or their patients. Educational objectives for the workshop were for students to define the roles and responsibilities of being an ally and an active bystander, to learn strategies to use as an active bystander in a situation influenced by implicit or explicit bias, to practice recognizing situations as opportunities for allyship, and to understand what resources to utilize during or after an encounter involving implicit or explicit bias.

Methods: The Active Bystander Training occurred during two consecutive advisory dean lunch meetings for second year medical students. The training included establishment of ground rules, review of definitions, role play of case scenarios, and reflection questions. All workshops were facilitated by an advisory dean and some sessions also included a third or fourth-year student facilitator. Case scenarios were based on real experiences collected from URSMD students already in their clinical years. Third and fourth year medical students were sent an anonymous survey and asked to describe clinical experiences from rotations during which they witnessed or experienced an incident involving implicit or explicit bias. During the workshop students were given a handout featuring strategies for being an active bystander which was adapted from the 2017 Implicit Bias Report by the Kirwin Institute. The handout also included school policies on incident reporting. Facilitators received a detailed guide prior to sessions. Following the completion of the workshop, students and facilitators received an evaluation that included questions on workshop effectiveness and utility in building active bystander skills, as well as a free form comment section to collect subjective feedback.

Results: Out of the 98 students participating in the workshop, 95 students completed the survey (97% response rate). Eighty-five percent of students found the workshop to be good, very good, or excellent.

While 89 out of 95 students agreed or strongly agreed with the statement that "Having the skills to be an active bystander is important", only 65 students agreed or strongly agreed that the workshop provided them strategies to be an active bystander in the medical education setting. Ninety percent of facilitators believed that the workshop gave students strategies to be an active bystander in the medical education setting. The largest number of comments focused on effectiveness of facilitation, comments ranged from the value of student facilitators to the overreach of facilitators. Additionally, there were many comments that addressed shortcomings of the sessions, with some groups not receiving the session handout, some groups not role playing the scenarios, and some groups focusing on how students could better stand up for themselves, instead of how they could be active bystanders to others.

Discussion: There are several important limitations to consider when evaluating the effectiveness of this workshop. We only administered a post-workshop survey so we were not able to compare student perceptions on the necessity of active bystander training or prior knowledge about active bystander methods before and after the workshop. Additionally, many of the comments were focused on scenarios that occurred in specific sessions, and as the surveys did not collect and link comments to each workshop group, we are unable to objectively assess whether there were significant differences survey responses based on facilitators. As this workshop is only in its first iteration, we only have one set of data to analyze the effectiveness of the session. At this point in time we do not yet have a system for long term follow up of participants to determine retention of knowledge and value of the session during clinical experiences in students' third year of medical school. Future directions include standardization of workshop flow and content across groups, administration of a pre-workshop survey, incorporation of student facilitators in every group, easy access to handouts for every student, and development of case specific and focused reflection questions.

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Carmon, Jessica

Preceptor
Linda Chaudron, MD, MS
University of Rochester Medical Center
Department of Pediatrics, Cardiology

The Importance of Diversity and Inclusion in Public Spaces

Abstract:
Background: Being a member of a marginalized group in an environment that is not diverse or inclusive can feel exceedingly isolating and hinders one's motivation and level of work [2]. One component of a diverse, inclusive, and welcoming environment is the experience individuals encounter in public spaces. Therefore, institutions of higher education should attend to providing diverse and inclusive public spaces to ensure that each individual feels represented, welcome, and is able to best achieve their full potential.

Many institutions of higher education feature honorary displays. These displays include photographs of individuals, titled plaques, and named auditoriums and buildings. Some displays feature individuals who are historically significant and played a role in shaping the institution, while others feature individuals who provided lasting financial support. Often these displays are homogenous and lack diversity and/or historical context. They fail to fully represent the individuals that work and study in the institution. When diversity is embraced and people are able to express their own individuality and celebrate each other's uniqueness, people are more likely to be engaged and collaborate with one another to achieve the goal of the corporation, organization, or institution [1]. Because public spaces have the potential to bring many people of different backgrounds and life experiences together, they are critical areas to explore for representation of the diversity of the organization. Everyone has something different that they bring to the table to enhance the creative thought processes [8]. Completely eradicating innate human biases may be nearly impossible, but that does not mean that steps cannot be taken to minimize the harmful effects of these biases. The first step is to acknowledge that these biases exist and then to develop an environment where stereotyping and discrimination are less likely to be initiated [5]. This can be done by ensuring that public spaces are diverse enough to fully represent everyone that works and studies there and inclusive enough to where each individual feels valued in their environment.

Goal/Objective: While organizations have many ways to address the diversity and inclusiveness of public spaces, we sought to develop an objective tool to gather data regarding the current physical environment of areas frequented by medical students in the University of Rochester School of Medicine (URSMD).

Method: We developed a tool, based on the windshield survey method [6] to investigate diversity of displays featured at the URSMD. A structured approach using maps to identify specific corridors was used to identify spaces for evaluation. Data were collected on 3 floors of the medical center which were divided into 19 sections. Each section took an average of 45 minutes to complete the tool. Domains assessed were the number and type of displays featured, whether the displays were permanent or temporary, the race and gender of individuals displayed, the race and gender of individuals for whom buildings and

auditoriums are named, and whether those individuals are historically significant and/or made a financial contribution. A critical limitation is that the determination of race and gender were based solely on one individual's (JC) visual determination. There were no notations of race, ethnicity or gender or confirmation from other sources for this study. Additionally, the tool that was used to assess the number of all-gender bathrooms and locker rooms, as well as lactation rooms and changing tables. One section assessed inclusivity in displays for all religions.

Photographs were acquired of displays featuring individuals and plaques. Qualitative and quantitative data were gathered in the description section of the tool including notations of race, gender, and motivations for contributions. Certain displays that are unique to the URSMD such as the Heritage Trail and the Hall of Alumni were also assessed qualitatively and quantitatively for diversity of the people displayed.

Analyses: Quantitative analyses of frequency and percentage were completed. Qualitative descriptions noted for whether or not the spaces were used effectively, whether they were areas for people to come together, and whether they were neatly kept.

Results: Four domains were identified as priorities. We collected data on the diversity in visual representation of photos and artwork, the inclusivity of religious prayer rooms and amenities such as bathrooms, lactation rooms, and changing stations, and the naming of buildings and auditoriums. The results are as follows:

Of all of the individuals displayed throughout the areas that were assessed, 50 of 87 (57%) were men and 37 of 87 (43%) were women. Of the individuals displayed, 81 of 87
(93%) were White, 4 of 87 (5%) were Asian, and 2 of 87 (2%) were Black.

Of the spaces that were named after individuals, 18 of 24 (75%) are men and 6 of 24 (25%) are women. Six displays were named after a group of individuals. 24 spaces were named after individuals who made a financial contribution, and 3 were named after historically significant individuals

There were 2 all-gender bathrooms and locker rooms on the Ground floor, 2 on the 1st floor, and 0 on the 2nd floor. There were no lactation rooms seen during the survey, although it was later discovered that there is one lactation room on the Ground floor that is not easily visible.

There is 1 prayer room on the 1st floor of the medical center that is named the Interfaith Chapel.

The Hall of Alumni displayed each graduating class of the URSMD since the first graduating class of 1929. The first woman is pictured in the Class of 1929, although she is the only one, and the of the class is made up of white men. The first Asian individual is pictured in the Class of 1932 and the first Black individual was in the Class of 1956. Over time the number of women and people of color has increased.

The Heritage Trail is made up of numerous displays portray the institution's history, and these displays are located in various hallways around the med center. The displays include photographs of George Hoyt Whipple, who is the Founder and Dean of the medical school, University of Rochester President Rush Rhees, and many other photographs of the institution. The displays are not very visible due to their small size.

The Heritage Trail was also assessed for diversity of individuals displayed, and 10 of the 12 (83%) of the individuals displayed were men, 2 of the 10 (17%) were women, and all 12 individuals (100%) were White.

Discussion: Our project suggests that an objective tool and rigorous method to assess physical space is critically important to assessing and then developing targeted approaches to addressing physical space that reflects the array of people who use the space. Objectivity is critical in addressing this topic as our own individual biases can color our lens when looking at and experiencing spaces. Our results suggest that the displays featured at the University of Rochester School of Medicine are not as diverse as the medical student population or the URSMD community. Majority of the displays that featured people of color were temporary displays that will be taken down in the future, so there could potentially less or more diversity in the future. Another factor that should be taken into account is the number and distribution of displays in certain areas and the relative amount of diversity among these areas. Some areas are significantly less diverse than others. Some of these areas have very few displays and lots of potential to add more displays rather than changing the displays that are already present. Areas that have fewer displays and less diversity and are highly trafficked should be prioritized.

Limitations: There are multiple limitations to this study. One critical one was noted in the methods section and that is that the determination of race and gender were based solely on one individual's (JC) visual determination. There were no notations of race, ethnicity or gender or confirmation from other sources for this study. We know that visual determinations of race, ethnicity and gender are not always accurate. Further data are required to confirm the observations. In addition, where there were large numbers of people such as in each of the graduating classes or the art display in the library, we did not count each individual member which could have increased the number and percentage of women and people of color. Despite these limitations, we believe the data provides an overarching view of the space and provides guidance as to next steps and priorities.

Conclusion: Universities and medical centers should aim to feature displays that better represent the student population, as a lack of diverse public spaces negatively impacts motivation and educational outcomes at institutions of higher learning. Improving diversity of displays will contribute positively to the matriculation of students. Representation is important; it allows people to feel a sense of belonging and molds our perception of reality [8]. It is important for people to know that their dreams are realistic and achievable. Physical space is very telling, which is why great efforts should be made to ensure that all physical spaces are diverse and inclusive enough for each individual to feel represented.

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Hebble, Patrick
Moyer, Rachel
Sachsenmeier, Eliot

Preceptor
Adrienne Morgan, PhD
University of Rochester School of Medicine and Dentistry
CACHED

UR Well Clinic Development Projects

UR Well is a group of student-run clinics based out of URSMD. The clinics offer free or discounted medical treatment to underserved populations at three locations around the city: St. Luke's Tabernacle Community Church, Asbury First Methodist Church, and St. Joseph's Neighborhood Center, while providing an opportunity for medical students to practice skills in a clinical setting. This summer three second-year medical students at the University of Rochester School of Medicine and Dentistry (URSMD) completed an internship based out of the St. Joseph's Clinic. During this internship, each student completed 3 rotations: clinical, administrative, and clinic development. As part of the clinic development rotation, each student worked on various projects designed to improve the quality of care at one or all of the UR Well clinics, all of which are discussed below. It should be noted that, because the clinic development rotation was only 3 weeks long, many of these projects are still being completed. As such, this abstract will identify current progress and future goals.

Addressing Social Needs:
When each patient goes through intake at St. Luke's, they are asked two important questions: "do you need help in any of the following medical areas" and "do you need help in any of the following social areas?" They are able to look through a list of resources ranging from housing and food to finding a primary care physician. Overall, 22% of patients requested assistance in some aspect of medical care and 8% of patients requested assistance in some aspect of social assistance.

While connecting patients to these resources is potentially one of the most beneficial aspects of attending St. Luke's, medical students have previously had limited capabilities to provide assistance. Referrals to necessary resources have taken the form of well-intentioned resource guides handed to patients after their appointments and unable to be followed up on. When students are aware of community organizations that could potentially help, they rarely have knowledge of the services these organizations can actually provide (as indicated by survey results from earlier this summer).

Two projects were undertaken this summer to address this gap in care. The first is a series of lunch talks designed to introduce medical students to local organizations that address the social needs commonly requested by patients. The goal of these talks will be to familiarize students with the services these organizations provide, such that students will be able to talk about them with patients and identify which organizations will best help which patients. Our hope is to have a different organization present each month during the academic year. Currently, Food Link, The Housing Council at Pathstone, The Long-

Acting Reversible Contraception (LARC) Initiative, and the Healthy Baby Network are scheduled to speak this Fall.

The second project designed to better address the social needs of patients is the formation of a social work partnership with Nazareth's Social Work Program. The goal of this partnership is two-fold, to both provide a more concrete avenue for patients to access local resources and to foster an interdisciplinary approach to medicine in the UR Well clinics. As a result of this partnership, one social work intern from Nazareth will be completing a year-long social work internship at St. Luke's UR Well clinic. With this development, patients can be told that - if they disclose any social or medical resource needs - there will be a social work student (under supervision from a Nazareth social work faculty member) on hand who is able to connect them with local resources. The hope with this partnership is that with a tangible source of assistance at clinic individuals will feel more comfortable sharing areas where they need assistance and that St. Luke's clinic will be better prepared to connect patients to local resources. In this way, we hope to have a more effective way to handle social needs of patients and better improve their long-term health. Data will be collected by the social work intern throughout the school year to document the number of patients who choose to speak with social work, what resources are most requested, and which resources the social work partnership is able to connect them with.

Interpretation Services:
A significant number of our patients have a primary language other than English. Since March 2019 (when the UR Well Demographicsform was update), of the 366 patients that reported a preferred language, 50 patients (13.7%) indicated that their preferred language is Spanish. Our goal at the beginning of the summer was to install interpretation phones at both Asbury and St. Luke's (St. Joseph's already has them). Unfortunately, neither site had the prerequisite wiring to set the phones up. Currently, our plan is to recruit qualified volunteers to take a "fluency exam" with the department of interpreter services at Strong. While passing this exam does not allow students to serve as interpreters, it allows students to talk with patients in Spanish. The ultimate goal at least one health team member at St. Luke's and Asbury will have the fluency certification every night. This project is currently in the process of student recruitment, and the plan is to include a slot for "Fluency Certification" in the next round of scheduling.

CME Credit:
One persistent challenge in organizing the weekly UR Well clinics is finding enough physicians willing to volunteer as preceptors for the medical student teams. It was realized that precepting at these activities could count toward Category 2 CME credit, a form of credit claimed by physicians from the AMA for participating in medical education. Consequently, fulfilling their CME requirements was thought to be a good potential incentive for physicians to participate in UR Well and students on the UR Well physician recruitment team were asked and provided the resources to advertise this opportunity in their search for providers.

Miscellaneous Projects:
UR Well Handbook: A handbook outlining the roles and expectations of UR Well for student volunteers is currently receiving final edits from student leadership. The purpose of the handbook is to ensure every volunteer clearly understands their responsibilities during the night. One of the primary focuses of the handbook is the procedure for clinic closures, as there is currently no standard practice for what to do in the event of a cancelation. Ultimately, the hope is that this procedure will involve volunteers personally greeting patients at the door to inform them of the cancellation, instead of simply leaving a sign.

Clinic Promotion/Advertisement: Interns met with a University of Rochester publicity team to speak about a special advertising campaign aimed at the 20th anniversary of UR Well. In addition, throughout the summer, administrative coordinators compiled a list of employers that send patients to the clinics. The goal of this list is to give updated clinic "business cards" to these employers for them to distribute to potential employees. Additionally, these business cards can be given to patients in the event of a clinic closure or when a clinic is full so they can know when and where the other clinics are. Finally, the website is currently undergoing an overhaul in hopes of making it more presentable and easier to use. One of the primary goals is to have an accessible calendar that displays all specialty nights, clinic offerings, and cancelations.

TeleMedicine: Using TeleMedicine as a means to provide care for patients remotely when a licensed physician could not be recruited was thought to help further with the challenge of physician recruitment. The TeleMedicine app "Zoom" would allow UR Well to do this but a pilot run (most likely through one of the clinic specialty nights) will still be necessary to ensure quality care and determine if TeleMedicine is actually more convenient that recruiting in-person physicians.

Discounted Supplies: Discounted supplies, such as a new thermometer, sharps containers, gloves, and office supplies were purchased through a URMC account to replenish the two clinics that are not based out of an established clinic during the day (St. Luke's and Asbury). This should prove to be a reliable avenue for purchasing new supplies for UR Well in the future.

Greater Rochester Health Foundation Grant: In noting the physical improvements that need to be done to the clinic space at St. Luke's clinic to provide a welcoming and respectful space for the community, a grant was submit to the Greater Rochester Health Foundation. The grant requested funding for improvements includin paint, new floors, a water fountain, and bathroom renovations as well as barriers in the waiting room to improve patient privacy during intake and television screens to display public health data while patients wait to be seen. Though the grant request was denied, more work will be put into revising the grant to request funding again this spring.

Iyengar, Mahima
Meyer, Jessica
Najera, Chance

Preceptor
Adrienne Morgan, PhD
University of Rochester School of Medicine and Dentistry
CACHED

Effectiveness of Student-Run Conference for Improvement in Self-Reported Knowledge and Attitudes on Im/Migrant Farmworker Health

Introduction: It is estimated that there are between 80,000 and 100,000 farmworkers in the state of New York. Migrant workers play an integral role in the agricultural industry, without which farms would struggle to meet production demands. They are particularly vulnerable to medical problems and workplace injuries due to lack of healthcare access, low socioeconomic status, and workplace hazards. The National Center for Farmworker's Health reports that 37.6% of agricultural workers are uninsured, and 71.6% of workers live below the poverty line. Workplace hazards include pesticides, heat and sun exposure, toxic dust exposure, repetitive strain injuries, and hazardous tools and machinery. The strenuous hours and isolation impact mental health of workers, with one study of local NY dairy workers reporting 80% of participants felt depressed. Healthcare professionals may interact with these communities in the primary care, emergency department, and other settings, and therefore need to be not only aware of this patient population and their healthcare needs, but also trained in the specific complexities of providing competent care to this population. To address this, eight medical students from the University of Rochester School of Medicine and Dentistry organized a full day conference during which farmworkers, community organizations, researchers, and healthcare providers gave presentations on numerous topics during the one-day conference. The goals of this conference were for participants to gain an awareness about the im/migrant worker communities in upstate NY and their barriers to healthcare, acquire new skills to foster providing competent care to im/migrant workers, engage with individuals who provide activism and advocacy for the im/migrant worker community, building partnerships for sustainable collaboration.

Methods: The full-day conference included sessions during which farmworkers, community organizations, researchers, and health-care providers presented on various topics relating to the work im/migrant workers perform. Conference attendees were encouraged to complete anonymous pre-conference and post-conference pencil-and-paper surveys that primarily served to evaluate the efficacy of the educational objectives of the conference. The survey also collected information about participants' occupations, and evaluations of each individual breakout session.

Results: The goals of this study were to assess the effectiveness of this student-run conference in terms of improvement in participants' self-reported knowledge and attitudes on im/migrant worker health. Demographic data indicated that 62% of attendees were students, 12% were healthcare providers, and the remaining 26% of attendees consisted of community advocates not directly affiliated with the

healthcare system. The differences in participants' knowledge were appreciable. Before the conference 42 out of 126 (33%) respondents either strongly disagreed, disagreed, or were neutral to the statement "I am aware of im/migrant communities in Upstate NY and their contributions to our community." However in the post conference survey, every respondent agreed or strongly agreed with the statement "As a result of attending this conference, I am better able to appreciate the experiences of im/migrant workers in Upstate NY and their barriers to healthcare." Additionally, participants reported feeling better able to engage and build partnerships with organizations advocating for the im/migrant worker community.

Discussion: This study provides a foundation for the successes and limitations of a student run conference as a tool to improve knowledge and awareness on a specific topic. Our findings indicate an increase in self-reported knowledge and awareness in all topics evaluated. Future student run conferences could more closely evaluate objective knowledge gain in participants and identify a better mechanism for follow up to identify long term change. Future conferences could also incorporate more effective outreach not only to students, but also to current community providers as well.

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Chen, Spenser

Preceptor
Chuan-Yu Chen, PhD
National Yangming University

Pediatric End-Of-Life Care Utilization Pattern in Taiwan

BACKGROUND: Several studies have indicated how attitudes toward end-of-life care varied by culture and society (Liu, et al., 2014, Huang, et al., 2013, Tang, et al., 2005). In the pediatric population, one retrospective study reported that only 7.2% of children who died from cancer in Taiwan utilized hospice care as compared with 35% to 44% in Germany and 41% in the US (Tang, et al. 2012, Bluebond-Langer et al., 2007, Hechler et al., 2008, Baker et al., 2009). While Taiwan's implementation of the national health insurance program has robustly improved healthcare delivery since 1995, palliative care consult teams were not available prior to 2005 (Wen, et al., 2008, Cheng, et al., 2015, Tang, et al., 2012). To this point, little is known about the utilization pattern of pediatric end-of-life care in Taiwan.

OBJECTIVE: To assess pediatric end-of-life care utilization pattern from 1998 to 2013 in Taiwan.

METHODS: National Health Insurance Data from 1998 to 2013 were obtained from the Ministry of Health and Welfare. Patients who met all of the following criteria were included in the study: 1) primary diagnosis categorized as "catastrophic illness" as defined by the Ministry of Health and Welfare, 2) between the ages of 1 to 17, 3) have a confirmed death date, and 4) have at least one outpatient or inpatient record before death. Outpatient and inpatient records 30 days before death were reviewed for previously established end-of-life care intensity markers (Earle, et al. 2005).

RESULTS: A total of 5984 minors were identified. 3488 (58.3%) were male and 2496 (41.7) were female. 36.2% were between the ages 1 to 5, 31.2% the ages of 6 to 12, and 32.7% the ages of 13 to 17. 20.3% of the patients died between 1997 to 2000, 34.3% died between 2001 to 2005, 29.8% died between 2006 to 2009, and 15.7% died between 2010 to 2014. The most common three catastrophic illnesses were malignancy (32.9%), neuromuscular (23.5%), and cardiovascular diseases (11.4%). In the last 30 days of life, 53.0% received two or more medically intense interventions, 8.8% had two or more emergency room visits, 15.1% had two or more hospitalizations, 47.8% were admitted to the ICU, 42.5% were intubated or placed on mechanical ventilation, and 20.3% received cardiopulmonary resuscitation. 58.0% died in the hospital. The utilization rate of hospice care in the last 30 days of life significantly increased over the study period: 1997-2000 (0.6%), 2001-2005(1.6%), 2006-2009(3.8%), 2010-2014 (6.3%) ($P<0.0001$). Only 160 patients (2.7%) utilized outpatient hospice, inpatient hospice, or palliative care consultation. Majority of them were those with malignancies (96.3%) and only six patients with non-malignancy diagnoses employed hospice care over the study period.

CONCLUSION: We observed high intensity end-of-life care for children under the catastrophic Illness category in Taiwan. Consistent with previous literature on Taiwan's end-of-life care pattern and attitudes, hospice and palliative care were rarely employed. While the utilization of pediatric hospice care increased

over the past decade, nearly no utilization remained for non-malignancy diagnoses. Meanwhile, Taiwan's National Health Research Institute recently published policy recommendations on pediatric palliative care, including benchmarks to improve pediatric end-of-life care. Empirical evidence is needed to understand the under-utilization in the pediatric population, particularly the subpopulation affected by non-malignancy related catastrophic illnesses.

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Gochenaur, Lauren
Peterson, Sara

Preceptors
David Adler, MD, MPH
University of Rochester Medical Center
Department of Emergency Medicine

Luis Vasquez, MD
President, Yantalo PERU Foundation
Medical Director of Clinic

Cervical Cancer Prevention: Knowledge and Barriers to Care Screening in Yantalo, Peru

Background and Introduction

Yantalo is a town located within the Peruvian Amazon, a historically isolated and impoverished region within Peru. Yantalo has 3535 inhabitants, where 1,612 (45.6%) are female and Spanish is the primary language.[1] Women's healthcare is free and accessible at a small medical post, the Centre de Salud, in the central town square. The post is usually short-supplied and understaffed when compared to the large patient volume; however Pap smears and acetic acid testing are offered here. HPV vaccination is available at the Centre De Salud but most young girls have been vaccinated through government- sponsored campaigns.

Globally, cervical cancer is the third most common cancer worldwide, and the second most common cancer in females globally.[2] In 2018, Peru reported an incidence rate of 25.2 per 100,000, the second leading cause of female cancer.[3] In comparison, the NIH reported the US incidence rate to be 8.1 in 2018. Cervical cancer has been identified as the largest cause of potential years of life lost in the developing world.[3] Human Papillomavirus (HPV) holds a strongly recognized link to cervical cancer, and is largely preventable through vaccination.[4]

Cervical cancer remains prevalent in Latin America, especially in rural communities like the ones located in the Peruvian Amazon where access to screening is sparse.[5] The current rate of cervical cancer screening is estimated to be 53.9% in all women above the age of 18 in Peru.[5] In Peru, barriers to cervical cancer screening include lack of availability of trained staff, lack of follow-up, as well as economic, geographical, and educational barriers.[6] Considering the high incidence and mortality rates of cervical cancer in Peru, gathering data surrounding knowledge and barriers to preventative care is instrumental in developing focused initiatives to reduce cancer rates in the future.

Objectives

The primary objective of this research is to assess knowledge on cervical cancer screening, prevention methods and collect data on barriers to accessing cervical cancer screening in women in Yantalo, Peru. The aims of our project include:

- Gain a better understanding of the barriers to accessing cervical cancer screening in rural Peru

- Assess knowledge surrounding cervical cancer and HPV among Peruvian women
- Explore the link between cervical cancer knowledge, rates of completed cervical cancer screening, and cervical cancer itself

Methods & Materials

A cross- sectional approach was used to assess the knowledge base of women in the community and barriers to accessing preventative care in Yantalo. The questionnaire consists of four close-ended question sections: demographic information, gynecological health history, barriers to care screening, and a knowledge assessment. The questionnaire also includes open-ended section allowing women to voice questions and give suggestions on how to improve knowledge in their community considering their personal experiences and attitudes.

We systematically disseminated surveys using a city plan of Yantalo and approached houses in -person. Subjects were eligible if they are a woman, at least 20 years of age, and from the Yantalo community. We used a structured interview format, ensuring women of all literacy levels are able to participate. Administering one survey took approximately ten to fifteen minutes. After completing the survey, respondents were asked if they had additional questions about the subject matter and were given an information sheet about cervical cancer and HPV.

Each question in the knowledge section has an option of "True", "False", or "I don't know." A response of "I don't know" is coded as incorrect, as it indicates a lack of knowledge. Surveys did not ask participants for personal identifiers and participants had the option to discontinue the survey at any time. Paper surveys were destroyed and electronic data was stored in a password protected file.

Results

Data from 217 respondents was collected, 207 respondents identified Yantalo as the community in which they live. 56% of respondents identified having completed primary school but not secondary school, the US equivalent to high school. 75.8% of responders (n=207) reported having heard of HPV, while only 23.7% reported knowing anyone diagnosed with HPV. Similarly, 77.8% of responders reported hearing of cervical cancer, with 33.3% reported knowing someone diagnosed with cervical cancer. When asked if they have ever received a test to check for cervical cancer, 44.4% (n=92) reported that they had. When given a 10-question knowledge assessment, women had an average score of 57.3%

Question	True	False	I Don't Know
HPV causes cervical cancer	137 (67.5%)	13 (6.4%)	53 (26.1%)
HPV can be passed through sexual contact	151 (74.4%)	18 (8.8%)	34 (16.7%)
Using condoms reduces HPV transmission risk	125 (61.2%)	35 (17.2%)	44 (21.6%)
Having multiple sexual partners increases HPV contraction risk	161 (78.9%)	16 (7.8%)	26 (12.7%)
A vaccine can protect you from HPV	118 (57.8%)	14 (6.9%	72 (35.3%)
HPV vaccines can effectively prevent cervical cancer	110 (53.9%)	13 (6.4%)	81 (39.7%)
Pap smears and acetic acid testing check for cervical	149 (73.0%)	8 (3.9%)	47 (23.1%)

Pap smears and acetic acid testing check for STIs	150 (73.5%)	19 (9.3%)	34 (16.7%)
Cervical cancer can be prevented by Pap smears	159 (77.9%)	11 (5.4%)	33 (16.2%)
Cervical cancer can be cured if detected early	189 (92.6%)	5 (2.5%)	10 (4.9%)
Spirits and supernatural can affect someone's health	100 (50%)	63 (31.0%)	39 (19.2%)

When questioned about receiving the HPV vaccine only 29.0% reported yes, 59.4% reported "No", and 11.6% reported "I don't know." If free tests for cervical cancer were offered, 79.1% of the women reported they would accept a free test, 12.6% reported no, and 7.3% reported "Maybe."

Barrier to Care	Women reporting this as a barrier
Women indicated they have easy access to cervical cancer screening	129 (62.6%)
"I am afraid the test will cause me pain"	30 (14.6%)
"I didn't know cervical cancer testing is something I should have done"	26 (12.6%)
"The test is too expensive or I don't want to spend money on it"	19 (9.2%)
"I am distrusting or feel uncomfortable around medical providers"	18 (8.7%)
"It is hard for me to find transportation"	18 (8.7%)
"There aren't any providers nearby"	14 (6.8%)
"I have a religious or moral objection to obtaining a screening test"	11 (5.3%)
Other Reasons (Open- Ended)	12 (5.8%)

Optional open-ended questions asked women how to increase education surrounding cervical cancer and HPV in Yantalo. 18% (n=37) of women indicated "having talks" as an effective method of spreading information in the community. Considering high volume of requests, an educational talk was held for the community in the centrally located Municipal Building. When asked if they had additional questions regarding the subject matter, common responses included, "What are the symptoms of cervical cancer?", "How do you prevent cervical cancer", and "How do you treat HPV and cervical cancer?"

Discussion

We surveyed 21% of our target population of eligible adult women in Yantalo (n=986) with the primary objectives of assessing the community's prevention-based cervical cancer knowledge and collecting data on cervical cancer screening rates and access in Yantalo, Peru. The average respondent was female, median age of 41.6 years old, with the education equivalent of some high school.

Rates of Cervical Cancer and HPV and Familiarity within Yantalina Women: The incidence rate of cervical cancer in Peru is 25.2%.[3] Despite this high incidence, only 33.3% of respondents knew someone diagnosed

with cervical cancer. When asked the same questions regarding HPV, both familiarity with and knowledge of someone with HPV diagnosis was lower when compared to rates of equal questions regarding cervical cancer. Considering the causal nature of the virus with cancer, and the high prevalence of HPV, this suggests a need for further testing for and education about HPV.

PAP Knowledge – Inconsistent: Interestingly, there were inconsistencies between women responding yes to "Have you ever gotten a test to check for cervical cancer?" (44.4%, n=92) and the number of women reporting when their most recent Pap test was (68%, n=141). This inconsistency suggests a potential lack of surrounding the functionality of Pap exams. This is further supported in the knowledge assessment, where 73.5% (n=150) of women incorrectly reported that Pap smears are a form of testing for STIs.

Additionally, 23.1% of women responded "I don't know" when given the statement "Pap smears test for cervical cancer." 77.9% of women incorrectly responded that cervical cancer can be prevented by receiving Pap exams. This suggests that information about Pap tests should be made available to Yantalo's women.

The Knowledge Assessment: The average score on the knowledge assessment was 57.3%. Younger women (20-49) performed significantly higher on the knowledge assessment than women over 70 years old. This is likely correlated with increased number of women attending schools, improved reproductive/sexual health education in schools, and internet accessibility.

The lowest scoring bracket, consistently, were women that did not complete primary school education. Their knowledge assessment scores were significantly lower than women completing secondary school, vocational school and some university education. Women with vocational school degrees performed the highest, with an average score of 70%. Women with a bachelor's degree or higher and some university did not have the highest scores on the knowledge assessment. Only five (2.4%) women with college Bachelor's, Master's or Doctorate (2.4% of total women) and thirteen women with some university education (6.3% of total women) were surveyed. It is recognized that women who hold higher levels of education may not reside in Yantalo due to the lack of career opportunities. Specific data regarding population education level is not available from the Yantalo Municipality.

HPV Vaccination Rates/ Survey wording: 59.4% of respondents (n=207) reported they had not received the HPV vaccine, with only 29.0% reporting yes. "Yes" respondents may be overestimated due to prevalent vaccine misunderstandings among women. During survey administration some women would respond "yes" to receiving vaccines, and then mention another illness such as rubeola or influenza. When following up, reiterating specifically for the vaccine for HPV, the women would still respond "yes." Anecdotally, this effect was more noticeable in older women. In Peru, the HPV vaccine is currently only available to females aged 9-10 years old during school campaigns. There is currently no schedule for organized or opportunistic catch up. There is no data available on HPV vaccination coverage on the national nor the local level.[3]

Women were unfamiliar with the term "cervical" as used on survey; a more commonly used term is "cuello uterino." Upon learning this, surveyors explained to women the similarity between the terms. However, It is recognized that this could lead to inaccurate answers for questions involving the term "cervical."

Health Center Data: Our survey data reports 41% of women have received cervical cancer screening within the last year (n=139). Data from the Centre of Health in Yantalo reports that 118 Papanicolaou exams

(2018 n=61, 2019 n=57) and 104 acetic acid exams (2019 n=40, 2018 n=64) were performed in women within the last year, for a total of 22.5% (n=986) women receiving cervical cancer screening within the last year. The number from the Centre de Salud data is likely underestimated, as it is known that women from Yantalo often travel to Moyobamba, a neighboring city, for pay-per-service gynecological care as the Centre de Salud only offers gynecology services on Mondays and is understaffed. In the San Martin Region, where Yantalo is located, estimated screening coverage of the general female population is 60.1%.[3] In Peru, cervical cancer screening is recommended in women ages 30-49 via PAP or VIA every three years.[3] Data from the Yantalo Center of Health shows that women aged 30-49 receive visual inspection with acetic acid testing and women 50-65 more commonly receive Pap smears.

Open Ended Questions: Upon receiving the response "have a talk" repeatedly when asked how to increase education, a charla was arranged by the investigators during the last week in-country. Flyers were distributed and posted around the community for three days. The talk occurred on a Sunday night at 6:30pm in a Municipal building that is located in the center of Yantalo. Only nine people attended the talk; three of which were men. The limited advertisement time and actual timing of the talk may be reasons for the poor turn-out

Future Directions: 79.1% of women reported they would accept a free test for cervical screening. When asked about access to cervical cancer screening tests, the majority of women (62%) indicated that they could access testing easily. The three most common barriers in seeking testing were fear that the test would cause pain (15%), not knowing that testing is something that they should do (13%), and the expense of test (9%). Public health initiatives that dissuade fear of receiving a Pap test and increase awareness of cervical cancer prevention may be key in increasing rates of cervical cancer screening in Yantalo.

In addition to the data collected, other useful data points to be collected in the future include smoking status, number of children, contraceptive use, age of sexual debut, and hysterectomy status. Data collected in 2019 from the Health Center in Yantalo (n= 986) includes information about contraceptive use. 30 (3.04%) women report using oral contraceptives, 73 (7.4%) report using injectable contraceptives, 30 (3.04%) report using implantable contraceptives, and 44 (4.46%) report using male condoms. Knowledge, barriers to care, and community attitudes surrounding contraception use in rural Peru remains an area that requires investigation to improve access to family planning strategies.

Hack, Madelaine
Stoner, Andrew

Preceptors
Rick Hodes, MD
Addis Ababa Burn, Emergency, Trauma Hospital
American Jewish Joint Distribution Committee

David Korones, MD
University of Rochester Medical Center
Department of Pediatrics, Hematology, and Oncology

Characterizing Spinal Deformity among Pediatric and Young Adult Patients in Addis Ababa, Ethiopia

Introduction: In Ethiopia, there is an extraordinarily large number of pediatric and young adult patients with spinal deformities. Anecdotal information from the Scoliosis Research Society (SRS) describes the majority of cases to be congenital and early-onset kyphoscoliotic deformities, and a sizeable minority of cases due to post-tuberculosis kyphosis.[1] Congenital scoliosis is caused by the failure of the vertebra to form and/or properly segment during embryonic development, resulting in an abnormal lateral curvature of the spine. Idiopathic scoliosis is scoliosis that develops, most often in adolescents between 11-18 years of age, without a known cause.[2] Post-tuberculosis kyphosis is a sequela of tuberculosis, a bacterial infection that most often attacks the lungs. When left untreated, the infection can damage the vertebrae and result in kyphosis, which is excessive outward curvature of the spine that results in an abnormal rounding of the back.[3] In their severe forms, all of these spinal deformities can lead to compression of the thoracic cavity and result in restricted lung function.

Despite this large patient population, there is no surgical service in the entire country that offers scoliosis deformity corrective surgery for the most severe cases. Furthermore, there is little information, besides that anecdotally provided by the SRS that characterizes patient demographics or the severity of spinal deformities seen in Ethiopia. This study aimed to provide quantifiable information that characterizes the population of pediatric and young adult spinal deformity patients in Addis Ababa, Ethiopia in order to illuminate the quantity and severity of deformities seen in the country.

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[3] Rasouli, Mohammad R., Maryam Mirkoohi, Alexander R. Vaccaro, Kourosh Karimi Yarandi, and Vafa Rahimi-Movaghar. "Spinal Tuberculosis: Diagnosis and Management." Asian Spine Journal 6, no. 4 (2012): 294. https://doi.org/10.4184/asj.2012.6.4.294.

Methods: We obtained data from the charts of 191 patients seen by Dr. Rick Hodes at his clinic in Addis Ababa Burn, Emergency, Trauma Hospital in Addis Ababa, Ethiopia between January 2016 and December 2018. Dr. Hodes single-handedly sees what is probably the largest volume of pediatric and young adult spinal deformity patients in the entire country. Charts consisted of files on the computer of .jpeg pictures of paper forms, X-rays, MRIs, etc. Participants met the following inclusion criteria: 29 years of age or younger at the time of their first clinical visit, documented demographics form and radiologic imaging, either X-ray, MRI, and/or CT scan, of the spine. A total of 822 charts were reviewed and 631 charts were excluded from the analysis, the majority because of a lack of the demographics form or radiologic imaging. Demographics data were collected from a standardized intake form. Classification of the kind of spinal deformity and the apex of the deformity was assessed from radiologic imaging. Pulmonary function was assessed with spirometry. Cobb angle, a measurement used to quantify the magnitude of scoliosis, was measured using the CobbMeter iPhone app. Cobb angle was measured from the radiologic imaging of patients who had pulmonary function test recordings.

Results: The patient population consisted of 96 boys and 95 girls; their average age was 14 years +/- 7 years. There was no significant difference between the ages of the boys and girls (p=0.09). Patients reported an average wait-time of 7 years between the self-reported time that they first noticed a problem with their spine and when they were seen by Dr. Hodes. 15% of patients reported receiving traditional healing. The majority of patients (55%) reported they did not know what was mechanism of their spinal deformity, and the second-most common response was due to a "fall down accident" (23%).

The distribution of the types of spinal deformities and the apex of deformity are summarized in Table 1 and Table 2.

Table 1. Type of Spinal Deformity (N=191)

Type of Spinal Deformity	Patients, n (%)
Kyphosis	42 (22%)
R scoliosis	65 (34%)
R kyphoscoliosis	29 (15%)
L scoliosis	32 (17%)
L kyphoscoliosis	19 (10%)
Disc bulge	3 (2%)
Double scoliosis (S Curve)	1 (1%)

Table 2. Apex of the Spinal Deformity (N=191)

Apex of the Deformity	Patients, n (%)
Cervical	2 (1%)
Cervical-Thoracic	1 (1%)
Thoracic	141 (74%)
Thoracic-Lumbar	31 (16%)
Lumbar	14 (7%)
Lumbar-Sacral	2 (1%)

41 patients, 18 boys and 23 girls, with scoliosis or kyphoscoliosis had pulmonary function test results and Cobb angle measurements. The average Forced Vital Capacity (FVC) % predicted was 50%, with a standard deviation of 14%. The average Forced Expiratory Volume in 1 second (FEV1) % predicted was 53%, with a standard deviation of 15%. Cobb angle measurement was an average of 88° with a standard deviation of 28°. There was no significant difference in the Cobb Angle measurement between the boys and the girls (p=0.6).

A simple linear regression was performed assessing the relationship between the Cobb angle and the FVC % predicted and the FEV1% predicted. There was a significant inverse relationship between the Cobb angle and FVC % predicted (p=0.014) and FEV1 % predicted (p=0.001). The variation of 14% of FVC % predicted was explained by the Cobb angle (R2=0.14). The variation of 25% of FEV1 % predicted was explained by the Cobb angle (R2= 0.25).

Discussion: This study provides insight into the severity of spinal deformity in young adult and pediatric patients in Addis Ababa, Ethiopia. In the international community, most authors agree that a Cobb angle of greater than 40° indicates the need for surgical treatment. The 41 patients who had Cobb angles calculated had an average measurement of over double the measurement indicated for surgery. The severity of pathology is reflected in the FVC % predicted and FEV1 % predicted values of the 41 patients, which were on average roughly half of the predicted volumes. There appears to be significant room for improvement in terms of increasing access to early medical attention given that patients reported waiting an average of 7 years between when they noticed a problem with their spine and when they were seen by Dr. Hodes. Additionally, there appears to be a lack of patient education regarding the etiology of their condition and how it can be treated. Roughly half of patients did not know what caused their deformity, and almost a quarter believed it was due to falling down. 15% of patients received traditional healing, which ranged from holy water treatments to treatments by Wogeshas, traditional healers who use hot instruments to burn the affected areas, resulting in permanent scarring along the back. In light of the lack of surgical centers that can do scoliosis corrective surgery in the country, one might suggest that public health interventions should be focused on early detection of spinal deformities, early medical attention, and patient education. However, early detection and medical attention are not useful unless there is some treatment option available for patients. The only corrective treatment option for these severe spinal deformities is surgery. We hope this study sheds light on the need for the development of spinal deformity corrective surgery centers in Ethiopia.

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Levy, Scott

Preceptor
Daniel Hailu, MD
Addis Ababa University
Department of Pediatrics

Assessment of current treatment data acquisition techniques within the Department of Pediatric Hematology-Oncolgy at Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia

Purpose: There is a lack of oncology registry data in many low-middle income countries (LMIC), with a significant lack of pediatric data. Our goal was to continue work on the implementation of previous efforts to begin collecting pediatric oncology registry data for Ethiopia. After an initial review of current treatment documentation practices at TASH, we decided that there was an immediate need for improvement in the techniques used for treatment documentation that needed to be completed prior to continuing efforts of implementing a registry.

Design/Methods: We conducted an initial review of current data treatment records to assess the pitfalls to accurate data collection. This included attending daily rounds on the unit as well as working with attendings, residents, nurses and pharmacists to understand exactly who was documenting the treatment data in the patient charts. After meeting with the different personnel involved, we identified the major roadblocks to accurate data collection. The major issue identified was a lack of uniformity of the documentation both within individual patient charts as well as between different patient charts.

Results: In an effort to simplify the data collection on the ward, we decided to create treatment specific worksheets that would serve two purposes: 1) clearly outline the treatment plan and 2) allow for real-time treatment data documentation in a uniform and concise document. After working with attendings, nurses and residents to create the worksheets we piloted the worksheets for Acute Lymphoblastic Leukemia (ALL) to assess the ease of implementation of a new documentation method. The worksheets proved to be clear method of outlining treatments as well as capturing treatment data. The pilot program highlighted that the rapid turnover of residents rotating on the Pediatric Hematology-Oncology service was a major hurdle to successful implementation.

Conclusions: The implementation of new documentation methods on the Pediatric Hematology-Oncolgy ward at Tikur Anbessa Specialized Hospital is an attainable goal and a vital step towards implementing a more complete pediatric oncology registry data collection method. This effort will require continual modification to the data collection techniques, frequent training for proper documentation techniques as well as further assistance from future visiting personnel (i.e. teaching physicians, pharmacists, medical students).

Pak, Clara

Preceptors
Dr. Nathan Congdon, MD, MPH
Queen's University Belfast
School of Medicine, Dentistry and Biomedical Sciences

Dr. Lynne Lohfeld, MPH
Queen's University Belfast
School of Medicine, Dentistry and Biomedical Sciences

Dr. Benjamin Hammond, MD
University of Rochester Medical Center
Department of Ophthalmology

China Laser and Surgery Study (CLaSS): A Mixed Methods Study with a Randomized Controlled Trial Comparing Outcomes from Selective Laser Trabeculoplasty (SLT) versus Surgical Treatment (Trabeculectomy) for Glaucoma with Qualitative Feedback from Physicians and Patients in Wenzhou, China

Glaucoma is one of the three leading causes of blindness in China. Although this condition can be controlled with medication to lower intraocular pressure (IOP), such treatment must continue over a patient's lifetime. This is not practical in resource-poor settings due to cost and inconvenience for patients. Surgery (trabeculectomy) is the standard treatment offered in rural China but is rarely used because of the following issues: a) need for hospitalization, which increases patient expense and inconvenience, b) high refusal rate by patients for all ocular surgery, c) high rates of infection due to poor quality instruments and material, d) need for multiple follow-up visits post-surgery.

A viable alternative for patients in rural China is selective laser trabeculoplasty (SLT), based on the following advantages: a) simplicity (done as a 5-minute outpatient procedure requiring only topical anesthesia), b) effectiveness (18-32% reduction in IOP, which is comparable to medication), c) safety (complications are rare and do not include serious infections as with trabeculectomy), d) convenience (minimal follow-up, with one visit within 6 weeks post-surgery), e) cost-effectiveness, f) acceptability to patients (due to low-cost outpatient care with easy follow-up).

However, rates of SLT to treat glaucoma are low in rural China, where glaucoma is the leading cause of uncorrectable blindness and only 10% of patients receive treatment. This may be because physicians are reluctant to offer SLT to patients and/or patients decline such treatment. Interviews with glaucoma specialists and patients with glaucoma can help us better understand barriers to the use of SLT to treat this disease.

The qualitative component of the CLaSS project is an exploratory descriptive study based on interview data from glaucoma patients and specialists affiliated with eye clinics in Wenzhou, Zhejiang Province,

China. The aim is to gather information about physician and patient views on: a) the acceptability of SLT and trabeculectomy, b) barriers to timely treatment and scheduled post-treatment follow-up of patients, and c) recommendations to improve care of glaucoma patients in rural China in the anticipation that this information will be used to improve the quality and accessibility of glaucoma care in rural China. Interviews with patients and physicians began in July 2019 and they will continue until the sampling criteria of 8-10 physicians and 20-24 patients are reached.

Parmeter, Stephanie
Wong, Wayne

Preceptor
Atiporn Saeung, PhD
Chiang Mai University
Department of Parasitology

Prevalence and Perceptions of Intestinal Parasitic Infections in Rural Lampang Province

BACKGROUND

According to the World Health Organization, Thailand has had impressive achievements in social, economic, and health development in the past 20 years[1]. The Ministry of Public Health enacted a universal health care policy in 2002 that resulted in coverage for 98% of the population[2]. Despite this coverage and an increasingly robust health care system, improvements in metrics have not been shared equally among urban and rural populations. Approximately half of the country's population resides in dense urban centers such as Bangkok and Hat Yai; the remaining 50.1% of the populace occupies rural areas dispersed throughout the country. Studies continue to show high prevalence of infectious diseases among rural communities, intestinal parasitic infections (IPI) being of significant concern due to the persistent exposure to soil and water[3,4]. Our study aimed to explore the burden of IPIs in rural Lampang Province. Additionally, we sought to elucidate individual risk factors, knowledge, attitudes, and beliefs about IPIs that may contribute to the disease prevalence. This information may be useful in guiding future strategies of disease prevention and/or control.

OBJECTIVES

1. Evaluate prevalence of intestinal parasitic infections in rural villages of Lampang Province
2. Discover potential risk factors affecting disease prevalence in these populations
3. Understand participants' knowledge and perceptions about parasitic infections
4. Explore the effectiveness of existing control measures/inform future control measures

METHODS

Phase I - Prevalence. The research team provided participants with clean plastic containers and detailed instructions on proper procedure for stool specimen collection. All fecal samples were then transported to the laboratory at the Department of Parasitology, Faculty of Medicine, Chiang Mai University for evaluation. Specimens were examined using two protocols: a direct wet smear and modified formalin-ethyl acetate concentration technique (M-FEACT). In the direct wet smear, fresh stool samples were emulsified in normal saline and mounted for microscopic evaluation. In M-FEACT, 1.0 g of stool was mixed well with 10.0 mL of 10% formalin and filtered through two layers of wet gauze into a centrifuge tube. 2.0 mL ethyl acetate was added before inverting the centrifuge tube and shaking vigorously for 20 seconds. The tubes were then centrifuged at 1500 rpm for 2-3 minutes.The debris plug was discarded and sediment was re-suspended in saline for microscopy.

Phase II - Interview. Interviews were conducted using availability sampling in the villages of Ban Pa Wieng and Ban Hia in Thung Kwao Sub-district, Muang Pan District in Lampang Province over a 6-week period. Villagers were recruited door-to-door and by word-of-mouth. Those under the age of 18, who had not yet lived in Lampang Province for a month, or those unable to provide voluntary, informed consent were excluded. Interview questions regarding demographics, cultural practices, and social behaviors related to risk exposure were developed based on previous studies regarding IPI risk. Structured oral interviews were conducted with 56 villagers with assistance from an interpreter provided by the Department of Parasitology at Chiang Mai University. Respondents were assigned a number and further deidentified to protect their privacy.

RESULTS

Phase I - Prevalence. Fecal samples from a total of 1,402 individuals were obtained, processed, and examined for parasites. 6.1% (86/1,402) of participants screened positive for parasitic infection. *Strongyloides stercoralis* accounted for 45% of infections, followed by 35% *Opisthorchis viverrini*, 6% *Giardia lamblia*, 3% *Entamoeba spp*, 7% other protozoa, and 1% each of hookworm, *Trichuris trichuria*, and *Taenia spp*. Of the 41 participants interviewed during *Phase II*, two stool samples were positive for *Strongyloides stercoralis* for an infection prevalence of 4.9% (2/41).

Phase II - Interview.

Demographics. This sample consisted of 30 males and 26 females from age 34 to 89 years, with an average age of 60 years. The majority of interview participants had a primary school level of education (82.1%) and worked as farmers (60.7%).

Demographics	
Gender	
Female	26 (46.4%)
Male	30 (53.6%)
Age (years)	
<40	2 (3.6%)
40-60	26 (46.4%)
>60	28 (50%)
Education	
No Schooling	3 (5.4%)
Primary	46 (82.1%)
High School	4 (7.1%)
College or trade school	3 (5.4%)
Occupation	
Unemployed	11 (19.6%)
Farmer	34 (60.7%)
Laborer	4 (7.1%)
Merchant	5 (8.9%)
Trade	2 (3.6%)
Monthly Income	
<$100	16 (28.6%)
$100-200	18 (32.1%)
>$200	22 (39.3%)

Knowledge. Most people had heard of intestinal parasites before (85.7%). This knowledge was obtained from a variety of sources including health education programs (21.4%), media such as television and the internet (12.5%), and personal experience with parasitic infections (62.5%). Of the participants with previous infection experience, 41% had been infected themselves in the past while another 21% knew someone who had been infected. Further understanding about IPIs was quite variable. 35.7% of people knew at least one sign, symptom, or complication of parasitic infection. 33.9% were unsure of what behaviors or actions might increase one's risk of getting infected. 55.4% of participants perceived that they were susceptible to infection. 46% perceived they could prevent themselves from being infected.

Knowledge and Perceptions	
Experience with Parasites	
Previously infected – self	23 (41.1%)
Previously infected – acquaintance	12 (21.4%)
Health staff/campaign	12 (21.4%)
Media (TV/Internet)	7 (12.5%)
Knowledge	
At least 1 parasite	50 (89.3%)
>1 route of transmission	52 (92.8%)
1 sign or symptom of infection	20 (35.7%)
Perceived	
Negative effect on social relationships	5 (8.9%)
Susceptibility to infection	31 (55.4%)
Capability for prevention	46 (82.1%)

Behaviors/Risks. 89.3% of participants noted that they were exposed to soil, either from their occupation (69.6%) or gardening for personal consumption (17.9%). Nearly all participants engaged in hygienic practices, including appropriate hand washing, filtration of drinking water, and washing produce prior to consumption. 96.4% of participants were aware that consumption of raw meat was a risk factor for parasitic infection; however, only 23.2% opted not to consume raw meat. 100% of participants reported that they had access to health care. 69.6% of people utilized pharmacologic prophylaxis, all of whom sought this treatment independently.

Risk Mitigating Behaviors	
Abstaining from raw meat consumption	13 (23.2%)
Water treatment prior to use	46 (82.1%)
Always defecating in toilet	51 (91.1%)
No occupational/recreational exposure to soil	6 (10.7%)
Pharmacologic prophylaxis	39 (69.6%)
Regular medical care	54 (96.4%)

CONCLUSION

The parasites with highest prevalence detected in this screening were Strongyloides stercoralis and Opisthorchis viverrini. The mode of transmission of these parasites are through soil exposure and raw fish consumption, respectively. With regards to the high prevalence of Strongyloides infection, we hypothesize that despite high reported rates of adherence to proper hygienic practices, pervasive exposure to soil contaminated by infectious Strongyloides larvae perpetuate infection in Thung Kwao Sub-district, Lampang Province. In addition, despite widespread understanding that consumption of raw

meat and pickled fish may increase the risk of parasitic infection, the practice remains a strong cultural tradition observed during times of celebration (eg. weddings, funerals, housewarmings).

Participants were familiar with intestinal parasitic infections. Most interview participants (89.3%) recognized at least one parasite endemic to the region. However, we learned that for many people (62.5%) this knowledge came as a result of previous personal experience with parasitic infections rather than effective health education. Knowledge and understanding of risk factors and consequences of intestinal parasitic infections were quite variable; cholangiocarcinoma, a consequence of chronic O. viverrini infection, was not commonly known, nor was the risk of neurocysticercosis from ingesting T. solium and T. saginata eggs through contaminated produce. Social acceptance of positive infection status and perceived capability for prevention contributed to a lack of urgency in eliminating parasitosis in the community. This community may benefit from education programs promoting informed decisions regarding behaviors that increase risk of parasitic infection.

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Rutagarama, Pierrot

Preceptor
Joseph Lanning, PhD
School for International Training

Co-Author
Nananamibia Duffy, MD
Rochester Regional Health
Department of Dermatology

Assessing Public Awareness of Scabies in Rural Malawi

Introduction: This study explored perceptions about etiology, mode of transmission, treatment, social impact of scabies; attitudes regarding prevention; and practices concerning care-seeking behaviors in rural Malawi. The last study on the prevalence of scabies in Malawi was published in 1991 where the rate was 36%. This disease requires further investigation as it can often be associated with considerable morbidity in low resourced areas, and assessment of the public's awareness of it can help determine if appropriate initiatives are in place to provide adequate health resources, education and management

Methods: This cross-sectional study analyzed knowledge and perceptions about the cause and presentation of scabies, attitudes towards prevention, and practices on care seeking behavior and treatment in Sesani village in the Ntcheu District of Malawi. Semi structured interviews were administered to 100 community members. Key informant interviews were conducted with 4 community health workers, locally called Health Surveillance Assistants (HSA), a traditional healer, a medical assistant, nurse and a pharmacist.

Results: 73% of community members interviewed had no formal schooling. Among community interviews, 52% were able to recognize the lesions of scabies when a photograph of the disease was shown and 97% reported having heard of scabies. 77% of community members reported that they have seen scabies before, with 60% reporting that they have seen it in the Sesani community. The most commonly attributed cause of scabies was a lack of personal hygiene (19%). None of the HSAs, medical assistant, nurse or traditional healer were able to identify the causation of the disease. There was a general opinion that people who were affected with Scabies felt social isolation, depression, and social discrimination. Because medical care at the local health clinic is not free the biggest barrier for seeking scabies treatment was cost.

Discussion and conclusion: Our findings highlight the need to improve health education and affordable access to treatment to support future scabies control efforts. An awareness intervention using HSAs, with emphasis on the cause of scabies and educational lessons correcting the misconceptions and beliefs regarding scabies, could improve the community's public knowledge and attitudes towards scabies.

Sampath, Ramya

Preceptors
Fahad Saeed, MBBS
University of Rochester Medical Center
Assistant Professor, Department of Medicine, Nephrology
Assistant Professor, Department of Public Health Sciences

Tandiar Samir, MD
Medical Director, Hospice Egypt
General Manager, Josaab Foundation

"Ba'ad al-sharr:" Cultural Barriers to Community-Based Hospice Care in Egypt

Background: While hospital-based palliative care services in Egypt are burgeoning, home-based hospice care remains scarce and clustered in the major urban center of Greater Cairo. It is currently estimated that there is nearly a 1:25,000 ratio of hospice organizations per capita in need of services. Hospice Egypt, one of the three hospice providers in Egypt, has sought to broaden access to hospice care through direct service and advocacy efforts. Yet many cultural and social barriers have limited the success of their organizational impact. While hospice organizations globally face some common challenges around drug policy and general taboos around death and dying, few studies have devoted attention to the specific barriers to hospice development in Egypt.

Aims: The aim of this project was to explore the perceived barriers Hospice Egypt faces in expanding their services and promoting awareness about the care needs faced by the Egyptian population.

Methods: Between July-August 2019, qualitative interviews were conducted with physicians, pharmacists, volunteers, and patients of Hospice Egypt to ascertain these stakeholders' perceptions of the barriers to cultural acceptance of hospice care. These interviews were then reviewed and compared with observational data regarding in-home service provision and organizational management to determine barriers affecting awareness and promotion of hospice services in Egypt.

Results: Four primary barriers were identified through interviews and ethnographic observation: 1) cultural taboos around discussing death and dying; 2) religious perspectives on end-of-life medical management; 3) the lack of the hospice concept in the Arabic language and in Egyptian medical training; 4) fundraising challenges facing NGOs in post-Revolution Egypt.

Conclusions: Hospice Egypt and and hospice development organizations in Egypt face unique, country-specific barriers to spreading awareness and infrastructure for providing home-based hospice care. These findings have implications for targeting local hospice advocacy and development efforts, particularly in the setting of resource constraints. These implications could not only help streamline Hospice Egypt's work but also aid international palliative care partner organizations in better supporting local development efforts.

Torres, Irianna

Preceptor
Jordi Camps, PhD
IDIBAPS Research Institute

Co-Authors
Claudia Galofre, PhD
Elena Asensio
Maria Ubach
Isabel Quintanilla
IDIBAPS Research Institute

Rapid Centrosome Reduction in Separase-Depleted Newly-Generated Tetraploid Cancer Cells

As a result of tumor evolution, clonal diversity within the same tumor, i.e. intra-tumor heterogeneity, occurs. A proposedmechanism contributing to intratumor heterogeneity is associated with numerical and structural centrosome aberrations. Given the role of centrosomes as the major microtubule organizing centers in cells and their responsibility to ensureequal chromosome segregation during mitosis, it has beenpostulated that the presence of extra centrosomes can initiate and propagate cancer by promoting genome instability. Weinvestigated the consequences of centrosome amplification inthree isogenic models of diploid (2N) and near-tetraploid (4N)colorectal cancer cell lines (DLD-1, RKO and SW837) and the non-transformed cell line RPE1. After developing stable populations of 2N and 4N clones, we demonstrated higher levels of CIN and karyotypic heterogeneity in 4N clones compared to 2N clones by fluorescence in situ hybridization. Additionally, immunofluorescence staining of pericentrin was performed to investigate the number and area of centrosomes. Results revealed that both the number and area of centrosomes was increased in 4N clones. After micro-array and RT-qPCR-baseddata showed a high expression of ESPL1, which encodes the protease separase, in near-tetraploid stable cells, a transfection of siRNA against ESPL1 was also performed in newly-generatednear-tetraploid cell lines. Results have revealed that despite the greater number of centrioles after ESPL1 gene silencing, the mitotic spindle poles remain mostly bipolar. Thus, our datasuggest a rapid reduction of supernumerary centrosome through clustering in newly-generated 4N cells, by which cancer cells are able to form multipolar spindles. Understanding mechanisms underlying this process may provide the chance to develop novel approaches for targeting intratumor heterogeneity in cancer.

Chase, Abbie

Preceptor
Patricia Luck, MBChB, MPhil, MSc
University of Rochester Medical Center
Division of Medical Humanities and Bioethics

Understanding Others: Can We, Should We, and How?

Background: The first year of undergraduate medical education includes workshops and classes that provide small windows into the lives of patients from vulnerable or unique populations. However, more depth of understanding is needed to make one wholly comfortable or knowledgeable about such singular population group, and through this able to care for them within their unique context.

This summer fellowship explored through self-education this gap between the classroom and the exam room, and potential methods of crossing this divide without burdening people from these communities with the unsought role of teacher. This project focused on transgender/gender diverse/non-binary people since this is a population for whom competent care is a large barrier to accessing basic healthcare.

Methods: First, the project was one of self-education. This entailed engaging with various narratives that explored the way gender diverse people have presented themselves to society through autobiographies, informational guides, articles, and documentaries. Then it examined transgender history and current issues in law, media, health insurance, and education. Each of these inquiries clarified the language that gender non-conforming people prefer others to use – or how to ask about such preferences (including the fact that there is not consensus on the terms "transgender" "non-binary" "gender non-conforming" and thus all are used throughout this project). Finally, the project covered some of non-binary people's most pressing concerns when going to the doctor.

This information was compiled into a guide that attempted to be forthright, non-judgmental and congenial. It linked to many resources by transgender people in order to center their stories and voices as well as to a more comprehensive spreadsheet of over 280 resources that can be sorted by medium and topic according to the preferences of the learner.

Throughout, personal surprises and points of confusion were tracked via daily journaling. In particular, close attention was paid to moments where the first reaction to a gender diverse person's story was incomprehension. Typically, this occurred when someone described their gender identity in a way that went beyond the cisgender and binary understanding with which much of contemporary society operates in the US. Further research and journaling typically resolved such cognitive dissonance, although gender theory and the study of it will continue to evolve.

Other stories that took careful consideration were those of family members of transgender people. Happily, many of them embrace and love their daughter/father/aunt, but they still miss their son/mother/uncle. Transgender people will say there never was a son/mother/uncle, and yet others feel

the loss – apparently of someone who never existed. This discrepancy between gender theory and emotional attachment is something to wrestle with on its own, but also of note was the degree to which these stories stood out to the cisgender researcher. People are drawn to experiences they can relate to, a boon and a burden depending on people's awareness of this tendency and how they handle it. When researching people with whom one does not share a lived experience, this must be kept in view to center the stories of those most marginalized while recognizing everyone's stories.

Conclusion: The most important elements of self-education and the points that transgender people consistently identify as important for providers to understand are listening to first-person narratives, learning about the language used by people within the community and the language they prefer that outsiders use, and making sure to work through biases and ingrained, unhelpful modes of thinking whenever possible.

This project was begun to combat a personal sense of ignorance that translated into an extreme lack of confidence and fear of causing harm when engaging in this topic with gender diverse people. Interestingly, the project confirmed the sense of ignorance but mitigated the lack of confidence. Having the scaffold of appropriate language and the basic facts of a community's history and current challenges allows one to be more honest about a deeper ignorance of someone else's life experience, which is not shameful since no one can actually walk in another's shoes.

This framework for self-education about people with whom one does not share a lived experience – but will most certainly care for at some point – could be applied whenever a student or physician feels ignorant or uncomfortable, and whenever patients indicate that more understanding is necessary to improve care. The challenge is the amount of time and sometimes uncomfortable introspection such learning takes. The remedy is that this process is lifelong.

Hernandez, Tresne

Preceptor
Patricia Luck, MBChB, MPhil, MSc
University of Rochester Medical Center
Division of Medical Humanities and Bioethics

Seeing Possibilities When Faced with Injustice

Systemic health disparities exist in North America based on race, ethnicity, immigration status, gender identity, and many other factors. The Western Biomedicine system of medicine can perpetuate these inequalities. In this context, how do medical students find inspiration? As students of professions focused on healing, so much of our learning comes through mentorship, from apprenticeship, and from the "practice of medicine." Through listening to the stories of those who share our values, we can examine our own actions and ways we would like to contribute. This project focuses on health justice: a value shared by many of us pursuing the field of medicine.

The purpose of this project was to explore how healthcare providers work towards greater health justice within a healthcare system which facilitates greater equity and support, yet perpetuates systems of oppression and inequality. Through a series of interviews with physicians, a nurse practitioner, and two clowns, the work of healers, supporters, and activists is explored.

In these interviews, this diverse group of individuals all focused on furthering equity in the world and spoke about their work in communities they work with and/or of which they are a part. This included a nurse practitioner working with LGBTQ+ people, homeless youth, and people seeking asylum in the United States; a physician working with Indigenous health leaders to help set up a clinic; two physicians who work with Zapatistas in Mexico; a Hematologist/Oncologist passionate about the intersection of spirituality, ethics, and medical care; and two clowns who facilitate clown care in multiple hospitals. All of these individuals spoke to the importance of community and shared values.

The issues of health justice or social justice were integrated into these individual's lives in different ways, although all of them highlighted the importance of people, connections, and community. Protesting in the streets, unlearning capitalism, advocating with international organizations, and creating humanism conferences were all ways in which these individuals sought to lessen inequality or lessen the harm that systemic injustice perpetuates for people.

Additionally, each person was asked, "What version of medicine do you wish were practiced 5 generations from now?" A common theme that emerged was the hope that healing in the future would not simply focus on fixing problems, but be about caring for each other. Some saw this as returning to the earth and its potential abundance if humans worked with the earth, others saw it as having institutions acknowledge that there is systemic inequality.

Finally, pieces of wisdom directly focused towards students of health professions were when interviewees answered the question, "What question would you love every student pursuing a healing practice to be considering?" Some spoke to the awe-inspiring being that each human is (including students), while others spoke to the necessity of seriously considering what it means to be in this profession. All of those interviewed shared incredible wisdom in how they arrived at contributing in the way they saw was needed.

These interviews were then edited and produced into podcast format available online for students, and other health providers, to listen to and reflect upon their own visions for shifting the modern Western Biomedical model dominate in North America to be more health justice focused. Another outcome of this project was a community gathering for fellow second year medical students facilitated in the fall of 2019. Incorporating techniques from Theater of the Oppressed, clowning, and group facilitation, this was a space for medical students to explore, for themselves and their communities, what impact they would love to have in the next year.

Every single medical student's reflections and proposed actions to take were different, just as every one of the health providers interviewed was, and is, working towards equity in a different way. By each of us taking action in our communities that aligns with a shared value of furthering equity, it is hoped that we can create a more supportive system of healing for the planet.

Ran-Moseley, Davina

Preceptors
Chin-To Fong, MD
University of Rochester Medical Center
Division of Medical Humanities and Bioethics

Timothy Quill, MD
University of Rochester Medical Center
Department of Medical Humanities and Bioethics

Medical School Curricula and the Teaching and Conceptualization of Gender According to a Multi-Metric Bioethical Analysis

Abstract: In the past decade studies have shown a significant upwards trend in the number of people openly identifying as non-cisgender and/or intersex and seeking affirming medical care (Meerwijk & Sevelius, 2017; Delahunt et. al, 2018). This rapid population growth has highlighted the dearth of information on non-cisgender and non-intersex patient care and further research has identified this dearth as having a significant negative impact on these minority communities and their health outcomes across the board. Multiple studies have identified educating providers on the variability of gender as one of the top priorities for addressing their poor health outcomes (Winter et. al, 2016; Marshall et. al, 2018). Thus the provision of adequate sex and gender-based education becomes an issue of ethics and a method to decrease the aforementioned minorities' health disparities.

A standardized medical school curriculum on gender and gender-affirming care would be a powerful delivery mechanism of such education. However, the majority of medical school curricula currently offer 5 hours or less on LGBT education as a whole, education which often includes the only information given on transgender and intersex patients (Obedin-Maliver, Goldsmith, & Stewart, 2011; Morrison, Wilson, & Smith, 2017). Following a literature review of the current methods American medical schools utilize in their curricula to teach about gender, we have created a multi-metric bioethical model for understanding gender through which schools can analyze the comprehensiveness of their current educational programs. We call this model "Gender Space". "Gender Space" takes into account chromosomes, gonadal and hormonal development, phenotypic expression, gender identity, environmental factors such as gender-related linguistics and culturally gendered expectations, and temporal factors such as how bodies and identities change over time.

The ultimate goal of this "Gender Space" model is to generate an increasingly sensitive and ethical standard of care through a more nuanced and comprehensive understanding of gender which will help providers appropriately communicate with and treat cisgender, transgender, gender diverse and intersex patients, thus improving health outcomes for all.

Schecter, Arielle

Preceptors
Tiffany Panko
University of Rochester Medical Center
Department of Obstetrics and Gynecology

Timothy Quill
University of Rochester Medical Center
Department of Medical Humanities and Bioethics

Facilitators and Barriers to Safe Sex and Effective Contraception in Deaf Women: A Mixed Methods Study

Purpose
Sexual health knowledge among Deaf populations in the United States is found to be lower than that among hearing populations. The reasons for this disparity are traced to inadequate availability of sexual health information in American Sign Language (ASL), and historical exclusion and trauma of Deaf people in education and healthcare spaces. This study seeks to explore and identify barriers and facilitators to the acquisition of sexual health information and access to contraception among the Deaf female population of Monroe County, NY.

Methods
Individual qualitative interviews were conducted and recorded with 20 ASL-using Deaf women and 20 English-speaking hearing women aged 18-44 who resided in Monroe County, NY for the past year. Participants were asked to reflect on their exposure to sexual health information, their decision-making process with regard to contraceptive use, and perceived barriers and facilitators to their acquisition of sexual health information and access to contraception itself.

Participants also completed demographic questionnaires about their sexual practices and current contraceptive use. Data analysis identified themes through rapid debriefing post-data collection and re-immersion by review of field notes, and reviewing randomly selected interview recordings. Data will continue to be analyzed to uncover additional themes, and to identify similarities and differences between the Deaf and hearing groups.

Results
Participants in both groups predominantly had post-secondary education, were heterosexual, and reported being in a monogamous heterosexual relationship. Similar to local demographics, 69% were white, and 31% were people of color. Analyses revealed that common challenges among Deaf women were related to inadequate or delayed sexual education from school and parents, inconsistent communication access to healthcare providers (HP), lack of individualized contraceptive counseling from HP, and difficulty accessing health information in their primary language of ASL. Hearing women shared similar challenges of inadequate or delayed sexual education from school and parents, as well as lack of

individualized contraceptive counseling from HP. Deaf women were more likely to identify peer social networks in college as the source of their first exposure to information about contraception. Such informal networks were widely reported by both Deaf and hearing women as facilitators of access to sexual health and contraception information; however, the potential for the spread of misinformation was higher for Deaf women because they were more likely to rely on this network over other sources of information. Deaf women identified other specific facilitators to accessing sexual health information, including ASL interpreter availability at healthcare appointments, visual aids for health education, and open communication with parents. Hearing women also identified open communication with parents as a facilitator. Both groups demonstrated similar knowledge funds and gaps about contraceptive methods and devices.

Conclusions

The results demonstrate that Deaf women experience barriers to acquiring information about sexual health, but when provided early access to this information - particularly via trusted sources and in ASL - they had more positive experiences with accessing contraception. Systematic changes at the community and organizational levels are needed to ensure accessible as well as comprehensive sexual health information and contraceptive healthcare; these changes would benefit both Deaf and hearing populations.

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YEAR-OUT RESEARCH

Ayers, Brian

Preceptor
Igor Gosev, MD
University of Rochester Medical Center
Division of Cardiac Surgery

Co-Authors
Katherine Wood, MD; Bryan Barrus, MD; Peter Knight, MD; Sunsil Prasad, MD; Christina Cheyne
University of Rochester Medical Center
Division of Cardiac Surgery

Jeffrey D Alexis, MD and Himabindu Vidula, MD, MS
University of Rochester Medical Center
Division of Cardiology

Heather Lander, MD and Julie Wyrobek, MD
University of Rochester Medical Center
Department of Anesthesiology

Ilan Goldenberg, MD and Scott McNitt, MS
University of Rochester Medical Center
Clinical Cardiovascular Research Center

Implantation of a Fully Magnetically Levitated Left Ventricular Assist Device Using a Sternal-Sparing Surgical Technique

Background:
Left ventricular assist devices (LVAD) have improved outcomes for properly selected patients with advanced heart failure but remain associated with a high degree of postoperative patient morbidity and mortality. We aim to describe our initial experience using the less invasive complete sternal-sparing technique for implantation of a magnetically levitated LVAD, the HeartMate 3 (HM3) pump.

Methods:
This retrospective, single center study included consecutive patients implanted with the HM3 LVAD between September 2015 through September 2018. Patients were compared based on surgical approach: sternal-sparing (SS) or traditional sternotomy (TS). The primary outcome was overall survival at six months. Secondary outcomes included perioperative complications, blood product utilization, and hospital readmissions.

Results:
Of 105 patients implanted with the HM3 LVAD, 41 (39%) were implanted via SS and 64 (61%) via TS approach. There were no intraoperative conversions. The SS patients were younger otherwise all other characteristics were similar between cohorts (Table 1). The SS cohort demonstrated a significantly lower

incidence of severe RV failure (7 vs 28%, p=0.012), fewer blood-product transfusions (41 vs 86%, p<0.001) and shorter index hospital length of stay (15.5 vs 21 days, p=0.018) (Table 2). Six-month survival was 93% for the SS cohort. No patients underwent orthotopic heart transplantation during the follow-up period. Multivariate analysis adjusting for age, INTERMACS profile, and therapeutic intent demonstrated comparable overall survival between surgical techniques, but the SS approach was associated with a statistically significant lower incidence of severe RV failure during 6-months follow (Table 3).

Table 1. Patient characteristics for sternal-sparing (SS) vs traditional sternotomy (TS)

Variable[a]	SS (n=41)	TS (n=64)	p-value
Characteristics			
Age (years)	57 [43-64]	61 [56.5-68]	**0.015**
Male	31 (76%)	50 (78%)	0.814
White	36 (88%)	50 (78%)	0.300
BMI (kg/m^2)	30.3 ±7.6	28.8 ±5.8	0.500
INTERMACS Profile			0.487
Profile 1	17 (41%)	22 (34%)	
Profile 2	6 (15%)	5 (8%)	
Profile 3	16 (39%)	31 (48%)	
Profile 4+	2 (5%)	6 (9%)	
NYHA Functional Class			0.242
Class IIIb	1 (2%)	6 (9%)	
Class IV	40 (98%)	58 (91%)	
Comorbidities			
Past cardiac procedure	10 (24%)	14 (22%)	0.814
Ischemic cause of heart failure	18 (44%)	30 (47%)	0.842
Stroke or TIA	3 (7%)	3 (5%)	0.676
Chronic renal insufficiency	11 (27%)	25 (39%)	0.214
Diabetes	12 (29%)	24 (38%)	0.409
Preoperative Support			
Impella or IABP	15 (37%)	19 (30%)	0.524
ECMO	9 (22%)	8 (13%)	0.278
Ventilator	4 (10%)	5 (8%)	0.734
Preoperative Values			
LVEF (%)	20.5 ±7.1	19.8 ±5.3	0.961
PCWP (mm Hg)	23.2 ±10.0	25.0 ±9.0	0.393
Cardiac index (l/min/m2)	1.8 ±0.5	1.9 ±0.5	0.536
Mean PAP (mm Hg)	35.8 ±11.5	35.1 ±8.4	0.974
Right atrial pressure (mmHg)	12.3 ±6.9	13.0 ±6.0	0.608
RVSWI (mmHg · mL · m-2)	512.2 ±229.7	619.8 ±291.5	0.081
RVSWI <400 (mmHg · mL · m-2)	12 (29%)	12 (19%)	0.239
Intended goal			**0.002**
Bridge to transplant	38 (93%)	46 (72%)	
Destination therapy	2 (5%)	18 (28%)	
Bridge to recovery	1 (2%)	0 (0%)	

[a]Variable presented as no. (%), mean ±SD or median [IQR]
BMI: body mass index; TIA: transient ischemic attack; COPD: chronic obstructive pulmonary disease; IABP: intra-aortic balloon pump; ECMO: extracorporeal membrane oxygenation; LVEF: left ventricular ejection fraction; PCWP: pulmonary-capillary wedge pressure; PAP: pulmonary artery pressure; RVSWI: right ventricular stroke work index

Table 2. Index hospitalization complications, resource utilization and survival

Variable[a]	SS (n=41)	TS (n=64)	p-value
Overall Complications			
RTOR for bleeding	2 (5%)	13 (20%)	**0.043**
Respiratory Failure	6 (15%)	15 (23%)	0.324
Unplanned re-intubation	3 (7%)	8 (13%)	0.522
Tracheostomy	2 (5%)	6 (9%)	0.478
Renal Failure	5 (12%)	17 (27%)	0.090
Hepatic Failure	3 (7%)	7 (11%)	0.737
Severe RV Failure	3 (7%)	18 (28%)	**0.012**
Use of RVAD	2 (5%)	10 (16%)	0.121
Stroke			
Any stroke	3 (8%)	6 (9%)	1.000
Hemorrhagic stroke	1 (2%)	1 (2%)	1.000
Ischemic stroke	2 (5%)	5 (8%)	0.702
Disabling stroke[b]	1 (2%)	3 (5%)	1.000
Infection			
Positive blood culture	1 (2%)	0 (0%)	0.390
Drive-line	1 (2%)	0 (0%)	0.390
Surgical site	4 (10%)	1 (2%)	0.075
Pneumonia	3 (7%)	12 (19%)	0.153
Mechanical ventilation time (hr)	16 [9-34]	42 [18-96]	**<0.001**
Chest tube output (24h) (mL)	1045 [840-1435]	1403 [893-1969]	**0.019**
Postoperative transfusions (24h)			
Received PRBC	17 (41%)	55 (86%)	**<0.001**
Received 4+ units PRBC	7 (17%)	19 (30%)	0.170
ICU LOS (days)	4 [3-7]	5 [3-13]	0.170
Hospital LOS (days)	15.5 [12-23]	21 [14.5-37.5]	**0.018**
Survived to discharge	38 (93%)	52 (81%)	0.153
Discharged Home	28 (68%)	36 (56%)	0.305
Discharged Rehab	10 (24%)	15 (23%)	1.000

[a]Variable presented as no. (%) or median [IQR]
[b]Modified Rankin score of >3 assessed three months after initial symptoms event
RTOR: return to operating room; RV: right ventricular; RVAD: right ventricular assist device; PRBC: packed red blood cells; ICU: intensive care unit; LOS: length of stay

Table 3. Adjusted 6-month survival, readmissions, and functional status

	Univariate			Multivariate		
	Hazard Ratio or Odds Ratio	[95% CI]	p-value	Hazard Ratio or Odds Ratio	[95% CI]	p-value
Mortality[a]						
SS Approach	0.29	[0.08-1.00]	0.05	0.33	[0.10-1.30]	0.088
Age	1.06	[1.01-1.11]	0.027	1.05	[1.00-1.10]	0.052
INTERMACS Profile 1 or 2	1.43	[0.57-3.63]	0.449	1.72	[0.66-4.30]	0.254
Destination Therapy	1.17	[0.38-3.55]	0.782	0.61	[0.19-1.99]	0.414
Required readmission[a]						
SS Approach	0.44	[0.19-1.03]	0.06	0.54	[0.25-1.16]	0.113
Age	1.01	[0.98-1.04]	0.674	0.99	[0.97-1.02]	0.645
INTERMACS Profile 1 or 2	0.25	[0.11-0.59]	0.002	0.37	[0.18-0.76]	0.007
Destination Therapy	1.72	[0.86-3.46]	0.124	1.45	[0.69-3.07]	0.326
NYHA class I[b]						
SS Approach	1.17	[0.50-2.74]	0.716	0.89	[0.35-2.27]	0.801
Age	0.97	[0.94-1.01]	0.135	0.98	[0.94-1.01]	0.174
INTERMACS Profile 1 or 2	1.05	[0.45-2.46]	0.902	1.01	[0.42-2.44]	0.981
Destination Therapy	0.56	[0.19-1.66]	0.292	0.61	[0.19-1.95]	0.401
RV Failure[b]						
SS Approach	0.17	[0.05-0.63]	0.008	0.15	[0.04-0.58]	0.006
Age	1.02	[0.98-1.07]	0.264	1.01	[0.97-1.05]	0.562
INTERMACS Profile 1 or 2	1.26	[0.50-3.19]	0.621	1.59	[0.60-4.25]	0.357
Destination Therapy	0.87	[0.26-2.91]	0.819	0.49	[0.14-1.77]	0.278

SS: sternal-sparing approach; NYHA: New York Heart Association
[a]Cox proportional hazards model
[b]Logistic regression

Conclusions:

In this single center observational study, we have demonstrated that the sternal-sparing approach may be a safe and effective surgical technique for implantation of the HM 3 LVAD in well selected patients. The potential benefits compared to traditional sternotomy requires further inquiry.

Bawany, Mohammad

Preceptor
Ajay E. Kuriyan, MD
University of Rochester Medical Center
Flaum Eye Institute

Co-Authors
A. Heffer
J. Proaño
University of Rochester Medical Center
Flaum Eye Institute

Cigarette Smoke Promotes Epithelial-Mesenchymal Transition in Retinal Pigment Epithelial Cells

Purpose
Cigarette smoking is a known risk factor for the development of proliferative vitreoretinopathy (PVR). The underlying pathogenesis of PVR involves retinal pigment epithelium (RPE) cells undergoing epithelial mesenchymal transition (EMT). We examined the effect of cigarette smoke extract (CSE) on RPE cell EMT in vitro to study one of the potential mechanisms through which cigarette smoke impacts PVR formation.

Methods
An immortalized human RPE cell line (ARPE19), was used for all in vitro experiments. CSE was made with research grade cigarettes by bubbling smoke through 10 ml 0.1% FBS medium for 2 min. The resulting solution was used as a stock (10%) and diluted further. The pH was adjusted to 7.2, the solution was filtered through a pore filter for sterilization, and then standardized by measuring the absorbance at a wavelength of 320 nm. The resulting CSE solution was used within 30 min of preparation. ARPE19 cells were cultured in 0.1% FBS media overnight and were then treated for 4 or 24 hours in 1 % CSE or control (0.1% FBS) media. A subset of cells underwent 24 hour recovery in control media after CSE exposure. Cell morphology was examined prior to and after all experimental conditions. RPE cell EMT was measured using Western blotting and immunofluorescence microscopy for alpha smooth muscle actin (αSMA), a key marker for EMT.

Results
CSE exposed ARPE19 cells acquired a spindle-like mesenchymal appearance which was not present in the control media ARPE-19 cells. Exposure to CSE caused a time and dose-dependent relative increase in αSMA expression in ARPE19 cells compared to ARPE19 cells in control media, by Western blotting. ARPE19 cells in 1% CSE for 24 hours had a 2-fold increase in αSMA expression compared to cells in control media. ARPE19 cells treated with CSE exhibited higher αSMA fluorescence compared to cells in control media.

Conclusions

ARPE19 cells exposed to CSE develop a mesenchymal appearance and undergo EMT, measured by an increase in αSMA expression by Western blotting and immunofluorescence. These findings support the potential mechanism of CSE-induced EMT and the higher rates of PVR development in smokers. Future studies on the mechanism of CSE-induced EMT will provide more insight into the role of cigarette smoke exposure and PVR development.

Brodell, James

Preceptor
Irvin Oh, MD
University of Rochester Medical Center
Department of Orthopaedics and Rehabilitation

Co-Authors
Ashlee MacDonald
James A Perkins
Jonathan T Deland
University of Rochester Medical Center
Department of Orthopaedics and Rehabilitation

Deltoid-Spring Ligament Reconstruction in Adult Acquired Flatfoot Deformity with Medial Peritalar Instability

BACKGROUND: A spring ligament tear is commonly present in advanced stages of adult acquired flatfoot deformity (AAFD). Previous anatomic studies have demonstrated that the superficial deltoid ligament blends with the superomedial spring ligament, forming the tibiocalcaneonavicular ligament (TCNL). Adding allograft TCNL reconstruction to osseous correction has been suggested to augment medial peritalar stability in advanced AAFD with large spring ligament tears. We aimed to investigate the clinical and radiographic outcomes of TCNL reconstruction for flexible AAFD with medial peritalar instability.

METHODS: Fourteen feet in 12 patients who underwent osseous and TCNL reconstructions for advanced AAFD (stage IIB with large spring ligament tears or stage IV) were recruited for the study. The mean postoperative follow-up was 24 (range, 12-33) months. Pre- and postoperative clinical outcomes were assessed by the Foot and Ankle Ability Measure (FAAM), SF-36, and Patient-Reported Outcomes Measurement Information System (PROMIS). Correction of forefoot abduction and the sagittal arch were measured from pre- and postoperative weight-bearing radiographs.

RESULTS: The FAAM Activities of Daily Living improved from 69.3 to 90.1 ($P = .001$). The SF-36 Physical Function (PF) and Pain subscales both improved significantly (39.4 to 87.8 and 44.6 to 93.1, respectively, $P < .001$ for each). The PROMIS PF improved from 38.2 to 46.8 ($P = .002$) and the PROMIS Pain Interference (PI) from 62.6 to 50.1 ($P = .003$). Radiographic measures showed an improved anterior-posterior (AP) talo-first metatarsal angle of 24.7 to 11.8 degrees ($P < .001$) and talonavicular coverage angle of 47.4 to 23.1 degrees ($P < .01$). An improved Meary's angle of 29.7 to 12.5 degrees ($P < .001$) and a calcaneal pitch angle of 11.7 to 16.9 degrees ($P = .14$) were noted in the lateral view.

CONCLUSION: Considering the anatomic characteristics of the deltoid-spring ligament complex, TCNL reconstruction may play a significant role in maintaining peritalar stability when performed with osseous correction. Deltoid-spring ligament (TCNL) reconstruction is a viable surgical option for those with advanced stage AAFD with medial peritalar instability that leads to improved functional and radiographic outcomes.

Bruce, Abena

Preceptor
Hoffman Moka Lantum, MD, PhD, MS
Sagitarix Ltd, CEO

Co-Author
Colby Previte, MD

Understanding Feasible and Affordable Interventions to Improve Maternal Health in Low-Income Communities around Nairobi, Kenya

Background: Maternal Mortality is a public health crisis that affects much of the world. Although maternal mortality dropped by 44% worldwide between 1990 and 2015, 99% of all maternal deaths occur in developing countries. The loss of female lives is both a public health problem and an injustice. Kenya is one of the many developing countries impacted by maternal mortality. As of 2014, child-birth and other pregnancy related causes occur at a rate of 362 per 100,000 live births in Kenya. Some of the leading causes of maternal mortality include infections (often caused by urinary tract infections, UTI's), gestational diabetes (diabetes that occurs after a woman becomes pregnant), and preeclampsia. These conditions can cause maternal morbidity and mortality. Sagitarix Limited is an organization that aims to use technology to improve health in low-income areas of Kenya. Sagitarix Limited recently began utilizing a mobile health product to read urinalysis results quickly and cheaply outside of a hospital setting, aiming to identify, treat, and refer women with high risk conditions.

Objectives: Understand feasible interventions that can be implemented by Sagitarix to improve maternal and child health and decrease maternal mortality rates in rural and low income communities in Kenya.
Methods: Preliminary research was performed to learn about potential affordable interventions that can be implemented to improve maternal and child health to women who access care at the Sagitarix clinical sites in Nairobi County, Bungoma County, Bomet County, Nakuru County, and Kiambu County, in Kenya. A literature review was conducted to understand interventions that have been successfully implemented in Kenya and other low- and middle-income countries to improve maternal and child health, and their potential for implementation at various Sagitarix clinical sites.

Results: Literature review showed several interventions being implemented by different organizations with the intent of improving maternal and child health. Interventions such as using ultrasound to identify high-risk pregnancies, using hemograms to identify anemia in pregnancies, and using urinalyses to screen for high risk conditions in pregnancy, are a few of the methods that are being used to decrease maternal mortality in low- and middle-income countries.

Conclusion: There are a number of interventions that can be implemented by Sagitarix to improve maternal and child health by addressing common causes of maternal mortality, including ultrasounds, hemograms, and urinalyses. Further research must be performed to understand the efficacy of each intervention and to help prioritize feasible interventions for Sagitarix.

Campbell, Timothy

Preceptor
Ahmed Ghazi, MD, MSc
University of Rochester Medical Center
Department of Urology

Co-Authors
Michael W. Witthaus
Tyler Holler
Rachel Mebryk
Katherine Cameron
Edward Messing
Jean Joseph

Look like an Expert: Gaze-Augmented Training in Novices Enhances Rate of Skill Acquisition in a VR Robotic Suture Task

Introduction

Surgical skill has a direct impact on patient outcomes (Birkmeyer NEJM 2013, Sosa 1998, Hobbs 2006, Wilkiemyer 2005, Kauvar 2006). In recent years, Simulation-Based Training (SBT) has been embraced by national bodies as a method of training surgeons out of the presence of a patient (Sachdeva 2008). The rise of SBT in surgical education can be attributed to a need to address a rise in complication rates that accompanied the adoption of minimally invasive surgical approaches. (Tendick 1993, Schurr 2000, Crosthwaite 1995, Gallagher 1998). SBT has been demonstared to a reliable way to improve basic trainee surgical skills (Derossis 1998, Goova 2008, Scott 2007) as well as improving procedural ability in clinical experiences (Barsuk 2009, Barsuk 2009, Aggarwal 2009, Crochet 2011, Zendejas 2012, Palter 2012).

Virtual Reality Simulation is a form of SBT often used in the development of technical surgical skills. In laparoscopic surgery it has been shown to improve learning outcomes in several surgical procedures as well as offering skill assessment (Gurusamy 2013, Hytlander 2002, Grantcharov 2004, Moglia 2016, Bric 2016). A notable impact of the potential of virtual reality training in surgical simulation is a 2002 study by Seymour et al., where non-VR-trained residents were nine times less likely than VR-trained counterparts to transiently fail to make progress, were 29% slower than VR-trained counterparts and five times more likely to burn nontarget tissue or to injure the gallbladder.

The Da Vinci Surgical Skill Simulator integrates virtual reality training into the Da Vinci Surgical System and is validated in face, construct, and content validity (Loulmet 1999, Zorn 2007, Hung 2011). It is used widely in surgical simulation [citation needed]

Head mounted eye-tracking and pupillometry, well-established tools in cognitive sciences, have begun to find a place in surgical education & in the study of surgical performance. Eye-tracking provides

insights into memory, problem solving, learning, cognitive control capacity, and reasoning (Hannula 2010, grant and spivey, 2003, rehder and hoffman 2005, Lai 2013, Funahashi 1989, Luna and velanova 2011, Munoz and Everling 2004, Demarais and Cohen 1998, Thibaut and French 2016, and Vigneau 2006). Motor-learning specifically can be quantified by pupil size, which also reflects task difficulty (White 2015) [additional citation needed]. The relationship between pupil dilation and cognition has also been studied broadly (Andreassi 1980, Beatty & Lucero-Wagoner 2000, Sirois & Brisson 2014), including specific insights in surgical applications [citation needed].

Another element of head-mounted eye tracking is the capture and display of the users' focus. Gaze point hanalysis has demonstrated significant differences between expert and novice performance (Vine 2012 "cheating experience", Law 2004, Wilson 2011 "perceptual impairment", Tien 2014, Eivazi 2017, Gonca 2018 "Insights from surgeon's eye movement data in a virtual simulation surgical training environment: effect of experience level and hand conditions"). In simple-task surgical simulation training, gaze-augmented training has demonstrated improved efficiacy, efficiency and performance in the face of retention and stress (Vine 2012 "cheating experience). Encouraging novices to intentionally deploy expert gaze patterns has been shown to facilitate more expedient, efficacious, and stress-resilient motor learning than when gaze patterns are not addressed in training (Wilson 2011 "Gaze training enhances laparoscopic technical skill acquisition", Vine 2012 "cheating experience")

The research presented here aims to deploy a gaze-augmented training paradigm for a VR robotic suture task utilizing head-mounted eye tracking in robotic-surgery-naïve medical students in a randomized controlled trial.

Methods

Participants were recruited through a medical school-wide recruitment e-mail. From this response, 24 respondents participated in individual "fittings" of the Pupil Head-Mounted Eye Tracking System (Pupil Labs, Berlin, DE) where participants were oriented to the Da Vinci Surgical Simulator (DVSS) (Intuitive Surgical, Sunnyvale, CA). During this session, participants completed two minutes of unscored time on a stacking game on the DVSS.

Following the orientation session, a pre-test session was scheduled within one week where the participants completed a search-and-place task to proficiency, which was defined as a total of two attempts ending in a 90% total score as determined by the simulation software (composed of efficiency and penalty subtotals). Efficiency was composed of time metrics and economy of motion. Penalty was informed by number of drops, seconds of excessive force and number of missed targets. Based on number of attempts, participants where then sorted into either a gaze-augmented training group or motor-training control group. The participant with the fewest number of attempts required to achieve two 90%+ scores was randomized to the gaze group by coin-flip number generator, the participant with the next fewest attempts required was sorted into the non-gaze group, the participant after that was sorted into the gaze- augmented group, and so on. At this point, one participant declined to schedule a follow-up session.

Following this session, participants scheduled a training session. During this session, participants viewed a pre-recorded video of an expert surgeon completing the training task (Suture Sponge 3) on the DVSS with instructional voiceover. The video footage was identical in both groups with the exception that the expert's gaze marker was available to the gaze-augmented training group. The expert-narration audio

in each video contained motor-based instruction. The gaze-augmented training group audio also provided description of and instruction to follow the expert users' gaze patterns.

After reviewing the video, all participants were given a chance to ask questions and then performed the task with real-time coaching from an expert up to ten times. After the first, second, and third attempt, participants reviewed video footage of that attempt with coaching. The gaze-augmented group videos included a gaze-marker. Both participants received motor-based coaching throughout all attempts and the gaze-augmented group also received coaching on gaze usage. After each attempt, participants reviewed a simulator-generated scoresheet including a total score, efficiency subscore (with subcategories) and a penalty subscore (with subcategories). The twelve training sessions were completed over two two-hour sessions, and in one case, an additional one-hour session.

After attempt 10, all participants practiced 60 seconds of an irregular rhythm tone-counting task and then performed the suture task a final two times while simultaneously counting an irregular bell-rhythm. No coaching was delivered during or between these attempts.

Average attempt Scores of the Gaze-Augmented training group were significantly higher than those of the motor-only group.

Results

The average score per attempt was 19.57 points higher in the gaze-augmented training group than in the control group (SE 7.44, P < 0.01). The average efficiency score per attempt was 17.79 points higher in the gaze-augmented training group than in the control group (SE 6.37, P < 0.01).

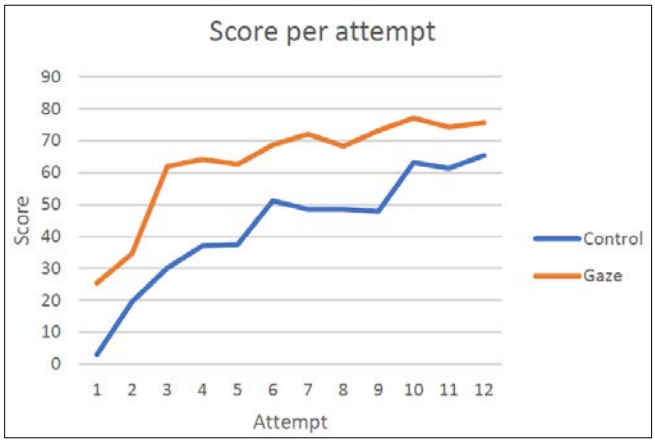

Figure 1. Total score per attempt.

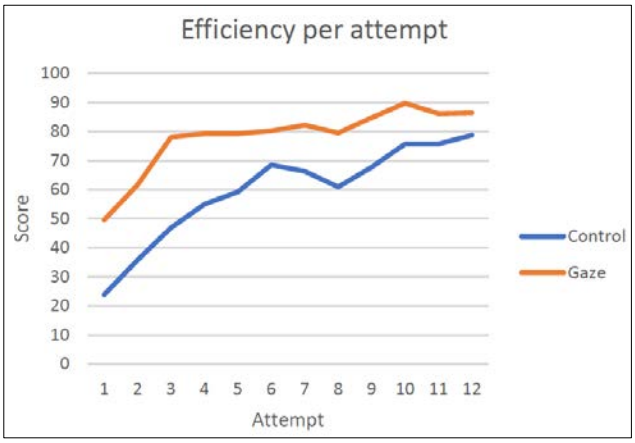

Figure 2. Efficiency score per attempt.

Total Score						
Effect	Group	Average Point Difference Per Attempt	Standard error	DF	t Value	Pr > |t|
Group	Gaze	19.57	7.44	187.00	2.63	0.01

Efficiency Score						
Effect	Group	Average Point Difference Per Attempt	Standard error	DF	t Value	Pr > |t|
Group	Gaze	17.79	6.37	187.0	2.79	0.01

Discussion

The results of this study offer further evidence for the efficacy of gaze-augmented surgical training. This study supports the feasibility of the use of gaze-augmented training in both VR and in robotic surgical settings. Repetition was chosen as it is underpins both proficiency-based and automaticity-based forms of training (Stefanidis 2012, Ahlberg 2007, Gallagher 2005)

Limitations to this study include the impossibility of blinding due to the live-coached design. A study design based around implicit learning (Spruit 2014) would reduce the coaching required and allow for a blinded design.

Further studies exploring associations between gaze-capture, pupillometry, eye movement, and objective performance are needed to potentially work towards building head-mounted eye tracking-based performance assessment tools able to incorporate measures of stress and mental effort.

Craig, Connor

Preceptor
Scott Kirkley, MD
University of Rochester Medical Center
Department of Pathology and Laboratory Medicine

Co-Authors
Emily Calamaro, MGC
Chin-To Fong, MD
M Anwar Iqbal, PhD
Bin Zhang, PhD
University of Rochester Medical Center
Department of Pathology and Laboratory Medicine and Pediatrics

Diagnosis of FOXG1 Syndrome Caused by Recurrent Balanced Translocation

The FOXG1 gene plays a vital role in mammalian brain differentiation and development. Intra- and intergenic mutations resulting in altered FOXG1 function or expression results in FOXG1 syndrome. The hallmarks of this syndrome are severe developmental delay or regression, post-natal growth restriction, post-natal microcephaly, autism-like social deficits, and a range of abnormal motor findings. Here we describe the case of a 7 year-old male patient found to have a de novo balanced translocation between chromosome 3q14.1 and 14q12 via chromosome, FISH, and microarray analysis. This intergenic mutation effects the proximity of FOXG1 to a previously described smallest region of deletion overlap (SRO), resulting in likely haploinsufficiency. This case adds to the growing body of literature implicating chromosomal structural variants in the manifestation of this disorder, and highlights the vital role of cis-acting regulatory elements in the normal expression of this gene. Finally, we propose a protocol for reflex FISH analysis to improve diagnostic efficiency for patients with suspected FOXG1 syndrome.

Esaa, Fatema

Preceptor
Julie Ryan Wolf, PhD
University of Rochester Medical Center
Department of Dermatology

Co-Authors
Alice P. Pentland
University of Rochester Medical Center
Department of Dermatology

Jonathan Silverberg
Northwestern University
Department of Dermatology

David Cella
Northwestern University
Department of Medical Social Sciences

The Utility of Pruritus-Specific PROs in Routine Dermatologic Care

Background: Itch is common symptom of dermatologic and systemic disease and has been associated with significant impairment of health-related quality of life (QoL), cognition, and functional ability. 1; 2; 3 Patient-reported outcome (PRO) measures are valuable tools in monitoring patients' overall health and QoL, however pruritus-specific PROs that assess QoL are limited.6 PROMIS® Itch is a pruritus-specific PRO measure developed by Dr. Jonathan Silverberg. It assesses QoL impairment due to itch in four different domains: Mood and Sleep, Scratching Behavior, Interference, and Activity and Clothing.

Objective: This study examined the utility and validity of 4 new PROMIS® Itch short forms alongside ItchyQoL and the Itch Numeric Rating Scale (NRS) during routine care in dermatology.

Methods: This was a retrospective study analyzing the results of 3 itch PROs (Itch NRS, ItchyQoL and PROMIS® Itch short forms) administered on iPads during check-in for clinic appointments at University of Rochester Dermatology.

Results: Total PROMIS® scores and short forms correlated with total ItchyQoL scores and corresponding subscales, respectively. The strength of correlation between each and subscale or short form and the total scores differed between patients with mild, moderate and severe itch. African American patients had higher mean scores for all short forms and subscales and were more likely to provide severe range answers than Caucasian patients. Patients with severe itch are likely to have clinically significant pain and anxiety.

Conclusions: PROMIS® Itch is a valid, reliable measure for assessing the impact of itch on quality of life (QoL). Itch severity influences the QoL factors affected by itch. Race influences the burden of itch on QoL. Patients with severe itch are likely to have clinically significant pain and anxiety, supporting the notion that itch affects QoL.

Goodman, Ariana

Preceptors
R. Kirk Riemer, PhD
Frank Hanley, MD
Stanford University
Department of Cardiothoracic Surgery

Co-Authors
Xiaoyuan, MD
Thomas Collins, MD
Stanford University
Department of Cardiothoracic Surgery

Williams Syndrome: Transcriptomic Profiling Demonstrates Multiple Phenotypic Differences Relevant to Homeostatic Regulation of Pulmonary Arterial Tone

Abstract Purpose: Williams Syndrome (WS) patients experience stenotic diseases of the aorta, renal, and pulmonary arteries (PA). This study examined PAs from patients with or without WS to compare vascular tissue architecture and gene expression profiles to characterize differences and facilitate a better understanding of the propensity for stenosis of WS PAs.

Abstract Methods: Pulmonary arterial tissue discarded during surgical repair operations on WS patients (n=6) and agePmatched controls (n=4) were cryopreserved or fixed. Histopathologic analysis including Movat Pentachrome staining and immunohistochemistry was conducted to assess differences in the organization of vascular cells and extracellular matrix proteins and corroborate observed alterations in gene expression. Comparative gene expression was analyzed using Affymetrix Human Transcriptome arrays.

Abstract Results: Histologic analysis comparing WS and Control PAs revealed several tissue architectural differences. Notably, marked heterogeneity among WS PA in both elastin fiber distribution and morphology was observed. Elastin strands distributed throughout the increased width medial layer were markedly shorter, thicker, nonPparallel and disorganized. Increased spacing between the strands was occupied by increased proteoglycan content (Movat Stain). Comparative gene expression analysis between groups demonstrated over 40 genes differentially expressed at the 4Pfold or greater level ($p < 0.05$). Marked differences were observed for genes related to the Serotonin (5HT) signaling pathway: WS PAs were characterized by reduced (>10Pfold) expression of 5PHTT (Serotonin Transporter) and increased (2.5Pfold) expression of Serotonin receptor subtype HTR2A. Of note, despite Elastin gene (ELN) haploinsufficiency of WS PAs, expression of ELN mRNA was robust and not different between groups. Immunolocalization of 5HTT and HTR2A demonstrated specific protein expression differences that parallel the observed gene expression differences.

Abstract Conclusions: The WSPspecific PA differences in both structure and gene expression relevant to serotonin signaling indicate a potential for disruption of contractile homeostasis. The potential effects of, for example, chronic elevation in contractile stimulus and reactive oxygen species production on conduit PA stenosis remains to be better understood.

Mitchell, Drew

Preceptor
Derek Bell, MD
University of Rochester Medical Center
Department of Surgery, Division of Plastic Surgery

Co-Author
Kathryn E.H. Skibba, MD
University of Rochester Medical Center
Department of Surgery, Division of Plastic Surgery

Nosocomial Burn Wound Infections are Eliminated with Daily Wound Care

Introduction:
Burn patients are at high risk for development of infection. Patients with burn wound infections are associated with an increased length of stay (LOS) and the use of broad-spectrum antibiotics.[1,2] Infection is a leading complication of burn wounds with reported rates between 2-39%, and is the principle cause of death and morbidity after injury.[1,3-6] This study describes the burn wound management protocol which has nearly eliminated burn wound infections at our institution.

Methods:
A retrospective review of all patients admitted to the burn service was performed from 7/1/2015-6/30/2017. The study included patients of all ages with cutaneous burn injuries hospitalized for 48 hours or longer. Exclusion criteria consists of patients admitted less than 48 hours, those with inhalation only (non-cutaneous) burns, and patients admitted for reasons other than burn (e.g. Stevens-Johnson syndrome, necrotizing fasciitis). Nosocomial BWI was defined as cellulitis and/or bacteremia without identifiable cause diagnosed after hospitalization for more than 48 hours. All diagnosed BWI were confirmed clinically by an attending burn surgeon, burn nurse practitioner, or burn physician assistant.

Wound care was consistent amongst all burn patients. At presentation, all burn wounds were cleansed with chlorhexidine and received mechanical and/or sharp debridement to remove detritus, nonviable tissue, and unroof blisters. The burn was then rinsed with water or saline, patted dry, covered with bacitracin/polymyxin B ointment and xeroform, and dressed with gauze. Facial burns were covered with petroleum ointment and left undressed. This wound care protocol was followed daily with emphasis on biofilm removal during chlorhexidine wash and mechanical debridement as needed.

Results:
A total of 490 patients met inclusion criteria: 36.5% female, 63.5% male. The average age at admission was of 31.78 ± 23.54 years. Most patients self-identified as Caucasian (71.0%) or Black (20.6%). Comorbidities were found in 161 patients which included smoking (23.7%), hypertension requiring medication (7.7%), respiratory disease (e.g. COPD, asthma) (5.9%), diabetes mellitus (6.5%), and illicit drug abuse (6.5%).

The average LOS was 8.78 ± 10.41 days. Sixty-two patients were admitted to the ICU for an average LOS 7.94 ± 9.54 days and 23 were intubated. Eight patients died in the hospital (4 from multisystem organ failure, 2 from respiratory failure, 1 from brain death, and 1 from central line associated septic shock). Thermal (81.2%) and friction (14.5%) burns were the most common burn etiologies.

There were 222 patients whose cutaneous burns were exclusively second-degree with an average TBSA 4.71% ± 6.72%; 26 patients' cutaneous burns were exclusively third-degree with an average TBSA 1.87% ± 1.94%; and 249 patients' cutaneous burns were combined second- and third-degree with an average TBSA 6.95% ± 11.02%. Thirty-three patients had concomitant inhalation and cutaneous injury. A total of 726 procedures (e.g. excision of burn wound, split thickness skin grafting) were performed by the burn surgery team on 158 patients during 305 visits to the operating room. The average number of wound care days until burn wound healing was 23.39 ± 24.88.

Zero patients were diagnosed with BWI based on clinical and/or laboratory evidence. There were 8 urinary tract infections, 4 pneumonias, 2 catheter-related bloodstream infections, and 1 clostridium difficile colitis.

Conclusion:
BWI after injury remains a common and potentially devastating complication. However, our burn center was able to prevent all instances of nosocomial BWI using the described wound care regimen as demonstrated by the data collected over two years.

Applicability of Research to Practice:
Nosocomial BWI is a preventable complication and our study demonstrates that with our daily wound care protocol this complication can be eradicated.

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Biscaye, Andre
Collins, Jeffrey

Preceptors
Danni Kirwan, MD
St. George's, University of London
Infection & Immunity Research Institute

Eduardo Ticona
Hospital Dos de Mayo
Servicio de Enfermedades Infecciosas y Tropicales

Neurological Syndromes in Individuals Infected with HIV in Lima, Peru

Introduction

In Peru and Bolivia, limited access to antiretroviral medications puts individuals with HIV at risk for opportunistic infections, some of the most devastating of which are neurological infections such as neurotoxoplasmosis, central nervous system (CNS) Chagas disease, and CNS tuberculosis.[1] Frequently in these countries, when patients with HIV infection present with a neurological syndrome, a definitive diagnosis is not possible due to a lack of medical imaging and laboratory resources. This puts patients at risk for delayed or imprecise treatment for these serious infections. Currently we face a great need to develop accurate and affordable tests that can be used for these neurologic infections in the developing world.[2]

The technology of nanoparticles presents a relatively cheap method of concentrating and preserving antigens from infectious organisms, which can be combined with existing technology such as enzyme-linked immunosorbent assay (ELISA) to increase the sensitivity and specificity of the assay. Previous research has led to the development of nanoparticle assays for Chagas, tuberculosis, and toxoplasmosis infections, which can detect antigen in urine by concentrating the antigen up to 100 times[2,3,4]. However, the accuracy and utility of these assays in the clinical setting has not yet been fully investigated. This multicenter study aims to recruit patients with HIV who present with neurological syndromes in order to compare these assays against other diagnostic tests currently used. If successful, this work will contribute to the development of accurate, affordable, and convenient new diagnostic tools for patients living with HIV and suffering from potentially life-threatening neurological syndromes.

Methods

- Study design
  This is an observational prospective cohort study in patients with HIV who present with neurological signs or symptoms that have developed within the last 6 months. Recruited patients are administered a questionnaire, receive a neurologically-focused physical examination, and provide samples of urine, blood, and cerebrospinal fluid (CSF). Patients also complete follow-up visits at three weeks and six months, in which the questionnaire, physical exam, and samples of urine and blood are repeated.

- Location and participant recruitment
  Participants are recruited at two hospitals in Peru and one hospital in Bolivia. Between February and June 2019, we recruited patients at Dos de Mayo Hospital in Lima, Peru. After training in completing informed consent for the study, we approached and consented patients in various hospital locations, including the emergency department, the infectious disease department, and internal medicine pavilions.

- Clinical data and sample collection
  If patients gave their consent to participate in the study, we administered the study questionnaire, performed a physical examination, administered a mini-mental status evaluation and HIV dementia screening tool, and coordinated collection of urine, blood, and CSF samples by hospital personnel. We also coordinated transportation of the samples to Universidad Peruana Cayetano Heredia where a laboratory team carried out the experimental nanoparticle assays for CNS infections as well as cultures, polymerase chain reaction, and other pre-existing diagnostic methods used as control assays.

Results

Between February and June 2019 we screened 27 patients for participation in the study and recruited 9 patients. The most common presenting sign/symptom was altered mental status, while others included seizure, ataxia, paraplegia, and headache. Reasons that screened patients were not recruited included refusal of consent, non-neurological etiologies of symptoms, and preclusion of consent due to critical condition or death. Of the 9 patients included in the study, 2 cases of cryptococcal fungal infection were detected. Other cases have not revealed positive results, although several laboratory detection methods are still pending. Some results may have been false negatives because patients had already been receiving treatment for presumed infection with toxoplasma or tuberculosis before we collected samples.

Reflections/Personal Impact

Participating in this project gave us a valuable perspective on the development of new diagnostic tools and on the reality of living with HIV in a resource-poor country. Joining the project required coordinating with researchers from Peru, the United Kingdom, Johns Hopkins University, and the University of North Carolina, which introduced us to the complexity of global health research. We traveled to the city of Iquitos in the Peruvian Amazon to meet with the research team at that site and learn the consenting and data collection process. We also developed close relationships with the infectious disease residents at Dos de Mayo Hospital in Lima and had the opportunity to participate in their daily rounds and hospital consult teams. Most of all, the experience of getting to know patients and their families in a time of terrifying uncertainty taught us humility and sensitivity while dealing with grave illnesses in another culture. This project will continue at the 3 sites in Peru and Bolivia and will hopefully help bring valuable diagnostic resources to medical teams and their patients.

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Merriman, Joely

Preceptor
Amancio Jose de Souza, PhD
Bahiana School of Medicine and Public Health, Salvador, Brazil
The Center for Research and Innovation

Co-Author
Marcos Almeida Matos, MD, PhD
Bahiana School of Medicine and Public Health, Salvador, Brazil

Capacity Building At A Brazilian Academic Research Laboratory Through The Study Of The Prevalence Of Enos Gene Mutations In Sickle Cell Disease Patients From Bahia, Brazil With Avascular Osteonecrosis

Project abstract: A one year capacity building project with subsequent years of data collection and analysis at the Center for Research and Innovation at the Bahiana School of Medicine and Public Health assessing correlation of mutations in the endothelial nitric oxide synthase (eNOS) gene and the prevalence of osteonecrosis in a sample patient population in northeastern Brazil. This project set the foundation for continued international collaboration between the Bahiana School of Medicine and Public Health and the University of Rochester School of Medicine and Dentistry - University of Rochester Medical Center.

Purpose of the study: To evaluate the prevalence of mutations in the gene coding for the endothelial nitric oxide synthase (eNOS) protein in Brazilian patients with a history of avascular osteonecrosis in the context of sickle cell disease (SCD).

Objective: Determine if there is prevalence of eNOS polymorphisms in patients diagnosed with sickle cell disease exhibiting cases of avascular osteonecrosis.

Specific Objectives

1. Demonstrate if specific eNOS polymorphisms (5' untranslated region, intron 4 and exon 7) are associated with avascular osteonecrosis in patients with sickle cell disease.
2. Determine if eNOS polymorphisms are associated with enhanced clinical severity of osteonecrosis in sickle cell patients.
3. Establish if there is association between clinical or laboratory factors and avascular osteonecrosis in sickle cell patients with eNOS polymorphisms.

Laboratory capacity building + project status at one year

During the funding period, lab capacity at the Center for Research and Innovation was increased through the development of an in-house protocol for DNA extraction and restrictive enzyme use, two funded positions for research assistants at the lab were instated, and the lab expanded its project base to include

projects looking at impact of community engagement outside of medical- and research-mediated interactions on health professional students.

At the one year mark, all eNOS SCD in-house protocols were working and research subject samples had begun to be processed. The project anticipates completion in May 2020.

Obudzinski, Sarah

Preceptor
James O. Sanders, MD
University of Rochester Medical Center
Department of Pediatric Orthopaedic Surgery

Co-Authors
Caitlin Orner, MD
Jordan Vokes, MD
University of Rochester Medical Center
Orthopaedic Residency Program

Pelvic Maturity Scale

Skeletal maturity is a key determinant of management and timing of interventions in pediatric orthopaedics, particularly for children with spinal and lower extremity deformities. Currently, the most reliable and efficient method for determining skeletal maturity is the Sanders skeletal maturity scale1. This, however, requires the use of hand radiographs. The primary objective of this study was to create and validate a simplified staging system for skeletal maturity using landmarks in pelvic radiographs. As radiographs including the pelvis are regularly obtained in the management of patients with spinal and lower extremity deformities, this scale would eliminate the need for extraneous hand x-rays to determine skeletal maturity. This was a retrospective descriptive study with two separate subject groups. The first study population included children from the Bolton Brush collection, a series of longitudinally-collected anthropometrics and skeletal radiographs from healthy children in Ohio between 1931 and 1942. The second study population included children from URMC outpatient clinics who obtained pelvic radiographs in 2018. Children aged 3-17 years old without bilateral hip pathology were included. The first part of this study looked at the major growth centers of the pelvis and their stages in development, as classified by the Oxford method2. Pelvic images from the Bolton Brush collection were reviewed and staged according to the Oxford system. Using anthropometric data of each subject's growth over time, the sequential timing of each developmental stage was then plotted relative to peak height velocity (PHV). Results revealed the following order of Oxford stages, starting ~4 years before PHV and continuing to completion of growth: FH4, Ilium2, IPJ2, FH5, GT4, TRC1, Ischium4, IPJ3, FH6, GT5, TRC2, Ilium3, Ischium5, PHV, FH7, GT6, R1, Ischium6, R2, Ilium4, R3, TRC3, Ilium5, GT7, R4, FH8, Ischium7. This information was then used to propose a pelvic maturity scale divided into 6 main stages: early childhood, pre-growth spurt, early growth spurt, peak height velocity, growth slowing, and terminal growth. Future steps will include scoring of modern images by orthopaedic attendings, residents, and medical students to test for interobserver reliability and validity of this scale in modern day patients.

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Patel, Alap

Preceptor
Howard N. Langstein, MD
University of Rochester Medical Center
Department of Surgery, Division of Plastic Surgery

Co-Author
Luoying Yang, MD
University of Rochester Medical Center
Department of Biostatistics & Computational Biology

Ventral Hernia Repair: Are We Actually Restoring Patients' Function?

Introduction

Ventral hernias are complex chronic diagnoses that require both medical and surgical management. Despite initial surgical repair, recurrence and complications can still persist. In the most complex of ventral hernias, the expertise of a plastic surgeon is required to medialize muscle flaps and for complex soft tissue closure. With medicine now having more of a population health focus, chronic illnesses must be managed in a cost effective manner. Ventral hernias are among the most expensive of chronic illnesses, as they require frequent surgical management[1-3]. While existing studies focus on outcomes following and costs associated with open versus laparoscopic hernia repair, no studies specifically assess return to work, which we use as a proxy for one' ability to return to being a productive and contributing member of society, after abdominal wall reconstruction with a components separation technique.

A hernia is a protrusion, bulge, or projection of an organ or part of an organ through the body wall that normally contains it, such as the abdominal wall[4]. The surgical repair of hernias dates as far back as the ancient times of Greece and Egypt[5]. Ventral hernias are the most common type of hernias after previous surgery, with as many as 10% to 20% of patients eventually developing hernias at incision sites following abdominal surgery[6]. These incisional hernias can have a recurrence rate of up to 32%; given about 10 million open abdominal surgeries performed in the USA between 2009 and 2013, that equates to roughly 3.2 million ventral hernias that will require repair[7-8]. Without changes in technique and materials, we cannot turn failure into success.

Initially, hernias were excised and closed primarily. With the invention of mesh, a device that provides additional support to weakened or damaged tissue, recurrence rates dropped in half[9-10]. Progress continued with plastic surgery's creation of the components separation surgery, a type of complex abdominal wall reconstruction performed for the repair of large hernias. However, without sufficient reinforcement, recurrence still persisted. At this point synthetic mesh infection rates were still high, but with the growing popularity of laparoscopic (minimally invasive) hernia repair, the success rate of a ventral hernia repair with minimal infection was higher than ever before[11]. Due to an increasing number of complex cases in obese patients, even laparoscopic ventral hernia repairs are falling out of favor because the recurrence rate is still high.

For the most complex patient population, the field of plastic surgery offers a unique approach to surgical repair. Plastic surgeons utilize their reconstructive and creative mindset to approach and reconstruct the abdominal wall in even the sickest patients[12-13]. They specialize in closing complex wounds, and are skilled in soft tissue manipulation and management. A combination of plastic surgeons' expertise and the additional of biologic mesh (porcine, bovine, or dermis of a cadaveric human), fewer contaminated meshes have been documented. Despire advancements, our success is far from perfect and patients with recurrence are apt to have more recurrences despite improved surgical technique.

While surgery itself is a key component of the cost, additional factors that exacerbate patients' financial burdens include pain management, frequent outpatient and hospital visits, and the indirect cost of time spent away from work[14]. By being unable to take on jobs, patients are unable to function as productive members of society and forego a source of income, ultimately being unable to fund their own healthcare needs. Unfortunately many patients requiring multiple surgeries are unemployed for extended periods of time, ultimately losing their health insurance, and subsequently rely on Medicare and Medicaid for treatment of this condition. This only further financially burdens our healthcare system.

Without analyzing associated costs and the lifestyles of patients with ventral hernias, society as a whole will continue to bear the burden of this chronic condition. Therefore our purpose is to understand whether ventral hernia repair is helping people become contributing members of society after their injury, whether we are successfully helping patients get back to work, and ultimately, whether or not we are improving lives.

Methods

After obtaining Institutional Review Board approval, our prospectively maintained abdominal wall reconstruction database was queried for all patients undergoing ventral hernia repair with definitive reconstruction by plastic surgery between 2005 and 2019. Data were collected on demographics, surgical history including use of mesh, surgical complications, employment, work limitations, and insurance and disability status. Complications reviewed included surgical site occurrence (wound dehiscence, draining pus/purulence at wound site, cellulitis, delayed wound healing, wound necrosis), seroma, respiratory insufficiency, return to operating room, chronic pain, hematoma, low urine output/UTI, DVT/PE, post-operative ileus, fat necrosis, exposed mesh, and hernia recurrence after definitive repair by plastic surgery.

All patients were called to participate in a follow-up phone survey. Patients were called a minimum of three times before being excluded. All surgery questions are listed in Figure 1.

Statistical analysis was performed using R-Studio (R-Studio Inc., Boston, MA) and Microsoft Excel. A p-value < 0.05 was considered statistically significant.

Results

Demographics

Ventral hernia repairs performed by plastic surgery between 2005-2019 were reviewed through our internal prospectively maintained database. The 441 patients included (52% female, mean age 57, range 18-90 years) had a mean BMI of 31.4 (range 17-50) (Table 1). The majority of our cohort was Caucasian (84.6%), and Not Hispanic (98%).

Surgical History

All hernias were caused by prior incision sites. Before definitive reconstruction by plastic surgery, patients had a mean of 2.92 abdominal surgeries (SD 1.76, range 1-14). These most commonly included organ removal (n=146, 33.1%), bowel resection (n=136, 30.8%), and bowel obstruction (n=75, 17.0%). (Table 2)

Before definitive reconstruction, patients had a mean of 0.52 prior hernia repairs (SD 0.91, range 0-7). While some presented to plastic surgery after having a hernia repair performed by a different surgical team (n=143, 32%), the majority presented for definitive repair of their index hernia (n=298, 68%). Of the patients with prior hernia repairs, 120 (29%) had prior use of mesh and 32 (8%) had a history of mesh infection. (Table 3)

Patient Follow Up

The mean follow up time for all patients was 244 days or 0.67 years (SD 306 days or 0.83 years). This is compared to a mean follow up time for patients with hernia recurrence after definitive repair of 573 days or 1.7 years (SD 318 days or 0.87 years). (Table 3)

Hernia Size and Reconstruction Technique

The mean hernia size for patients was 175 cm^2 (SD 87 cm^2), and surgical technique for abdominal wall reconstruction was most commonly either a bilateral (n=272, 83%) or unilateral (n=31, 9%) components separation. The mean patient length of stay was about 7.3 days (SD 7 days). (Table 4).

Mesh

A biologic mesh was most commonly used (n=202) at the time of definitive repair, and included Strattice (Allergan, Dubin, Ireland), Permacol (Medtronic, Minneapolis, MN), Alloderm (Allergan), FlexHD (MTF Biologics, Edison, NJ), and Surgisis (Cook Medical, Bloomington, IN). Synthetic mesh types used (n=69) included Prolene (Ethicon, Somerville, NJ), Composix E/X (C.R. Bard), Vicryl (Ethicon, Somerville, NJ), Goretex (Flagstaff, AZ), and DualMesh (Flagstaff, AZ). Reinforced biologic mesh used (n=41) included Oxitex (TELA Bio, Malvern, PA). (Table 5) One hundred twenty-nine patients did not have mesh use documented in their medical records, generally before the use of electronic medical records at our institution. (Table 5) Mesh was placed retrorectus (sublay) / preperitoneal (n=250), intraperitoneal (underlay) (n=44), or onlay (n=18). The mean mesh size used was 239 cm^2 (SD 126 cm^2). (Table 5)

Phone Survey and Employment Status

All 441 individuals included in retrospective review were asked to participate in a phone survey. From our original cohort, 170 accepted the call and all but 3 chose not to participate. When asked if patients were currently working, 39.5% (n=66) said yes and 60.5% (n=101) said no. (Table 6B).

For those currently working (n=66), the mean recovery time before going back to work was 3.26 months (SD 0.68, range 3-5). When asked if their work changed after going back, 68.3% (n=43) said no and 36.5% (n=23) said yes with less lifting as a common modification. The majority of those who did not need work modifications were doing deskwork (n=27, 63%). The majority of those who did need work modification were doing heavy labor jobs (n=19, 83%).

For those currently not working (n=101), 56 (55.4%) said they did not work before their injury, 5 (5%) said they were already retired before their injury, 39 (38.6%) said they were working before their injury and would have kept working otherwise, and 1 (1%) said they were working before but decided to retire after their injury. Of the 39 who said they would have kept working without their injuries, most people were previously in heavy labor jobs (n=29, 74%).

There were no statistically significant differences when comparing individuals who were currently working or those were not working at the time of our phone survey. There were also no statistically significant

differences when between those who presented for repair of their index hernia versus those who have had their recurrent hernias repaired in the past by general surgeons.

Complications

A total of 383 (86.8%) patients suffered at least 1 postoperative complication. The most common complications were surgical site occurrence (wound dehiscence, wound infection, draining pus at wound site, cellulitis, delayed wound healing, or wound necrosis) (n=132, 34%), seroma (n=28, 7%), and respiratory insufficiency (n=18, 5%). (Table 8)

The recurrence rate after definitive repair by plastic surgery was 9% (n=36). Of the patients who did recur, 13 had participated in the phone survey. Of these, 4 were currently working and one person after survey had change their work from heavy to light labor. Nine people were not working, and four said while they weren't currently working, they would have continued to work had it not been their hernia and surgery. (Table 8).

Discussion

Ventral hernias must be thought of as a chronic illness. Surgical correction of the defect is not sufficient, and success must be placed in the context of public health and health economics. For example, success must consider improvement in a person's quality of life and restoration of function. HIV, for example, should be analyzed with metrics that include the need for medical management over many years, return to work, and ability to return to previous level of function. If successful return to previous level of function is not the possible, then costs go beyond just healthcare dollars, and include dollars lost in lack of productivity. Our study uniquely studies ventral hernia repair as a chronic illness, utilizing employment as a proxy for ability to return to previous quality of life and ability to living as a functioning member of society.

One goal of ventral hernia repair is to help individuals return to their prior level of function. If the individuals in our study were working after surgery, many needed their work to be modified (36%). While this is a minority, these individuals' jobs are crucial to the work force. If these individuals are displaced from their heavy labor jobs, this may burden not only on the patient who's entire livelihood needed to be adjusted from a very physically demanding job to a desk job, but also to the employer who now needs to find and train a replacement. Furthermore, surgeons should counsel individuals with heavy labor jobs to anticipate the need to adjust their work after surgery. Our results showed that definitive repair did help individuals with desk jobs as 27 (63%) were able to go back to work at their prior level of function.

Only 39.5% of patients in our study were currently working when called after their definitive repair by plastic surgery, and although a minority (36.5%) said they needed work modifications, nearly all said their modification was less lifting. Twenty-three patients had heavy labor jobs before ventral hernia repair, dropping down to only 4 still having sufficient ability to perform heavy labor after surgery. These individuals in particular were not brought back to their baseline after ventral hernia repair. While necessary for the patient, this places a burden on the employer in finding someone to fill this role.

Some able-bodied individuals after surgery choose to stop working because of their hernia and subsequent repair (n=39, 38.6% of those not working). These individuals were lost (no longer working), but otherwise would be expected to go back to work and were not helped by ventral hernia repair. Overall, few patients said they used PT or had an individualized exercise plan, but these may be areas of further research to determine if there is a role for either in rehabilitating individuals. Of the people who choose not to go back to work, the majority were heavy laborers, indicating this specific population should be counseled on what to expect for their employment after surgery. In directly comparing those who were

and were not currently working, and those presenting for index versus recurrent hernia, there were statistically significant differences amongst the variables we assessed.

While the number of index hernia repairs presenting to our plastic surgeons (68%) may be unexpected, we attribute this to the strong reputation of our institution's abdominal wall reconstruction program (Table 3). Referring physicians may have been more inclined to send patients with hernias to plastic surgery for definitive repair, even before referring them to a general surgeon.

Our included data include patients operated on before the use of electronic medical records, and so there is limited information available on mesh use before 2011. However, nearly all patients had a biologic mesh used. Many of the specific mesh types documented in this study are not used anymore. As is consistent with mesh placement is many hernia repair studies, the majority of our meshes were placed in a retrorectus (sublay) fashion (57%) (Table 5).

Recall bias associated with our phone survey also limits our study. To account for this, our survey allowed our respondents to provide non-specific answers, such as saying their work entailed little to no labor or saying that they returned to work within 3 or 4 months after surgery.

Conclusion

Ventral hernias are complex chronic illnesses that are often surgically managed; however, not all VHRs are "successful" as patients may not fully realize a complete benefit. Most people were not working after VHR, and individuals with desk jobs prior to VHR were able to return to their employment after surgery, but those with light or heavy labor jobs had to have their work modified to meet their reduced level of function. Patients should be counseled on their realistic ability to function after this operation.

Figure 1: Phone Survey Questions

Do you currently work?

YES:

- How long after surgery did you return to work?
- Please explain why your time away from work was as long as it was. Include non-medical reasons as well (i.e. social circumstances).
    - This is an appropriate question to ask all subjects because ideally, their clinicians will have let them know when they might expect to go back to work. Sometimes, the actual duration will be shorter or longer than what was initially described to them after surgery.

NO:

- Did you work before your injury?
- Have you qualified for disability as a result of your hernia injury?
- Have you applied for disability as it related to your hernia injury?
- Did your work change after your hernia/injury?
- How did your work change?
- (i.e. did you work have to be modified? Did you have to change the industry you worked in)?
- How would you describe your work? (a) desk work, (b) light labor / occasional lifting, (c) heavy manual labor
- Did you get additional Physical Therapy or Occupational Therapy?
- Did you self-initiate an exercise plan after surgery?
- Post-operatively, what was the maximum weight you were allowed to lift?

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Robinson, Casey

Preceptors
Anthony Pietropaoli
University of Rochester Medical Center
Department of Medicine

Co-Authors
Elizabeth Levy
Tristan Bice
Jimmy Zhang
University of Rochester School of Medicine and Dentistry

Christina Dony, MD
Michelle Malnoske, MD
G. Tsang
O. Wexler
A. Rovitelli
S. Mroczek
University of Rochester Medical Center

Impaired Forearm Reactive Hyperemia Is Associated With Lactate, Red Blood Cell Deformability, and Mortality in Septic and Non-Septic Critically Ill Patients

Sepsis is associated with microcirculatory and red blood cell (RBC) dysfunction. It is unclear whether these abnormalities are unique to sepsis. We tested the hypothesis that forearm reactive hyperemia is impaired in both sepsis and non-septic critically ill patients, more so in non-survivors. We further hypothesized that forearm reactive hyperemia would be correlated with RBC deformability, lactate concentration, and severity of illness.

METHODS: This was a prospective cohort study enrolling patients from the medical and surgical intensive care units at the University of Rochester Medical Center, and a healthy control group to provide normative data. Forearm reactive hyperemia was measured with Doppler ultrasound of brachial artery blood flow before and after a 5 minute period of stagnant ischemia induced by sphygmomanometer cuff inflation at the upper forearm. Venous lactate was measured in the clinical laboratory. Red blood cell deformability was measured by timing the passage of buffer- suspended RBCs through 5 μM pore size filter paper. Reactive hyperemia is expressed as the percent change in brachial artery blood flow from before to immediately after stagnant ischemia. Summary statistics are expressed as median (interquartile range [IQR]). Differences between groups were analyzed using the Kruskal-Wallis test, and correlations between measurements were analyzed using Spearman's rank correlation coefficient (rho). Some of these results were reported previously in abstract form, but the analyses reported herein are unique.

RESULTS: Reactive hyperemia was severely impaired in critically ill patients (204 [141,303]%, n = 134)

compared to controls (394 [259, 578]%, n = 42, p < 0.001), but similar in septic (210 [160, 306]%, n = 85) and non-septic patients (212 [121, 323]%, n = 37, p = 0.58). Among all critically ill patients, reactive hyperemia was higher in hospital survivors (220 [143, 309], n = 112) compared to non-survivors (154 [125, 197], p = 0.01). Reactive hyperemia was significantly correlated with APACHE II score (rho = -0.25, p=0.004, n = 134), RBC filtering time (rho = - 0.34, p = 0.003, n = 69), and venous lactate (rho = - 0.24, p = 0.01, n = 109).

CONCLUSION: Microcirculatory impairments are similarly present in septic and non-septic critically ill patients. These impairments are associated with severity of illness, mortality, and physiologic correlates of microcirculatory function. Forearm reactive hyperemia measured with brachial artery ultrasound shows promise as a practical, non-invasive technique for assessing microcirculatory function in critically ill patients.

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Sulovari, Aron

Preceptor
Addisu Mesfin, MD
University of Rochester Medical Center
Department of Orthopaedics

Co-Authors
Etka Kurucan, BA
David Bernstein, MBA, MA
University of Rochester Medical Center
Department of Othopaedics

Nationwide Analysis of Spinal Fusion Outcomes in Multiple Sclerosis Patients

Introduction: Multiple sclerosis (MS) is a common cause of disability in the US and MS patients may manifest pathology of the cervical or lumbar spine. The impact of MS on cervical and lumbar spine fusion has yet to be studied in a nationwide analysis. The objective of this study was to determine trends and compare the characteristics, comorbidities, and complications in patients with and without MS undergoing primary cervical or lumbar spine fusion.

Methods: The Nationwide Inpatient Sample (NIS) from 2003 to 2014 was used to create experimental MS and non-MS control cohorts undergoing primary cervical or lumbar spine fusion. Univariate and bivariate analysis were used to determine and compare outcome measures.

Results: The 196 MS patients undergoing primary cervical spine fusion had higher rates of chronic blood loss anemia, depression and lower perioperative rates of neurologic, cervical spine-related, pulmonary, renal and infectious complications and incidental durotomy compared to the 37,888 controls. The 842 MS patients undergoing primary lumbar spine fusion had higher rates of depression and lower rates of diabetes without chronic complications, hypertension and renal failure compared to the 165,726 controls. No significant difference was found in mortality or total perioperative complication rates.

Conclusion: MS patients undergoing cervical and lumbar spine fusion had similar mortality and total complication rates as patient without MS. Based on one of the largest studies on MS patients undergoing spinal fusion, spine surgeons should be reassured on the low complication and mortality rate in this patient population.

Tomlinson, Samuel

Preceptors
Eric Marsh, MD
Children's Hospital of Philadelphia

Benjamin C. Kennedy, MD
Children's Hospital of Philadelphia

Long-Term Reproducibility of Interictal Spike Trajectories in Children Undergoing Invasive Monitoring With Subdural Electrodes

Background: Interictal spikes are pathologic events that arise when local populations of cortical neurons become abnormally synchronized. Spikes are a hallmark feature of electroencephalography (EEG) recordings in children with epilepsy. Spikes have a tendency to arise and propagate through networks of interconnected brain regions, but the pathophysiological significance of this network phenomenon is uncertain. The purpose of this study was to characterize the long-term stability of interictal spike propagation in children undergoing invasive exploration with subdural electrodes prior to epilepsy surgery.

Methods: Full-duration intracranial EEG records from 12 children (mean age 13.1 years) undergoing Phase II evaluation for epilepsy surgery were retrospectively examined. Functional connectivity networks were constructed based on the tendency for regions to co-activate during interictal spike discharges. For each spike event, a propagation trajectory was visualized based on peak latencies. Each electrode in the network was assigned a 'Degree Preference' based on the tendency to appear early (i.e., upstream) or late (i.e., downstream) in propagation trajectories.

Results: Regions exhibited stable Degree Preferences in all twelve patients, indicating that spikes have a tendency to propagate through highly reproducible propagation trajectories. Across patients, regions appearing upstream in propagation trajectories were more likely to localize to the seizure onset zone, and resection of these regions was associated with favorable surgical outcomes.

Significance: Interictal spike propagation is a characteristic and highly reproducible behavior of epileptic brain networks. These results shed new light on the pathophysiological significance of interictal spike propagation and suggest a role for spike analyses in planning the surgical resection.

Turner, Sydnie

Preceptor
Amina Alio, PhD
University of Rochester Medical Center
Department of Public Health Sciences

Father-Inclusive Programing Resources: Trainings, Curricula, Measures and More

The Health Baby Network of Rochester (HBN) provides services for women and families during the perinatal period. An important aspect of the HBN is The Community Action Network (CAN). CAN is comprised of community members and healthcare providers of Rochester who work towards aligning community resources with the needs of families in Rochester. One goal the CAN is currently discussing is increasing father engagement during the perinatal period through offering father-inclusive programming and resources. Based on an extensive literature review, an 18-page resource guide was developed to highlight techniques and practices that have worked for father-inclusive parenting programs in the past. The manual outlines various tools that may be useful for beginning and maintaining a fatherhood program. The resources reviewed in the manual include educational programs, staff training, recruitment, retention, and quality measurements. The manual describes how the resources can be used, prices (if applicable), and where the resource can be accessed. It is important to be attentive to the diverse needs of fathers who may be interested in accessing HBN services. The guiding resources that were used to develop this manual take into consideration the demographics of mothers and families who are already benefiting from the Healthy Baby Network. Some potential program ideas that were purposed in CAN meetings after sharing this resource included father to father mentoring, educational didactic sessions, home visitation, and fatherhood events. The CAN also talked about recruitment and retention strategies and a need for a point person to lead the initiative. As a result, the Healthy Baby Network is now looking to fill positions for Fatherhood Programing Coordinator and Fatherhood Community Health Worker to prepare themselves to offer father-inclusive programing in the Greater Rochester area.