



Scholarly Pathways

Scholarship Forum
Class of 2017



Director of Scholarly Activities: Pat Lye, MD

Scholarly Activity Workgroup Leaders *Director:* David Brousseau, MD, MS
Associate Director: Linda Meurer, MD, MPH

Scholarly Pathway Directors

Bioethics	Cynthiane Morgenweck, MD, MA Ryan Spellecy, PhD Arthur Derse, MD, JD
Clinical & Translational Research (Physician Scientist)	David Brousseau, MD, MS
Clinician Educator	Karen Marcdante, MD
Global Health	Stephen Hargarten, MD, MPH
Health Systems Management & Policy	John Meurer, MD, MBA William Hueston, MD
Molecular & Cellular Research (Physician Scientist)	Jennifer Strande, MD, PhD
Quality Improvement & Patient Safety	Catherine Ferguson, MD Geoffrey Lamb, MD
Urban & Community Health	Linda Meurer, MD, MPH Rebecca Bernstein, MD, MS

Scholarly Pathway Coordinators

Hilary Chavez, MS
Meaghan Hayes, MEd
Jen Kraus, BS

Scholarly Pathways are a required component of the M1 and M2 year of the Discovery Curriculum. Students select an area of concentration through which they enrich and individualize their medical training, while exploring an area of interest. Students can apply to participate during M3 year, of which 115 Class of 2017 students did.

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

Students must complete a faculty-mentored Scholarly Project which meets *Glassick's Criteria for Scholarship* by the end of M3 year regardless of M3 Pathway participation.



Congratulations to Pathway Coordinator Hilary Chavez (center) who was recognized with a President's Community Engagement Award on April 22, 2016!

Best wishes to Hilary as she begins retirement July 1, 2016. She will be missed by the many students, faculty, community members, and staff she has worked closely with since 2010!

Class of 2017 Scholarship Forum Agenda
Thursday, June 30, 2016

1:00 pm **Welcome** **Kerrigan Auditorium**

Linda Meurer, MD, MPH, Director, Urban & Community Health Pathway

Opening Remarks

William Hueston, MD, Senior Associate Dean for Academic Affairs

1:15 pm **Podium Presentations** **Kerrigan Auditorium**

Kyle Greiber **Bioethics Pathway**

Title: *Plastic Surgery in a Discordant Twin?*

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Allison Shewmake **Clinical & Translational Research Pathway**

Title: *Defining Excessive Bleeding (EB) in Infants Undergoing Cardiac Surgery*

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Meghan May **Clinician Educator Pathway**

Title: *Caregiver Skills Differ by Health Literacy*

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Cooper Rapp **Global Health Pathway**

Title: *Prioritizing Care for Cambodian Children with Congenital Heart Defects*

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Jamal Saleh **Molecular & Cellular Research Pathway**

Title: *Methotrexate-induced CD30(+) T-cell Lymphoproliferative Disorder of the Oral Cavity*

Page: 40

Brett Cohen **Quality Improvement & Patient Safety Pathway**

Title: *Implementation of Lean Methodology in a Free Clinic*

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Divya Manda **Urban & Community Health Pathway**

Title: *A Novel Triage Level System for Children Entering Foster Care*

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2:45 pm **Poster Presentations** **Alumni Center**

Refreshments served

4:30 pm **Adjourn**

BIOETHICS



Cynthiane Morgenweck, MD, MA
Ryan Spellecy, PhD

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

Pages 1-3

CLINICAL & TRANSLATIONAL RESEARCH



David Brousseau, MD, MS

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

Pages 3-19

CLINICIAN EDUCATOR



Karen Marcdante, MD

Students gain skills needed to teach in a clinical setting, learn how to apply educational principles to their teaching, and develop a scholarly educational product.

Pages 20-23

GLOBAL HEALTH



Stephen Hargarten, MD, MPH

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

Pages 23-29

M3 SCHOLARSHIP FORUM



The M3 Scholarship Forum celebrates the Scholarly Projects completed by each member of the graduating Class of 2017. Projects not listed as POSTER or PODIUM were presented previously.

HEALTH SYSTEMS MANAGEMENT & POLICY



John Meurer, MD, MBA
William Hueston, MD

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

**No M3s in AY 2015 – 2016.*

MOLECULAR & CELLULAR RESEARCH



Jennifer Strande, MD, PhD

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

Pages 30-42

QUALITY IMPROVEMENT & PATIENT SAFETY



Catherine Ferguson, MD
Geoffrey Lamb, MD

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

Pages 42-52

URBAN & COMMUNITY HEALTH



Linda Meurer, MD, MPH
Rebecca Bernstein, MD, MS

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

Pages 52-66

Evaluating the SPAM Method of Eliciting Code Status Discussions**Authors:** Ellis K, Catlett A**Project Mentor:** Cynthiae Morgenweck, MD, MA

Fromme and White proposed the SPAM method to assist the admitting physician with eliciting a patient's code status, providing a framework for sensitive yet timely conversation. This project seeks to evaluate resident opinion of an educational intervention teaching the SPAM method. To achieve this goal, we conducted an educational intervention consisting of a didactic lecture, role-playing and OSCE. Students then completed surveys assessing experience, areas of knowledge, and emotional comfort. Students completed 4 surveys; a pretest (n=51), post-test (n=18) and repeated surveys at 30 days (n=21) and 6 months (n=27). At 30 days and 6 months; a majority of students recalled the SPAM acronym, a majority agreed or strongly agreed that the method was useful, and a majority used the method sometimes or always in their clinical practice. Given the positive responses to the SPAM method, it is a viable method for teaching students to gather a patient's code status.

Plastic Surgery in a Discordant Twin?**Authors:** Greiber K, Morgenweck CJ**Project Mentor:** Cynthiae Morgenweck, MD, MA

When talking with a family considering cosmetic surgery for their child with Down Syndrome, there are many ethical issues that ought to be explored. Are there added considerations when the child presented is one of two monozygotic twins discordant for Down's Syndrome? Can assent be obtained? How much attention should be paid to the sense of shared identity that stems from being one of a pair in the decision making process? Are there benefits to altering the appearance of the Downs twin to the 'normal' twin? Do these benefits extend to both twins? Are these benefits enough to classify it as something more reconstructive in nature, a shift which could have implications in terms of justice? At what age should the surgery be done, if at all? The goal of this presentation is to answer these and other questions in order to discuss key bioethical issues encountered in this scenario.

Role of Sleep Disturbances in Children with Autonomic Complaints**Authors:** Gundrum K, Chelimsky TC, Norins NA, Simpson P, Nugent M, Chelimsky G**Project Mentor:** Gisela Chelimsky, MD

Purpose: Little is known about the relationship between autonomic dysfunction and sleep disturbances. Children presenting with autonomic complaints frequently have comorbid sleep issues. This study aimed to identify patterns of sleep disturbances and autonomic dysfunction in a pediatric population. Methods: We completed a retrospective chart review of 16 children who underwent sleep and autonomic testing. Subjects were divided into 3 groups based on sudomotor CASS score and POTS criteria. Sleep quality, sleep architecture, and number of comorbidities were compared among groups. Results: There were no significant differences between groups in measures of sleep quality, sleep architecture and number of comorbidities. Conclusions: Patients with POTS and other forms of autonomic dysfunction experience multiple sleep disruptions, but there is no pattern to these abnormalities. An underlying diagnosis of POTS does not correlate with increasing amounts of symptoms or symptom severity.

Hip-Joint Contribution To ACL Injury In Females During Double-Leg Landings**Authors:** Kirkpatrick KV, Schaefer E, Fritz J, Harris G, Grice S, Vetter C**Project Mentor:** Carole Vetter, MD

Introduction: Annually~200,000 ACL injuries occur resulting in significant short/long-term morbidities. Our study would be one of the first to measure hip power in relation to the role of the hip in ACL-injuries. We hypothesize the kinematics/kinetics of the hip concerning power/abduction serve as a critical mechanism in ACL non-contact injuries in females. Specific Aims: Assess hip dynamics during the impact phase of double leg landing from drop-jumps by examining hip kinetics/kinematics in the sagittal/coronal/transverse planes. Methods: Marker-based lower extremity motion analysis of five 22-25y/o females performing double-leg-drop-jump landings from 30cm. 12 Vicon MX cameras, AMTI, and Bertec six-axis force plates collected kinematic data(250Hz) and kinetic data(3000Hz). Results: Hip shows power production during the first 20ms of landing followed by power absorption. Power contribution greatest in sagittal plane. Both coronal/transverse plane angles show variability/asymmetry while moments don't. Foot progression angles show variability/asymmetry. Conclusion: Work identifies potentially-critical mechanism of Hip effects w/landing via altering knee torque.

Provider Knowledge of Adolescent Mental Health Care Laws**Authors:** Lindeke S, Byrne R, Morgenweck C**Project Mentor:** Ryan Byrne, MD and Cynthiae Morgenweck, MD, MA

It is common for psychiatric illness to first manifest during adolescence. Wisconsin laws regarding access to treatment in adolescence are complicated. This project assessed provider knowledge of Wisconsin's adolescent mental health care laws, specifically statutes 51.13 and 51.14. A review of these laws followed by a knowledge-based questionnaire was created and sent to providers in the Psychiatry Department at Children's Hospital of Wisconsin. Eighteen providers responded, and the average percent of correct answers was 58.6%. There was no correlation between percentage correct and years of practice, nor were there differences in scores based on academic degree of provider. Importantly, only 26.7% of the respondents felt they had sufficient knowledge of laws from their training to adequately advise patients and families. Overall, our results suggest there is opportunity for expanding the knowledge of these laws among providers, and future work should include education in this area.

A Terminal Patient's Conditional Right of Accessing PAS as an End-of-Life Option**Authors:** Rich TM, Spellecy R**Project Mentor:** Ryan Spellecy, PhD

The 50+ page ethical exploration asks if there is a morally relevant difference between removing a feeding tube and Physician-assisted suicide (PAS). It also contemplates the counter-arguments and fears of physician assisted suicide against the annually published public data on legal and regulated PAS programs in the United States. Within this text, the slippery slope concerns of PAS are shown to be unfounded compared to such data. In addition, with a basic foundation of ethical principles and PAS history explained, as well as application of thought experiments, this text logically supports and defends the right of a legalized and regulated PAS end-of-life option to competent, rational, terminal patients. This written piece continues further by illustrating that there does not exist a morally relevant difference regarding PAS and removing a feeding tube from a terminal patient.

Teaching and Assessing Professionalism across Primary Care Residency Programs**Authors:** Weasler, LE**Project Mentor:** Ryan Spellecy, PhD**Community Partner:** Ascension

ACGME's Milestone Project doesn't specify validated educational experiences and assessment methods for each stage of resident professionalism. The purpose of this review is to address primary care program directors' (PD), residents', and physicians' perceptions of unaddressed aspects of a program's professionalism curricula. A literature review resulted in five articles surveying a total of 1106 PDs, co-PDs, residents, and physicians. The most effective educational experience and assessment method were role-modeling and observation, respectively. Despite increased time teaching professionalism and published guidelines, residents reported difficulty applying professionalism lessons, practicing physicians reported assessment methods weren't beneficial, and PDs continued teaching professionalism in an unstructured manner. PDs and co-PDs had higher ratings when compared to residents and physicians for the level of perceived resident preparedness and curriculum structure. Further studies on the validation of educational experiences and assessment tools along with more uniform published guidelines and EPA implementation will ensure adequate professionalism training.

Emergency Department Utilization By Trauma Patients After Initial Trauma Encounters**Authors:** Abou-Hanna J, Kugler N, Rein L, Szabo A, Carver T**Project Mentor:** Thomas Carver, MD

This study evaluates 30-day ED utilization after patients' initial trauma encounter. A retrospective review of adult patients evaluated by the trauma service in 2014 was performed. Data collected included patient demographics, trauma characteristics, disposition, follow-up, and ED utilization within 30-days of discharge. Univariate analysis and multilogistic regression delineated predictive factors for ED utilization. In 2014, 1,836 patients were evaluated with 71.4% being male, 69.1% suffering blunt trauma, and a median age of 36 years. Caucasians and African-Americans accounted for 46.9% and 41.3% of patients respectively. Within 30 days of initial trauma discharge, 14.2% utilized the ED. Pain (30%) was the most common diagnosis. On univariate analysis, African-American race, penetrating trauma, scheduled trauma follow-up, and Medicaid insurance predicted ED utilization ($p < 0.05$). However, on multilogistic regression, only penetrating trauma (OR 2.12 $p = 0.019$) and scheduled follow-up (OR 1.94 $p = 0.008$) remained significant. Knowing these predictors may help develop interventions preventing subsequent ED utilization.

Interfractional Movement of Female Pelvic Organs During RT Delivery**Authors:** Affi M, Liu F, Erickson B, Li XA**Project Mentor:** X Allen Li, PhD

Purpose/Objectives: To minimize irradiation to a normal organ during radiation therapy (RT), accurate organ-specific inter- and intra-fractional variations are essential for the determination of an organ-specific margin and/or for the planning of adaptive RT. This research hopes to quantify the inter-fractional female pelvic organ movement and volume change during RT delivery. **Materials/Methods:** Daily diagnostic-quality CT data acquired 27 for female patients during RT for various pelvic cancers were examined. Contours of bladder, rectum, vagina, uterus, cervix, large and small bowel, and sigmoid generated on the planning CTs were populated to the daily CTs. The contours from daily CTs were compared to that on the planning CT using a software tool to assess the daily variations in terms of various parameters. **Results:** Large inter-fractional variations were observed. Organ deformation is relatively lower in the female reproductive organs (higher DCs) as compared to other structures, most notably small/large bowels and sigmoid.

Cognitive and Neuroanatomical Factors Associated with Speech Perception in Aging**Authors:** Altonji K, Kassel M, Driscoll I, Humphries C, Sabri M**Project Mentor:** Merav Sabri, PhD

This study sought to determine whether declining speech-in-noise (SIN) perception in older adults with normal hearing is associated with cognitive performance and structural integrity of cortical gray matter. 18 younger adults (mean= 26.1) and 18 older adults (mean= 62.4) with normal hearing were tested with the Montreal Cognitive Assessment, the Repeatable Battery for the Assessment of Neuropsychological Status, the Wechsler Adult Intelligence Scale, and the QuickSIN Speech-in-Noise Test. Structural Magnetic Resonance Imaging scans were acquired in all subjects to look at the relationship between SIN perception and structural integrity of the frontoparietal attention network and semantic network. This study demonstrates that in aging, SIN perception does indeed decline despite normal hearing and can be attributed to declining executive function related to attention and working memory. Deficits in speech perception are also associated with decreased gray matter thickness in cortical areas involved in executive cognitive control, attention, and language processing.

Nasal Mucosa Temperature In Healthy Individuals and Subjective Nasal Patency**Authors:** Bailey RS, Casey K, Pawar S, Garcia GJ**Project Mentor:** Guilherme Garcia, PhD

Historically, otolaryngologists measured nasal resistance and minimum cross-section area to evaluate nasal obstruction. Sensation of nasal patency may be more associated with activation of cold receptors, but this has not been extensively measured. Our study investigated correlation between subjective nasal patency and mucosa temperature. Twenty-two healthy adults were recruited. Subjects completed the Nasal Obstruction Symptom Evaluation (NOSE) and a visual analog scale (VAS) to quantify nasal patency. A sensor was used to record nasal mucosa temperature at two locations along the nasal septum. Inspiratory nasal mucosa temperature at the vestibule correlated with VAS in the right cavity ($R = 0.41$) and expiratory temperature at the vestibule correlated with NOSE in the left cavity ($R = -0.56$). No other significant correlations were found. This study demonstrates possible correlation between subjective nasal patency and mucosa temperature. However, our results suggested irritation of the nasal mucosa. Future studies should consider non-contact methods.

How Do Patient Characteristics Influence Anxiety During Pediatric Venipuncture?**Authors:** Bolin AE, Lunoe M, Drendel AL**Project Mentor:** Amy Drendel, DO, MS

Two-thirds of children have a fear of needles but little is known about the anxiety experienced by young children during venipuncture. The goals of this study were to assess the anxiety experienced by children before and during venipuncture and evaluate the patient characteristics associated with high anxiety. This was secondary analysis of data from a randomized controlled clinical trial comparing Jet Injected Lidocaine (J tip) to a vapocoolant spray for pain treatment during venipuncture of children aged 1 to 6. Their anxiety was measured by a blinded researcher using the modified Yale Preoperative Anxiety Scale (mYPAS), a validated observational anxiety scale ranging from 23 to 100. mYPAS was measured at three time points: (1) prior to tourniquet placement, (2) just prior to pain treatment, and (3) during venipuncture. Patient age, gender, race, number of previous venipunctures and pain treatment were evaluated. Descriptive statistics and multivariate logistic regression were used for analyses.

Topographic Patterns of Stroke in Patients with Intracranial Atherosclerotic Disease**Authors:** Burkhartsmeier C, Zaidat S**Project Mentor:** Osama Zaidat, MD, MS

Introduction: This study aims to examine the effects of middle cerebral artery (MCA) stenosis on the topographic patterns of infarcts, and provide a clearer understanding of patterns and mechanisms of strokes in the MCA territory from ICAD. Methods: Retrospective chart review of patients with a diagnosis of ICAD. Digital subtraction angiography was used to examine plaque features, and MRI to examine the stroke mechanism and topography. Results: Four patients with embolic only strokes resulting in either cortical or watershed only infarcts, one patient with lacunar stroke resulting in basal ganglia infarct, and one patient with combination embolic and side-branch occlusion stroke resulting in combination cortical, subcortical, and basal ganglia infarcts. One patient without MRI imaging. Discussion: A relationship between MCA stenosis and embolic mechanism strokes, cortical infarcts, and watershed infarcts is suggested but must be examined further with additional data. There is an association between $\geq 90\%$ stenosis and cortical infarcts.

Outcomes and Approach in Repair of Coarctation of the Aorta**Authors:** Callahan CP, Saudek D, Shillingford A, Creighton S, Hoffmann R, Dasgupta M, Mitchell ME, Woods RK**Project Mentor:** Ronald Woods, MD, PhD

Objective: To compare the value of thoracotomy vs median sternotomy with cardiopulmonary bypass for repair of coarctation of the aorta and arch hypoplasia. Many view proximal arch hypoplasia as an indication for sternotomy. Methods: 235 consecutive infants undergoing repair from Jan 1, 2000 to Jan 1, 2014 at CHW with exclusion of single-ventricle palliated patients were reviewed. Primary outcome was arch re-intervention. Results: 12 patients were repaired through median sternotomy and 223 were repaired through thoracotomy. Arch re-intervention occurred in 2 (16.7%) in the sternotomy group and 17 (7.6%) in the thoracotomy group, $p=0.3$. In multivariate analysis, only operative weight was associated with arch re-intervention ($p=0.03$). Sternotomy and proximal arch Z score were not significant factors. Sternotomy was significantly associated with hospital charges ($p<0.0001$). Conclusion: Repair of coarctation with arch hypoplasia through a left thoracotomy may be associated with higher value by offering non-inferior outcomes at reduced charges.

Emergency Response Teams for Pediatric Non-hospitalized Patients**Authors:** Chen J, Drendel, AL, Saxe R, Meyer MT**Project Mentor:** Amy Drendel, DO, MS

Background: Emergency response teams including Rapid Response Teams (RRT) and Code Teams respond to unexpected clinical deterioration of patients in the hospital. Non-hospitalized patients (NHP), including outpatients, visitors and staff can trigger an emergency response. Previous studies suggest RRT activations for adult NHP require minimal interventions. Objective: Characterize emergency activation triggers, interventions and outcomes of NHP aged 0-18 years at a tertiary pediatric hospital Methods: A retrospective cohort study of emergency activations in 2013-2014. Descriptive statistics were used for analyses. Results: Of the 383 events, 132 (44%) were for pediatric NHP. Mean age was 8.7 years and 51% were male. Most common activation triggers included syncope (31%), respiratory symptoms (21%) and injury (17%). Only 10% of activations required immediate medical interventions. Conclusion: RRT activations for pediatric NHP represent a substantial proportion of all emergency team responses. The most common trigger was syncope and none of these children required medical interventions.

Neoadjuvant Radiotherapy for Retroperitoneal Sarcoma: A Systematic Review**Authors:** Cheng H, Miura J, Lalehzari, M, Rajeev R, Donahue A, Bedi M, Gamblin C, Turaga K, Johnston F**Project Mentor:** Fabian Johnston, MD, MHS

The multi-modal treatment of retroperitoneal sarcoma has seen increased use of neoadjuvant radiation. However, its effect on local recurrence and survival remain controversial. We aimed to evaluate the literature. The review was conducted with pre-specified inclusion and exclusion criteria. Of 8,701 citations, 15 articles reported on 464 patients. Median age was 56 years (45–64). Predominant histological subtypes were liposarcoma (51.54%) and leiomyosarcoma (23.26%). Tumor differentiation were 37.1% well-, 12.8% moderate-, 46.0% poorly-, and 4.1% undifferentiated. Most studies featured external beam radiation therapy (EBRT) treatment regimen with some who included patients treated with IMRT. Median follow-up averaged 41.4 months (19–106 months). Median 5-year OS, PFS, and LRR rates were 58%, 71.5%, and 25%. Grade 1 (Mild) through Grade 5 (death) toxicities were experienced by 18.8%, 10.2%, 16.3%, 0.7%, and 1.6% of patients. NART is safe to use for RPS, but its effect toward survival and local control remains unclear.

Intrathecal Baclofen Dosing for Spinal Cord Injuries**Authors:** Chisum P, McGuire J, Tarima S, Reid L, Sahr N, Nelson ME**Project Mentor:** John McGuire, MD

Introduction: Intrathecal baclofen (ITB) treats spasticity in spinal cord injury (SCI) patients but lacks dosing guidelines. The objective was to compare differences in dosing patterns based on ambulatory status and whether patients were receiving other spasticity treatments. Methods: A retrospective study was conducted using 50 qualified SCI patients treated with ITB. Ambulatory patients were compared to non-ambulatory patients based on their starting dose, rate of dose change, time to reach and amount of the stable dose. Three therapy groups were compared (ITB alone, ITB + botulinum toxin, ITB + antispasmodic medication) based on the stable dose achieved. Results/Discussion: Ambulatory and non-ambulatory patients did not show a difference in starting dose ($p=0.12$). Non ambulatory patients showed a greater monthly increase in dose ($p<0.001$). Ambulatory patients reached a stable dose 1 year earlier than non-ambulatory patients ($p=0.011$). There was no difference in stable dose between the three therapy groups ($p<0.953$).

Clinical Presentation of RYR2 in Pediatric Cyclic Vomiting Syndrome**Authors:** Chou R, Li BU, Chou H**Project Mentor:** B UK Li, MD

CVS is an idiopathic functional GI disorder of normal periods with recurrent and severe episodes of vomiting and abdominal pain lasting from several hours to days. Existing research using Courtagen next-generation sequencing platform for mitochondrial and nuclear-encoded genes involved in energy and mitochondrial function found significant conserved sequences of the Ca²⁺ channel gene RYR2, required for Ca²⁺ release from the SR in cardiac and brain tissue, in CVS versus non-CVS patients. Our study combined sequencing data from Courtagen with clinical history provided by 31 pediatric CVS patients upon initial visit to the CVS program at Children's Hospital of Wisconsin. Associations between RYR2 mutations with chronic fatigue (50% vs. 4.2%), severe headaches (80% vs., 40%), and more often having acute episodes triggered by 'negative stress' (60% vs. 48%) versus 'positive' (20% vs. 68%) were seen. Further data analysis may help us implement personalized treatment to better treat pediatric CVS sufferers.

Elbow Biomechanics of Pitching**Authors:** Fehr S, Kilian C, Damrow D, Lyon R, Liu XC**Project Mentor:** Shayne Fehr, MD

27 healthy males were recruited. The experience group (EG) consisted of 18 participants. The no experience group (NG) consisted of 9 participants. Upper extremity kinematics were captured using 8 motion sensors. Participants pitched at max effort and three pitches from each participant were averaged together. The results of the study showed that EG had a larger external rotation compared to NG during late cocking (-48.9 vs 5.8), larger flexion during early cocking (119.6 vs 100.1), and a longer duration of wind up (26.4% vs 0%). EG had great external rotation, which suggest that this may be due to experience. EG had increased flexion during early cocking, but no other phase. These results are consistent with previous studies that found elbow flexion was not significantly different between levels of play. EG takes longer to get through wind up and into early cocking. This may be due to increase experience in EG.

Physiological Evaluation of Septoplasty and Turbinectomy Using Virtual Surgery**Authors:** Dayal A, Rhee JS, Garcia GJM**Project Mentor:** Guilherme Garcia, PhD

Surgical treatment for nasal airway obstruction (NAO) often involves a combination of septoplasty and turbinectomy. Due to lack of objective measures to quantify symptoms, surgeries are recommended based on clinical examination alone, which is prone to observer bias, resulting in suboptimal outcomes. We applied virtual surgery to systematically investigate the contributions of septoplasty and turbinectomy to decreasing nasal resistance in one patient. A three-dimensional anatomic model underwent geometry-deforming software to create surgery models. Computational fluid dynamics simulated nasal airflow and quantified nasal resistance. A 1.2-mm inferior turbinectomy decreased Left cavity's nasal resistance by 28%, and additional turbinate reduction provided no significant decrease. Moving the septum medially reduced Right side's resistance. While septoplasty improved Right cavity's nasal patency, it did not increase Left cavity's resistance significantly. Hence, the extent of turbinectomy should be to provide enough space to move the septum medially. Thus, computational modeling can help plan surgeries.

Is Fundoplication Necessary Following Heller Myotomy?**Authors:** DeHaan RK, Frelich MJ, Goldblatt MI, Kastenmeier AS, Gould JC**Project Mentor:** Jon Gould, MD

Background: Previous RCTs have demonstrated that fundoplication following Heller myotomy (HM) results in less acid exposure to the esophagus when compared to myotomy alone. We hypothesized that HM with limited hiatal dissection (LHD) compared to HM with full hiatal dissection (FHD) and partial fundoplication result in similar symptomatic outcomes. Methods: This is a retrospective review of prospective data. All patients underwent HM for achalasia over a 30-months. In select patients, a LHD was performed. Symptomatic outcomes were assessed up to two years post-op using the validated ASQ, GIQLI, and GERD-HRQL. Results: A total of 31 patients underwent HM during the study interval. Patient demographics and baseline symptoms did not differ significantly. At greater than one year post-op there was no significant difference between the groups for all measures. Conclusions: HM with LHD and HM with FHD and partial fundoplication result in similar symptomatic outcomes.

Student-Generated Unique Characteristics Section of the Medical Student Performance Evaluation Letter: Survey and Results**Authors:** Holloway R, Domack A, Treat R, De Roo K**Project Mentor:** Richard Holloway, PhD

The goal of this study was to evaluate student attitude towards, value of, and support for the Unique Characteristics section of the Medical Student Performance Evaluation (UC). We conducted a cross-sectional survey of all 4th year medical students at MCW during the 2014-2015 academic year. We developed statements to assess student perceived value, experience writing, and support for the UC. Students agreed that their participation would positively affect their candidacy for interview selection and success in the Match. Additionally, they believed they had an advantage over students at other schools that did not draft their UC. There were differences among specialties; Emergency Medicine voiced the lowest value for the UC. The present study supports the utility and value of students at MCW drafting their own UC section of the MSPE. Future investigations should focus on expanding to other schools, comparing public to private institutions and refining the inter-specialty comparisons.

High-Grade Partial-Thickness Rotator Cuff Tears**Authors:** Donohue N, Nickel B, Grindel S**Project Mentor:** Steven Grindel, MD

INTRODUCTION The established algorithm for surgical treatment of a partial-thickness rotator cuff tear (PTRCT) recommends that high-grade tears should be repaired and low-grade tears debrided. Recent evidence, however, has challenged this algorithm by showing that some low-grade tears should be repaired based on tear location. The objective of this study is to evaluate functional outcomes after completion and repair of high-grade PTRCTs based upon tear location. **METHODS** Sixty patients who underwent arthroscopic completion and repair of Ellman Grade 3 PTRCTs of the supraspinatus were evaluated preoperatively and postoperatively. Patients were separated by tear subtype as identified at time of arthroscopy. **RESULTS** Twenty patients in each subtype were established. Similarly significant ($p < 0.001$) improvements were demonstrated in all three subtypes for three validated outcome measures. **CONCLUSION** Our study validates the current algorithm for Ellman Grade 3 PTRCTs and advocates their completion and repair, regardless of tear location.

Retinal Microvasculature Imaging in the Human Eye**Authors:** Fagbemi O, Razeen M, Sredar N, Dubra A**Project Mentor:** Alfredo Dubra, PhD

Adaptive optics scanning light ophthalmoscopy (AOSLO) allows non-invasive visualization of transparent retinal structures. Our aim was to identify retinal microvascular pathology using this non-invasive method. The subjects chose for this project included normals, a Coats Disease, a branch retinal artery occlusion and a glaucomatous patient. An AOSLO was used to capture image sequences in various modalities. These videos were used to generate motion contrast perfusion maps. These images were then manually montaged to produce a larger impression of the retina and vessels. Imaging revealed pathological features, such as abnormal blood flow through retinal vasculature. In this study we found AOSLO retinal imaging can be used to characterize the human eyes. In particular, split detection imaging allows for a noninvasive alternative to the fluorescein angiography for perfusion mapping the retinal vasculature. Additionally, we found wide field imaging expedites the compilation process while maintaining high levels of image quality.

Abnormal Molecular Markers and Clonal Plasma Cell Burden in Light Chain Amyloidosis**Authors:** Hammons LRA, Brazauskas R, D'Souza A**Project Mentor:** Anita D'Souza, MD

INTRODUCTION Both light chain amyloidosis (AL) and multiple myeloma (MM) are plasma cell dyscrasias found to have similar frequently-occurring translocations, deletions and aneuploidy. Also, overall survival of both AL and MM are thought to be dependent on the size and proliferation of plasma cell clones. The purpose of our study was to assess specific genetic abnormalities and correlate findings between MM molecular markers found in AL with prognosis. **METHODS** Retrospective study reviewed 107 patients with systemic AL using MM-guided FISH, cytogenetic studies, organ involvement and demographic factors from January 2010 until January 2015. **RESULTS** Forty-one percent of patients had abnormal FISH. Abnormal FISH studies significantly increased the probability of having plasma cell involvement $\approx 10\%$ ($p = 0.002$). **CONCLUSIONS** The biological behavior and clinical outcome in AL, much like those in MM, appear to be dependent on molecular determinants that could serve as attractive future therapeutic targets and predictive prognostic variables.

Variable Myocardial Response to Load Stresses in Infants with Single Left Ventricular Anatomy After Surgical Palliation**Authors:** Horriat NH, Deatsman, SL, Stelter J, Frommelt PC, Hill GD**Project Mentor:** Garick Hill, MD

Initial surgical strategies in neonates with single left ventricular anatomy vary based on adequacy of pulmonary and systemic blood flow. We evaluated single LV myocardial response to varied physiology and initial palliation: no palliation/PA band; BT shunt only; or Norwood procedure. Echo measures of ejection fraction, LV mass indexed to height^{2.7}, end diastolic volume indexed to body surface area, and mass/volume ratio were obtained at presentation, early post-bidirectional Glenn (BDG), late post-BDG, and post-Fontan. The cohort included 38 children. Ejection fraction was similar but depressed in all groups at all stages. LV mass was higher in the NP group than the BT group at early post-BDG and higher than both BT and NO groups at late post-BDG, with resolution post-Fontan. The NP group had the most remarkable remodeling in LV size. Ventricular remodeling can be identified despite initial surgical palliative strategies with no significant differences after Fontan palliation.

Frailty Markers and Thyroid/Parathyroid Surgical Outcomes in the Elderly**Authors:** Jin S, Yen TW, Carr AA, Lalande B, Doffek K, Evans DB, Wang TS**Project Mentor:** Tracy Wang, MD, MPH

Background: Frailty, the decreased physiologic reserves due to multi-organ system decline, is a risk factor for poorer postoperative outcomes in the elderly. This study sought to identify frailty biomarkers in patients undergoing cervical endocrine surgery. **Methods:** This is a retrospective chart review of 317 patients who underwent thyroidectomy and/or parathyroidectomy. Demographic, preoperative information, and postoperative laboratory values and complications occurring within 60 days of surgery were collected. **Results:** Of the 39 complications, there was no difference in the number of general or endocrine-specific complications by age. Only cardiac events differed by age group. Complications were more frequent in patients with preoperative sleep apnea, on anticoagulants, and with preoperative functionality of <4 METS. **Conclusion:** Age was not predictive of postoperative complications. Preoperative factors such as sleep apnea, anticoagulant use, and low functional status may be markers for frailty in cervical endocrine patients.

Assessing Photoreceptor Structure in Retinitis Pigmentosa and Usher Syndrome

Authors: Sun L, Johnson R, Langlo C, Cooper R, Razeen M, Russillo M, Dubra A, Connor T, Han D, Pennesi M, Weinberg D, Stepien K, Carroll J

Project Mentor: Joseph Carroll, PhD

Purpose: Examine cone photoreceptor structure in retinitis pigmentosa (RP) and Usher syndrome using adaptive optics scanning light ophthalmoscopy (AOSLO). Methods: Eleven RP and eight Usher syndrome subjects underwent SD-OCT and AOSLO imaging. Split-detector AOSLO images were used to assess remnant cone structure in areas of altered cone reflectivity on confocal AOSLO. Results: Foveal and parafoveal cone densities from confocal AOSLO images were significantly lower in Usher syndrome compared to RP. Though significantly correlated to BCVA and foveal sensitivity, cone density can decline by 38% before visual acuity becomes abnormal. Aberrantly waveguiding cones were noted within the transition zones and corresponded to intact inner segments. Conclusions: Foveal cone density can be decreased in RP and Usher syndrome before visible changes on OCT or decline in visual function. AOSLO provides more sensitive monitoring of disease than current methods. Split-detector AOSLO offers unambiguous and quantifiable visualization of remnant cone inner segment structure.

Assessing Medical Students' Ability to Competently Care for LGBT Patients

Authors: Kim E, Petroll A, Havas N

Project Mentor: Nancy Havas, MD

Despite a growing awareness of health disparities in the LGBT (Lesbian, Gay, Bisexual, Transgender) population, medical students are not adequately trained to competently care for LGBT patients. The objective of this study is to assess the competency of preclinical medical students in interacting with and assessing the needs of an LGBT patient. We designed a pilot OSCE for preclinical medical students where they were asked to take a medical history of a cis-gender lesbian female with masculine gender expression. Following the encounter, the standardized patients were asked to evaluate students. The students also completed an evaluation including their view on LGBT education in medical school. Overall, the 49 students indicated that LGBT education is essential in the medical school curriculum but felt less prepared when addressing LGBT-related health concerns in a clinical setting. To deliver comprehensive care, medical schools must train students on the competent care of LGBT patients.

Racial Disparity in Hyperthyroidism Prior to Surgical Referral

Authors: Kim J, Wang TS, Doffek K, Evans DB, Yen, TWF

Project Mentor: Tina Yen, MD, MS

There is a paucity of information on racial differences in benign thyroid disorders. Through a retrospective chart review of 191 patients, we sought to determine whether racial disparities exist in the etiology, presentation, and management of patients with hyperthyroidism prior to surgical intervention. There was no difference in the etiology of hyperthyroidism by race. By race, there was no difference in the presence and the duration of each of the 8 symptoms, except for heat intolerance ($p=0.03$). The total number of symptoms per patient differed by race; non-white patients had more symptoms than white patients ($p=0.03$). There was no racial difference in the TSH or free T4 values, the receipt and the duration of antithyroid medication, and receipt of radioactive treatment prior to surgery. Future studies in larger, more racially diverse populations are needed to improve our understanding of potential racial disparities among patients with hyperthyroidism.

Quantal Energy Alters Maturation, Proliferation, and Mineralization of Osteoblasts**Authors:** Kolz JM, Huges P, Struve J, Davidson R, Marshall S, Weihrauch D, Ninomiya JT**Project Mentor:** James Ninomiya, MD, MS

Osteoporosis and the resultant fractures are injuries resulting in high levels of morbidity and mortality. Studies have shown photon energy absorption from near infrared light exposure, quantal energy (QE), increases bone healing in vivo. However, its biological mechanism remains largely unknown. To elucidate this mechanism, MC3T3-E1 pre-osteoblasts were cultured after a single exposure of QE. Analysis revealed an increase in proliferation on day 3 and mineralization on day 17. Maturation was altered as seen by a decrease in osterix (OSX), osteocalcin (OCN), and integrin-binding sialoprotein (IBSP) expression on day 2, increased expression of OSX, IBSP and alkaline phosphatase (ALP) on day 5, decreased expression of OCN on day 10 and decreased expression of collagen, type 1, alpha 1 (COL1 α 1) and ALP on day 14. This suggests that exposure to QE has effects on bone turnover and mineralization, and may be a potential modality for the treatment of osteoporosis and fractures.

Congenital Brain Anomalies in PHACE Syndrome**Authors:** McCoy G, Siegel D, Drolet B, Metry D, Frieden I, Hess C, Maheshwari M**Project Mentor:** Dawn Siegel, MD

PHACE Syndrome: congenital disorder characterized by large infantile hemangiomas associated with developmental defects of the brain, heart, blood vessels, and eyes. No rigorous, dedicated analysis of the structural brain anomalies has been done. Inclusion criteria: Enrollment in the PHACE Syndrome Clinical Registry with available MRI reports. IRB approval was obtained through CHW. A literature review was performed to identify all structural brain anomalies reported in PHACE syndrome and used to create a data intake form. 145/196 had MRI reports. We identified structural brain anomalies in 48/145 cases. The most common anomaly was unilateral cerebellar hypoplasia (26 cases). Next, arachnoid cysts (11 cases) and corpus callosum anomalies (9 cases). Various other brain anomalies were found with an incidence of 1-3 patients. In all but one case of unilateral cerebellar hypoplasia, the affected side was on the same side as the hemangioma. All hemangiomas were in an S1 and/or S2 distribution.

Complications Associated with Pro-Dense Synthetic Bone Void Filler**Authors:** Munaretto N, King D, Neilson JC, Hackbarth D, Carrera G**Project Mentor:** David King, MD

INTRODUCTION: Pro-Dense, a synthetic bone grafting substitute, has shown reproducible remodeling to bone and no direct complications. However, while using Pro-Dense, we have noted that patients with lesions that communicate with the synovial fluid may have abnormal radiographic incorporation. GOAL: To improve our understanding of the outcomes and complications associated with Pro-Dense. METHODS: Retrospective review of 60 patients who received Pro-Dense placement from 2008-present. Time for complete Pro-Dense radiographic incorporation and abnormal incorporation were analyzed. RESULTS: The median time to full radiographic incorporation of Pro-Dense was 8 months. All 5 lesions that demonstrated altered Pro-Dense incorporation demonstrated evidence of synovial fluid communication. CONCLUSIONS: Pro-Dense is a reliable bone graft substitute. However, the use of alternative bone grafts should be considered in treating lesions that have intra-articular communication, as it may leave the patient at risk for pathological fracture.

Measurement of Non-Concussive Head Impacts in College Football Players**Authors:** Murtha JK**Project Mentor:** Michael McCrea, PhD

Head impact sensors are critical tools for investigating the biomechanical character of head impacts sustained in sports participation. This study assessed the measuring accuracy of the xPatch (X2 Biosystems, Seattle), which can be attached directly to an athlete's head and therefore has theoretical utility for sports that do not use helmets. Data for 26,306 non-concussive impacts sustained by 53 football players on four NCAA Division III teams were collected using the xPatch during the 2013 fall season. The overall medians were found to be 22 g and 4415 rad/s² for peak linear and rotational acceleration, respectively. The frequencies of very high magnitude impacts were 1.0% and 43.8%. When compared with values from other impact samples measured by the gold standard head impact sensor, the Head Impact Telemetry System (HITS, Simbex, Lebanon, NH), the xPatch overall median and frequency of high magnitude impacts were found to be empirically similar for peak linear acceleration and vastly greater for peak rotational acceleration.

Addressing Recovery Expectations of Patients with Shoulder Impairment**Authors:** Neuman ES, Urbain JA, Burns EA, Rosenthal AS, Grindel S, Wessel B**Project Mentor:** Edith Burns, MD

Rotator cuff injuries are one of the most common joint conditions in adults with a large impact on quality of life and independence. First line management generally includes PT and home exercise; however it is difficult to evaluate the efficacy of this due to lack of standardization and poor compliance and follow-up by patients. To address this, we are using Kinect Technology to improve management of shoulder injuries and compare clinical outcomes overtime. In a survey of patients at the VA undergoing primary conservative vs surgical management of their shoulder impairment, we found that over 80% of patients believed their recovery would take 4 months on average, and 70% of patients believed they would return to 90-100% of their baseline level. These results confirmed that shoulder impairment patients have unrealistic expectations for their recovery that may impact their adherence to therapy and ultimate recovery.

Identifying Risk Factors for Complications Following VHR in the Elderly Patient**Authors:** Ohlrogge E, Knechtges P, Webb T**Project Mentor:** Travis Webb, MD, MHPE

Introduction and Hypothesis: Recent studies posit frailty markers as predictors of complication in elderly surgical patients. The Modified Frailty Index (MFI) [Farhat. Et. al] predicts complication in elderly ventral hernia repair (VHR) patients. **Methods:** A retrospective review of VHR patients ≥ 65 years at FMLH from August 1, 2008 to April 15, 2014 was performed. Data on complications, demographics, comorbidities, and frailty markers were collected and analyzed using IBM SPSS 22. **Results:** The cohort comprised 138 patients. Variables associated with complication by X2 analysis and Fisher's exact test were history of delirium ($p=0.01$), obesity ($p=0.02$), decreased functional status ($p=0.02$), increased serum creatinine ($p=.01$), and decreased albumin ($p=0.01$). AUC from ROC analysis of MFI was .681 (95% CI of .593-.770). **Conclusion:** MFI was not a strong predictor of complications within our population. Screening for history of delirium, obesity, decreased functional status, elevated creatinine, and decreased albumin is recommended prior to VHR.

Nasal Resistance in Relation to Cross-Sectional Area of the Nasal Airway**Authors:** Garcia GJ, Oland G, Rhee JS**Project Mentor:** Guilherme Garcia, PhD

Virtual surgical planning can be used to improve nasal airway obstruction (NAO) surgeries, which have a failure rate of up to 37%. In this study a mathematical equation was developed to predict nasal resistance based solely on upper airway cross-sectional area (CSA). Computational fluid dynamics (CFD) simulations were performed on CT scans of 60 unilateral nasal cavities to model inspiratory flow. CSA and air pressure were measured at uniformly spaced sections and fit to the general equation: $R_{unilateral} = \sum_{i=1}^n k_i A_i^{x_i}$ where $R_{unilateral}$ is the unilateral nasal resistance, n is the number of sections, A_i is the CSA of section i , and k_i and x_i are constants. This equation predicts nasal resistance to within $8 \pm 32\%$ of CFD results, thus demonstrating that estimates of nasal resistance can be instantaneously obtained from airway CSA. Virtual surgery software can utilize this relationship when attempting to reduce airway resistance during NAO surgical planning.

Factors Associated with Continuous Heparin Infusion in Sick Children**Authors:** Onyeama SJ, Hanson S, Hoffmann R, Dasgupta M, Faustino EVS**Project Mentor:** Sheila Hanson, MD, MS

Continuous heparin infusion (CHI) is commonly used to maintain CVC patency in children despite the lack of evidence supporting its efficacy. We hypothesized that certain patient, hospital and/or CVC factors influence CHI use. A secondary analysis was done using the PROTRACT study which observed 59 international Pediatric Intensive Care Units (PICU) in 2012. Factors associated with CHI use were identified, and the frequency of CHI was measured for each patient, hospital and CVC factor using chi-squared, Mann-Whitney and Fisher's exact tests. Results show age was not a significant factor for CHI use. Craniotomy and heart disease had increased CHI use. Tunneled CVCs had significantly decreased CHI use. The Asia-Pacific region showed increased CHI use, as did community hospitals and smaller PICUs (<10 beds). Bleeding diagnosis, coagulopathy and concurrent heparin use do not appear to affect the frequency of CHI use. In conclusion, certain patient, CVC, and hospital factors are associated with CHI use in critically ill children.

Risk Factors Associated with Donor-Specific Antibody (DSA) Following Renal Transplantation**Authors:** Park SH, Schiller JJ, Johnson CP**Project Mentor:** Christopher P Johnson, MD

Clinical and immunologic risk factors for DSA formation within the first year following renal transplantation are not well understood. 401 recipients with at least 4 measurements of DSA (measured using solid phase immunoassays) during the first year between 2008 and 2012 were examined. Analyses included Kaplan-Meier and Cox Regression. 14% (55/401) developed DSA within the first year. 33% of DSA resolved without treatment and only 9% developed persistent DSA, all with initial sumMFI > 4000 (23/23). Class II DSA were more common than class I (69% vs 51%), with HLA-DQ being the single most common (45%). DSA negatively impacted overall graft ($p=0.03$) and death-censored graft ($p=0.04$) survival at 4 years. Pre-existing HLA sensitization was the strongest predictor of post-transplant DSA formation within the first year ($p < 0.01$) of transplant. Recipient age, race, gender, diabetes, donor source (living vs. deceased), delayed graft function and immunosuppressive regimen were not significant.

Hammertoe Correction with K-wire Fixation in 2,698 Toes**Authors:** Kramer W, Parman M, Marks RM**Project Mentor:** Richard Marks, MD

Background Using K-wires for correction of hammertoe deformities is a common method for fixation after proximal interphalangeal arthroplasty or fusion. This study reviews a large experience utilizing K-wire stabilization. Methods Follow-up duration, pin duration, recurrences, and complications for hammertoe corrections performed from 1999-2013 were analyzed. Results: 1,115 operations were performed with 2,698 hammertoes corrected. Complications were: 94 (3.5%) pin migrations, 9 (0.3%) pin tract infections, and 2 (0.1%) pin breakages. There were 150 (5.6%) recurrent deformities and 94 (3.5%) toes required revision surgery. Expected rates and rate ratios (rr) of patients requiring revision hammertoe correction, when compared to the entire study population, were greater in patients who: underwent an MTP capsulotomy 3.10 vs 0.97 (rr=3.20) and who experienced K-wire related complications 5.10 vs 1.80 (rr=2.84). Conclusion K-wire fixation led to good maintenance of correction and remains an effective low cost procedure.

Surgery as First Line Therapy in SFT of the Retroperitoneum**Authors:** Rajeev R, Patel M, Jayakrishnan T, Johnston F, Bedi M, Charlson J, Turaga K**Project Mentor:** Kiran Turaga, MD, MPH

Solitary fibrous tumors of the retroperitoneum are rare spindle cell neoplasms, with a paucity of data on treatment outcomes. We hypothesized that surgical excision offered acceptable outcomes in SFTs. NCDB was used to identify patients with SFT from 2004-11. A systemic review of literature was also conducted after creating a pre-specified search strategy. Of 51 patients in NCDB, 58.8% were males with a median age 60 yrs. and tumor size of 16cm. Surgical resection was performed in 92.2% with 63.8% having a margin negative resection. Peri-operative mortality was 2.1%. The median survival was 51.1 mo. From the systematic review, we identified 8 studies with 24 patients. Median age and tumor size was similar to the NCDB. After median-follow up of 54 mo, 79.2% were alive without disease. 3 patients died of disease, 1 was alive with disease and 1 was lost to follow up. Recurrence was reported in 16.7% of patients. Complete surgical excision is a viable treatment modality for retroperitoneal SFT leading to long term survival.

Molecular Profiles to Guide Potential Therapy for Biliary Tract Cancer**Authors:** Potkonjak M, Miura J, Turaga KK, Johnston F, Tsai S, Christians K, Gamblin TC**Project Mentor:** T Clark Gamblin, MD, MS

Chemotherapy regimens for intrahepatic cholangiocarcinoma (ICC) and gallbladder adenocarcinoma (GC) are interchangeable; yet, response rates are suboptimal. Biomarkers from ICC and GC patients were analyzed to identify differences with therapeutic implications. Pathologic specimens from 217 ICC and 28 GC patients referred to Caris Life Sciences underwent immunohistochemical analysis for 17 biomarkers. In the total cohort, actionable targets included: 95% low TS, 82% low RMM1, and 74% low ERCC1, indicating potential susceptibility to fluoropyrimidines, gemcitabine, and platinum agents, respectively. Subgroup analysis by tumor origin revealed a differential biomarker expression pattern. A higher frequency of ICC showed low levels of TS (p<0.01) and RRM1 (p=0.02). A greater frequency of GC showed high levels of TOPO1 (p=0.02), indicating a potential increased benefit from irinotecan. Differing molecular profiles between ICC and GC provide evidence that the two are distinct diseases, and require different treatments to optimize response.

Acetazolamide Reduces Postoperative Pain After Laparoscopic Inguinal Herniorrhaphy**Authors:** Pourladian I, Lois A, Frelich M, Kastenmeier M, Woehlick H, Goldblatt M**Project Mentor:** Matthew Goldblatt, MD

Carbon dioxide (CO₂) is the preferred gas for abdominal insufflation during laparoscopic inguinal herniorrhaphy. An accumulation of residual carbonic acid, a byproduct of CO₂, can produce abdominal and referred pain in the postoperative setting. Acetazolamide is a drug that inhibits carbonic anhydrase, an enzyme known to increase the rate of carbonic acid formation. We hypothesized that post-operative pain caused by CO₂ insufflation may be decreased with the administration of preoperative acetazolamide. This study is a retrospective review of patients who underwent laparoscopic inguinal herniorrhaphy at the Medical College of Wisconsin between October 2012 and August 2014. Mean pain scores when first awake were significantly lower for the acetazolamide group (0.68 \pm 1.25) than the control group (2.39 \pm 2.6), $p < 0.01$. The amount of opioid administered to manage pain post-operatively was significantly less for the acetazolamide group (4.61mg, \pm 5.03) than the control group (8.87mg \pm 8.43).

Assessing Photoreceptors in Macular Hole Using Split-Detector AOSLO**Authors:** Randerson EL, Davis D, Higgins B, Kim JE, Han DP, Connor TB, Wirostko WJ, Carroll J**Project Mentor:** Joseph Carroll, PhD

Introduction: Macular hole (MH) and vitreomacular traction (VMT) occur with disruption in the Interdigitation Zone (IZ) and Ellipsoid Zone (EZ) seen with Optical Coherence Tomography (OCT). Confocal Adaptive Optics Scanning Light Ophthalmoscopy (AOSLO) has shown areas devoid of waveguiding cones persisting following surgical intervention. Here, we examined inner segment structure of these lesions using split-detector AOSLO. **Methods:** 7 eyes from 6 subjects with MH or VMT were imaged with spectral domain OCT, confocal AOSLO, and split-detection AOSLO following surgical intervention.

Results: Split-detector AOSLO revealed remnant inner segment structure within dark areas in confocal AOSLO. In addition, split-detector images demonstrated that not all hyperreflective dots in confocal AOSLO were derived from cones. **Conclusion:** Split-detector AOSLO provides additional information in these retinal conditions, and will likely become an invaluable tool for assessing residual cone structure in conditions with confocal AOSLO discrepancies.

Anorectal Reflexes with the ISNCSCI Examination**Authors:** Razmjou AA, Waring W**Project Mentor:** William Waring, MD

Introduction: Anal reflexes are sometimes used clinically to evaluate patients' autonomic function. There is no research identifying the inter-rater reliability of these reflexes. **Methods:** 27 exams of SCI therapists were compared to exams performed by a PM&R physician. Reflexes included anal wink (AW), "wiggle waggle" (WW), Foley tug (FT), in and out (IO), and bulbocavernosus (BC). **Results:** The percentage of reflexes present on the physician's vs therapists' exams were 44.4/33.3 (AW), 51.9/18.5 (WW), 71.4/71.4 (FT, n=7), 40.7/29.6 (IO), and 68.2/50 (BC, n=22), respectively. The physician noted reflexes in 62.7% of exams versus the therapists' 40.7%. The agreement between exams was 85.2% (AW), 59.3% (WW), 100% (FT), 70.4% (IO), and 63.6% (BC). **Conclusions:** Considering anorectal reflexes were new to therapists, agreement was fairly high and the AW had the best agreement (sample size adjusted). Further inter/intra rater research plus clinical correlates are needed to explore the incorporation of these reflexes into the ISNCSCI exam.

Clinical Assessment and Treatment of Humeral Head Avascular Necrosis**Authors:** Ristow J, Ellison C, Mickschl D, Grindel S**Project Mentor:** Steven Grindel, MD

Forty-five shoulders treated for humeral head avascular necrosis (HHAVN) between 2004 and 2015 were reviewed for treatment type, etiology, complications of treatment, and shoulder functionality using the Simple Shoulder, Modified Constant, UCLA Shoulder, and ASES scores. At a mean follow-up time of 2.7 years (3.9 years for arthroplasty) the patients who underwent total shoulder arthroplasty (TSA) or hemiarthroplasty showed greater score improvement and higher outcomes in all four scoring methods than patients who performed physical therapy ($P < 0.05$). There was no significant difference in the functionality outcomes of the TSA vs. hemiarthroplasty patients ($P > 0.05$). None of the arthroplasty patients required additional surgery, while eight of the twelve PT patients did. Two of the TSA patients had a complication during treatment, while the hemiarthroplasty and non-surgical patients had no complications. This study demonstrates that shoulder arthroplasty is a safe and effective treatment for patients diagnosed with HHAVN.

Factors Impacting Outcome Following Surgery in Infants with Congenital Heart Disease**Authors:** Runzheimer A, Ghanayem N, Hehir D**Project Mentor:** Nancy Ghanayem, MD

The bidirectional Glenn surgery is the second of three staged, palliative procedures for infants with a single ventricle pathology. Survival following stage 2 is high, though significant morbidity does exist. This study aims to identify risk factors for poor outcomes following stage 2 palliation. A single center review of 150 infants undergoing stage 2 palliation. Descriptive, univariate, and multivariate analyses was performed. Patients of gestational age 35 weeks or less, birth weight of 2.5kg or less, or additional cardiac or extracardiac anomalies were classified as high risk. Postoperative length of stay was the primary outcome of interest. Feeding mode prior to stage 2 and inpatient interstage were independently associated with a prolonged length of stay. High risk status was also associated with a prolonged length of stay. Of note, age at surgery, anatomic subtype, and prior shunt type were not found to be associated with length of stay.

Reoperative Surgery for Failed Fundoplication - A Complex Operation**Authors:** Schumm M, Frelich M, Simon K, Gould JC**Project Mentor:** Jon Gould, MD

Background: Reoperative surgery for failed fundoplication is complex with significant potential morbidity. We hypothesized that as the number of attempts at surgical correction of a failed fundoplication increases, that morbidity increases and outcomes decline. Methods: Procedures included reoperative fundoplication and conversions to Roux-en-Y Gastric Bypass (RYGB). Morbidity and symptomatic outcomes were assessed relative to the number of prior attempts of fundoplication in a given patient. Complications were graded according to the Clavien-Dindo Classification scheme. Symptomatic outcomes were assessed with validated disease specific quality of life instruments. Results: There were 70 reoperative fundoplications and 29 conversions to RYGB. Symptomatic outcomes improved in all study groups. Many complications within 30 days (35%) were Grade III or greater. Conversion to gastric bypass was an independent risk factor for Grade III and greater complications. Conclusions: Reoperative surgery for failed fundoplication is a high-stakes intervention. Complication rates are highest when the salvage procedure is a conversion to RYGB.

Stemmed Versus Resurfacing Hemiarthroplasty for Cuff Tear Arthropathy**Authors:** Schwartz T, Wagner T, Mikschl D, Grindel S**Project Mentor:** Steven Grindel, MD

Objective: To compare outcomes of the stemmed hemiarthroplasty to the resurfacing conservative anatomic prosthesis (CAP) hemiarthroplasty in cuff tear arthropathy (CTA) patients with deficient rotator cuffs. This is the first study, to our knowledge, to compare these prostheses utilizing the case history of a single surgeon. Methods: Clinical outcomes for 39 patients were measured retrospectively, using validated shoulder outcome scores, visual analog pain scale (VAS), and range of motion measurements. Results: Average follow-up time was 26 and 32 months for CAP and stemmed groups, respectively. Statistically significant improvement was recorded in all outcome measurements except forward flexion (all groups), abduction (all groups), and internal rotation (stemmed group). There were no significant differences between the two prostheses in any parameters. Conclusions: The improvements in post-operative measurements and lack of significant difference in outcomes between these two prostheses demonstrates that CAP hemiarthroplasty is an acceptable alternative to the more traditional stemmed component.

Morbidity of Curative Cancer Surgery and Suicide Risk**Authors:** Jayakrishnan TT, Sekigami Y, Rajeev R, Gamblin TC, Turaga KK**Project Mentor:** Kiran Turaga, MD, MPH

Curative cancer operations lead to debility and loss of autonomy in a population vulnerable to suicide death. Objective: To examine the effects of morbidity of curative cancer surgeries and prognosis of disease on the suicide risk in patients with solid tumors. Methods: Retrospective cohort study using SEER data (2004-2011); multi-level systematic review. Results: Among 482,781 patients who underwent curative cancer surgery, 231 committed suicide. Factors significantly associated with increased risk of suicide included male sex and age >65 years. When stratified by 30-day overall post-operative morbidity, a significantly higher incidence of suicide was found for surgeries of high morbidity (IR, 33.30) than both those of moderate morbidity (IR, 24.27) and low morbidity (IR, 9.81) surgeries. Conclusion: Patients who undergo high-morbidity surgeries appear most vulnerable to death by suicide. The identification of this high-risk cohort should motivate surgeons to adopt screening measures during post-operative follow-up for these patients.

Impact of a Chronic Pain Management Pathway on Opioid Use by an Emergency Department**Authors:** Pace C, Shah S, Zhang A, Zosel A**Project Mentor:** Amy Zosel, MD

In this retrospective cohort study, we examined the efficacy of a chronic pain management pathway. Data were collected during similar time intervals before and after implementation of the pathway. From our results, we conclude that after implementation of a chronic pain management pathway in the Froedtert Hospital Emergency Department, there was a decrease noted in opioid administration in ED and opioid prescription on discharge. In patients presenting with acutely painful complaints, there was no overall decrease in opioid administration to the patients in the ED. This is a promising shift considering prescription opioid abuse and misuse is one of the biggest public health crises facing healthcare. Although this study remains a proxy to how ED administrations and prescriptions of opioids relate to opioid use in the larger community, it demonstrates that ED providers are in a unique position to reduce access to opioids.

Defining Excessive Bleeding (EB) in Infants Undergoing Cardiac Surgery**Authors:** Shewmake AC, VanSandt AK, Bercovitz RS**Project Mentor:** Rachel Bercovitz, MD, MS

Bleeding is common in infants undergoing cardiac surgery with cardiopulmonary bypass (CPB). We investigated current definitions of EB and assessed their ability to predict adverse outcomes. The aim of this study is to propose a new definition of EB in this population. We completed a literature review of articles studying pediatric cardiac surgery with CPB that used bleeding as a predictor variable or outcome of interest. Definitions of EB were isolated and collected. A retrospective review of 130 infants < 6mo who underwent congenital heart surgery requiring CPB at Children's Hospital of Wisconsin from 2012-2013 was performed. Primary outcome of interest was post-operative chest-tube output. Most definitions do not accurately predict poor outcomes. Definitions using early bleeding and bleeding over an extended time are more predictive of transfusion and re-operation risk than either alone. A meaningful definition of EB is necessary to find ways to improve perioperative bleeding outcomes.

Influence of Head Impact History on Concussion Biomechanics**Authors:** Sjoquist D, Stemper BD, Shah AS, Murtha J, Humm JR, LaRoche A, Pfaller A, Broglio S, Guskiewicz K, McCrea M**Project Mentor:** Michael McCrea, PhD

There is an effort to understand the biomechanics of concussion through head accelerometer systems. This study seeks to compare in vivo data between the xPatch and Head Impact Telemetry System (HITS), and describe how prior head impact history contributes to the biomechanics of injury. Methods: 438 college football players were equipped with the xPatch. Concussive and nonconcussive impacts were monitored for Peak Linear Acceleration (PLA) and Peak Rotational Velocity (PRV). Injury biomechanics were compared to previously published HITS data. Concussion biomechanics were also correlated to prior impact history of the athlete, assessing the number of impacts the athlete sustained, and impacts >25%, 50%, and 75% the injury median PLA and PRV. Results: The Xpatch overestimates PRV compared to HITS. Strongest correlations were seen with previous impacts >50% and >75% PLA to decreasing rotational velocity of the injury, suggesting that prior high magnitude impacts could contribute to decreasing biomechanics of concussion.

Extended Review of Beta-Blockers In Geriatric Trauma Patients**Authors:** Neideen T, Solverson M**Project Mentor:** Todd Neideen, MD

Recent studies allude to a survival benefit in head trauma patients taking preinjury beta-blockers, which is at odds with the findings of a previous retrospective cohort study on preinjury beta-blocker use in geriatric trauma patients. We expanded the previous study to include a total of 3044 trauma patients older than 65, reviewed the admission histories for preinjury beta-blockade, and used statistical regression to determine correlation between preinjury beta-blockade and mortality. Preliminary data show that of the patients taking beta blockers before their trauma, 14.7% died before discharge. Mortality in patients not taking beta blockers was 13.4%. Mortality in patients with head injury was 25.9% and significantly associated with warfarin use only. In patients without head injury, preinjury beta-blockade was significantly associated with mortality. The preliminary data does not support the conclusion that preinjury beta-blockade is associated with survival in head-trauma patients.

Understanding Cost in Interventional Radiology and Vascular Surgery**Authors:** Wang A, Dybul S, Patel PJ, Tutton SS, Lee CJ, White SB.**Project Mentor:** Sarah White, MD, MS

Purpose: To evaluate interventional radiologists' (IR) and vascular surgeons' (VS) knowledge on the cost of common devices and procedures. M&M: An online survey was administered to IRs and VSs. Demographic information and physicians' opinions on hospital costs were elicited. Respondents were asked to estimate the average price of 15 devices and the reimbursements for 10 procedures. Price estimates were correct if values were $\pm 25\%$ of actual costs. Multivariate analysis was used to analyze data. Results: 1,090 physicians completed the questionnaire. Overall, 19.8%, 22.8%, and 31.9% were accurate in the price estimations of devices, Medicare reimbursement, and wRVUs for procedures, respectively. Estimation accuracies for procedures showed a positive trend in more experienced physicians, private practice physicians, and those who practice in rural areas. Conclusion: This study suggests that IRs and VSs have limited knowledge regarding procedural costs. Therefore, more attention should be placed on cost education and awareness.

Significant Twelve-month Weight Loss Variability after Sleeve Gastrectomy**Authors:** Kindle T, Wright B, Bosler M, Gould J**Project Mentor:** Tammy Kindel, MD, PhD

BACKGROUND: Sleeve gastrectomy (SG) is currently the most popular bariatric performed procedure in the United States. Increasing post-operative experience with the SG has shown marked variability in nadir weight loss outcomes. METHODS: A bariatric database was retrospectively reviewed for patients who underwent a SG as a primary bariatric procedure from 01/2012-3/2015. %TWL was calculated at 2 weeks, 1 month, 3 months, 6 months, 9 months and 12 months post-operatively. 12 month %TWL was divided into categories of < 20% TWL, 20-24% TWL, 25-29% TWL, 30-35% TWL, and >35% TWL. RESULTS: The average 12-month %TWL was $27.7 \pm 8.3\%$ (n=134). Individual weight loss outcomes: 19.4% (n=26) of patients achieved < 20% TWL. 16.4% (n=22) achieved 20-24% TWL. 23.1% (n=31) achieved 25-29% TWL. 20.9% (n=28) achieved 30-34% TWL. Finally, 20.1% (n=27) achieved >35% TWL at 12 months post-operatively. CONCLUSIONS: This study finds there is significant weight loss variability after a SG.

Impact of the Chronic Pain Treatment Pathway on ED Opioid Prescriptions**Authors:** Zhang A, Shah S, Zosel A, Pace C**Project Mentor:** Caroline Pace, MD

Objective: Prescription pain medication abuse and misuse is a significant public health problem. In 2012, the Froedtert Hospital Emergency Department implemented the Chronic Pain Treatment Pathway (CPTP) to reduce inappropriate use of opioids while providing appropriate and compassionate medical care. This study evaluates the efficacy of the CPTP on ED opioid prescribing. Methods: A retrospective chart review was performed on patients who presented to the ED with chronic and acute pain. Pertinent data collected include types, doses, and number of opioids prescribed. Results: After the implementation of CPTP, the number of patients with chronic pain who received at one or more opioid prescription decreased by 13.52% ($p = 0.0017$) and the number of hydrocodone prescriptions decreased by 2.52 ($p = 0.028$). No significant differences were found in acute long bone fractures. Conclusion: The CPTP successfully decreased opioid prescribing in the ED for patients with chronic pain without affecting the treatment for patients with acute pain.

Pediatric Language of Satisfaction**Authors:** Atwood DT, Drendel A**Project Mentor:** Amy Drendel, DO, MS

Background: To improve patient quality of care, a study describing pediatric language characteristics for expressing satisfaction was performed. Method: Qualitative study of general pediatric inpatients at CHW. Patients were 3-17 years old, English-speaking and no developmental delay. Result: 38 patients were enrolled. The most common words used by children were “happy/good” or “sad/bad” from preschoolers, “happy/really happy” or “sad/very sad” for school-age and “happy/good” or “disappointed/frustrated” for adolescents. Quantifying language and abstract logic was more common as age increased. Increased vocabulary and complex language were more common for dissatisfaction. All age groups comprehended satisfaction questions. All patients 13 or older correctly defined the word satisfaction. Conclusion: Children ages 3 and older are capable of communicating satisfaction. The words and language characteristics outlined in this study will assist healthcare providers evaluate pediatric satisfaction and improve quality patient care.

Improving the Presentation of Web-Based Case Studies**Authors:** De Prey J, Tuffnell M, Martinez WM**Project Mentor:** Wanda M Martinez, PhD, MD

Background: Web-based learning has become an increasingly important tool in medical education. Educators must adapt existing educational material to a web-based format. In this study, we aimed to determine the usage patterns of web-based ophthalmic case studies and enhance their content, design, and quality to improve utilization and learner experience. Methods: Google analytics data and subjective user feedback were evaluated to compare the usage of and improve 17 web-based ophthalmic case studies. Results: After launching the new website, the total number of page views increased 42%, there was a more uniform distribution of page views per case, and average time spent per case decreased 60%. Additionally, nearly 24% of visitors are accessing the cases using a tablet or mobile device. Discussion/Conclusions: Understanding patterns of web-based learning will allow educators to design websites that fulfill the goals of the academic exercise while providing a time-efficient and fruitful experience to the learner.

Increasing Awareness and Utilization of Yoga Classes for Cancer Patients**Authors:** Koula MJ, Knight JM**Project Mentor:** Jennifer Knight, MD, MS

Research continues to grow regarding yoga and meditation as a beneficial adjunct for oncology patients. Educating healthcare professionals about the benefits of yoga and meditation for patients undergoing cancer treatment and recovery is one of the best ways to increase patient utilization of these programs. The goal of this project is to increase health care provider awareness of existing yoga and meditation programs and, as a result, increase patient utilization and sustainability of such programs. Pre- and post-surveys were given around a five minute presentation that highlighted benefits of yoga for oncology patients as well as outlined how to get patients involved in the classes that exist through Froedtert. Short informational sessions resulted in 90% of healthcare providers stating that they would be more likely to recommend yoga and meditation classes for their patients.

Randomized Controlled Trial of Health Literacy-Related Interventions in the ED**Authors:** Lepley B, Brousseau DC, May M, Morrison AK**Project Mentor:** Andrea Morrison, MD, MS

Over half of the 22.3 million annual visits to the pediatric emergency department (ED) are non-urgent. The goal of this pilot study was determine the feasibility, parental preference, and limited efficacy of a mobile health application compared to a low literacy book. We conducted a randomized controlled trial of parents of children presenting to the pediatric ED for non-urgent visits, with follow-up completed at 1, 3, and 6 months. Modified intention to treat analysis was completed for proportional data, and wilcoxon rank sum test for limited-efficacy testing. This study was feasible in recruitment (83.3%) and follow-up retention (80.6% with $\hat{\alpha} \approx 1$). Unexpectedly, the book was preferred by parents, calling into question real world feasibility of mobile health app interventions. While not powered to find a difference, there was a 40% reduction in one interventional group, showing promise that translation into a study with larger power could possibly decrease subsequent ED visits.

The Efficacy of Visual Detection of Schistosomiasis in Lake Malawi**Authors:** Mahr R, Jensen P, Bootsma H, Smith M**Project Mentor:** Candice Johnstone, MD, MPH**Community Partner:** University of Milwaukee, School of Freshwater Sciences

Schistosomiasis is a major public health concern around Lake Malawi. The objective of this project was to compare the existing visual detection system in place around the lake to real-time PCR. Twenty-two samples of snails were collected from different areas of the lake. They were allowed to sit overnight in jars of water which were analyzed the next day via magnifying glass for presence of cercariae, in accordance with the established system. The samples of water were filtered, transported back to the lab in the US, and the DNA was isolated. Using previously established genus-specific real-time PCR, the samples were tested. Two of the 22 samples were positive in the field. With current data, we were able to detect Schistosoma DNA in 6 of the samples. This suggests a high false negative rate via optical detection and the need for further consideration of different environmental detection methods.

Caregiver Skills Differ By Health Literacy**Authors:** May M, Morrison AM, Brousseau D**Project Mentor:** Andrea Morrison, MD, MS**Community Partner:** Downtown Health Center

Objectives: The aim of this study is to explore the relationship between caregiver health literacy and care-seeking behavior for acute illness in a pediatric clinic and ED. **Methods:** This was an in-depth qualitative interview study at two locations: an ED and inner city community health center. Caregivers presenting for non-acute pediatric illness were enrolled and interviews were audiotaped, transcribed, coded and analyzed. **Results:** A total of 50 semi-structured interviews were completed with 56% possessing low health literacy. Care seeking characteristics differ between low and adequate health literacy caregivers. Low health literacy caregivers are more inclined to overestimate severity of illness thus seek care sooner. Caregivers with adequate health literacy seek reassurance of illness management and value close relationships with their physician. Certain situations prompt caregivers to seek expedient care regardless of health literacy. **Conclusions:** Differences in management of non-urgent pediatric illness exist between low and adequate health literacy providers.

A Walk in Their Scrubs - A Medical Student/Nursing Partnership**Authors:** O'Keefe M, Gedeit R**Project Mentor:** Rainer Gedeit, MD

Goals: improve interdisciplinary interactions by creating a partnership between medical students and nurses

Background: Interdisciplinary education is one of MCW's core competencies, yet true exposure is limited.

Methods: A 4-week M3/M4 elective was designed where medical students are to be partnered with a nurse preceptor to learn the day-to-day role of a nurse on the medical team. Activities will include technical tasks (IV placement, G tube placement, etc.) and observation of nursing/physician relationships. Students will have sufficient time blocked off for reflective writing about experiences that they have had during the rotation.

Assessment methods: Nursing physician collaboration assessment, qualitative analysis of reflective writing, nursing preceptor evaluation. Limitations: As an elective, students will self-select - meaning the students who might benefit most may not elect to take it. Further explorations: Exposure to other medical professionals.

Co-registering Brain Histology and MRI to Detect Glioblastoma Multiforme**Authors:** Pellatt BJ, Mickevicius NJ, LaViolette PS**Project Mentor:** Peter LaViolette, PhD, MS

Glioblastoma multiforme (GBM) is the most common primary brain tumor with a median survival of 14.6 months despite surgery and therapy. One difficult aspect of brain tumor therapy is the inability of imaging to detect infiltrative tumor. Co-registration of brain tumor histology with MRI allows for the possibility to apply algorithms to recognize patterns in imaging contrasts to detect tumor cellularity. We hypothesize algorithms applied to co-registered MRI and precise histology can produce predictive models to detect cellularity and locate tumor on imaging. Ex-vivo brain tissue from 1 patient was excised from 3 regions and imaged using multiple MRI sequences and MR contrasts T1, T2, fractional anisotropy (FA), axial kurtosis (AK), radial kurtosis (RK), apparent diffusion coefficient (ADC), and mean diffusivity (MD). The PLS trained model generated from FA and AK resulted in the best cell density-predicting model, which is due to both quantities being sensitive to cellular characteristics.

Implementing an Immunization Curriculum: Enhancing Vaccine Knowledge and Advocacy**Authors:** Piquette T, Havas N**Project Mentor:** Nancy Havas, MD

Vaccination of healthcare workers (HCW) greatly impacts disease prevention. To foster a vaccine-supportive environment, we assessed 161 first year medical student's knowledge and attitudes regarding vaccination before and following an immunization curriculum. Students discussed vaccine misconceptions, patient vaccination refusal, and patient-centered vaccination recommendation. Students learned proper technique for vaccine injection, following which they administered and received an influenza vaccination from a fellow student. Knowledge improved from 74% to 100% of students scoring greater than 80% ($p < 0.0001$). Advocacy to recommend vaccination to patients increased for general vaccinations ($p = 0.0354$) and influenza vaccination ($p = 0.0242$). Competency in discussion and administration of a vaccine injection increased significantly from 18% to 93% ($p < 0.0001$). With improved knowledge and advocacy towards vaccinations, patient-centered educational skills, and the efficient vaccination of an entire medical school class, we have begun to shape the attitudes of future HCW towards the utility of vaccination as a powerfully efficacious disease-prevention tool.

Cadavers as Educators**Authors:** Stauder E, Stevens S, Swartz J, Huerta M, Gerhardt A, Stauder S, Hoagland T**Project Mentor:** Todd Hoagland, PhD**Community Partner:** Nicolet High School

Background: After fulfilling their primary role in educating medical students (MS) the educational value of body donors can be maximized through a MS-led curriculum for high school students (HSS), augmenting their anatomy education and increasing understanding of preventable disease. Methods: HSS participated in a ½ day MS-led session that included: MCW tour, Pre-test, Anatomy Lab Introduction, Lab Stations (Thorax/Abdomen/Extremities/Brain), Post-test, Multidisciplinary Health Careers Panel. HSS were surveyed and wrote optional reflection essays from which themes were identified using standard methodology. Results: Pre/post-test results were compared; students improved in all categories (Thorax: 68->81%, Abdomen: 78->83%, Extremities: 62->82%, Brain: 66->79%, Health Behavior: 86->88%, Overall: 72->82%; n=158). Themes included: "will share learning with others (84%)", "better understanding (69%)", "influence health perception/choices (50%)". Conclusions: CAE is a novel approach to maximizing body donor educational value. There was increased participant knowledge which was likely disseminated by participants to their communities.

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Individual Decisions of Secondary Findings Following Genome Sequencing**Authors:** Bishop CL, Dimmock DP, Strong KA**Project Mentor:** David Dimmock, MD

Genome sequencing is an emerging clinical tool which may result in genetic variants that are not directly related to the patient's primary disorder, but give insight into other mutations. Currently, knowledge is limited regarding what type of access a patient would want to have to these Secondary Findings (SFs) and much research is being conducted to define the best way to involve patients in SF decision making. This study reports on 310 individual choices for return of SFs that were completed at the Medical College of Wisconsin's clinical sequencing laboratory. Individuals were given access to 5 categories of SFs to select from: no other incidental findings, untreatable childhood disorders, treatable adulthood disorders, untreatable adulthood disorders, and carrier of a disorder. We found that 76.1% of individuals selected every SF to be reported, 4.5% wanted a subset of the options, and only 9.4% did not want any SFs. Overall, this data supports the opinion that patients want and utilize the ability to choose the findings reported.

Improving Pneumococcal Vaccination Rates of Medical Inpatients in Nepal**Authors:** Bock, AM, Chintamaneni, K, Rein L, Frazer T, Kayastha, G, MacKinney, T**Project Mentor:** Theodore MacKinney, MD, MPH

In Nepal, there is a high lung disease burden and incidence of streptococcal pneumonia due to multiple factors including air pollution, dust exposure, and cigarette smoking. This very first QI study for Patan Hospital sought to measure the baseline pneumococcal vaccination rate of qualifying adult patients discharged from the medical wards and assess reasons for non-vaccination. QI interventions were instituted to improve this rate, and measure change and the effectiveness of QI methods in producing the desired outcomes. In the 3 week baseline assessment, 2 out of 81 (2%) eligible patients had received a prior pneumococcal vaccine (PNV); 68 (84%) unvaccinated patients responded that they were unaware of the PNV. After the QI interventions, the PNV rate significantly increased to 42% (23/56, $p < 0.001$). Only 5 (9%) unvaccinated patients were not asked or were unaware of the PNV, a significant change ($p < 0.001$). QI measures were effective in increasing PNV rates, despite the limited familiarity with QI methods and projects in our hospital.

Assessment of Quality of Life Among Violently Injured Youth**Authors:** Boyle EB, Melzer-Lange MD, Levas MN**Project Mentor:** Michael Levas, MD, MS**Community Partner:** Project Ujima

The global impact of youth violence on health can be very great in terms of mortality, morbidity and disability. Project Ujima, was created in Milwaukee, WI to alleviate some of this burden. The aim for this study was to use objective patient-reported quantitative measures to assess the health related quality of life (HRQOL) of youth aged 8-18 who have been violently injured and attended Project Ujima Summer Camp. 8-18 year old youth participated in a HRQOL survey at baseline and at the end of programming (6 weeks). Average change in scores improved in all general domains of HRQOL with the largest change in scores seen in psychosocial functioning (mean diff: +5.33) and emotional functioning (mean diff: +8.33). Average changes in scores for specific domains were mostly positive with the largest effect seen in patient anxiety (mean diff: +4.98). Only participant anger scored more poorly following the intervention (mean diff: -2.01). A community-based summer program hosting violently-injured youths resulted in overall improved HRQOL.

A Trial of Quality Improvement Processes in Diabetes Care at Patan Hospital, Nepal**Authors:** Chintamaneni K, MacKinney T**Project Mentor:** Theodore MacKinney, MD, MPH

The incidence of diabetes and hypertension in Nepal is steadily increasing, with the prevalence expected to double by 2030. A common sequela associated with diabetes and hypertension is kidney disease, detectable by microalbumin assays. Our quality improvement study utilized multiple Plan-Do-Study-Act (PDSA) cycles in conjunction with standard chart-review to evaluate the current practices at Patan Hospital in Kathmandu, Nepal. Three interventions were utilized to increase compliance: educating physicians on the current testing guidelines, reminders attached to patient charts, and translated patient education handouts. Prior to interventions, baseline testing was 32.6% of eligible patients. After all interventions were performed we measured a statistically significant increase to 69.8% compliance with testing guidelines. Our study showed that the application of multiple faceted interventions were able to significantly increase the rate of ordered quantitative microalbumin tests in diabetic and hypertensive patients in a quality improvement naive hospital.

A Toxicogenetic Panel for Chlorpyrifos Pesticide in Yantalo, Peru**Authors:** Dobberpuhl K, Duffey M, Kehl KS, North PE, Sander TL**Project Mentor:** Tara Sander Lee, PhD

Farming practice in Peru has led to increased pesticide toxicity, partly due to lack of personal protective equipment, which can cause neurological effects. Toxicogenomics is the study of how an individual's DNA contributes to metabolism of toxins. However, it is not known which genetic variants make an individual more susceptible to the toxic effects in Peru. This project involved developing a toxicogenetic panel for the pesticide chlorpyrifos to assess toxicity risk and garner information on variation frequencies in the Peruvian population. An extensive database and literature search was conducted to identify the major enzymes involved in chlorpyrifos metabolism, a pesticide observed in high levels in Yantalo, Peru. Eleven genetic variants were identified in 3 genes that were either advantageous or detrimental in terms of toxicity risk. This panel can be used in Yantalo, Peru for testing farmers exposed to pesticides to create awareness and decrease disease. It will also add to the scarce amount of frequency data for this population.

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Examining Obstetric Care and Outcomes Among Somali Refugee Women in Milwaukee**Authors:** Gibson E, Guo M**Project Mentor:** Beth Damitz, MD

Somalia ranks among one of the worst countries in maternal and infant mortality. An increasing number of Somali refugees have settled in Milwaukee. This study aims to investigate maternal and infant health in refugee women who received care from Wheaton Franciscan Family Health Center in comparison to their counterparts in Somalia. Data from Somali refugees who received prenatal care 01/01/2013 to 12/31/2015 was obtained including: prenatal visits, prenatal vitamin prescriptions, maternal age, marital status, pregnancies, gestational age, contraception use, birth weight, maternal and infant deaths. This data was then compared to reports from WHO and UNICEF on Somalia. Of note, a subset of our patients also attended monthly sessions that covered topics on prenatal and postpartum care. Overall, while there were definitely factors that have improved for Somali women currently living in the US, there are still many barriers that must be overcome to improve maternal and infant health.

Medication Abortion: A Discussion of Procedure with Focus on WI and NY**Authors:** Gillett E, Broekhuizen F**Project Mentor:** Fredrik Broekhuizen, MD

Medication abortion, as practiced under the evidence-based protocol, is a safe and efficacious alternative to surgical or aspiration abortion procedures for women who experience significant barriers in abortion access, whether legal, transportation, financial, temporal. This procedure provides a greater than 95% efficacy rate with a less than 5% chance of retained products and a 1% chance of continued pregnancy. However, disparity exists in access dependent upon your state of legal residence, from highly restrictive, anti-abortion legislation in Wisconsin to the unrestricted, open access of New York. My own work in both states has broadened my understanding of the procedure and the constraints placed on both physicians and women.

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OEF/OIF Veterans Perceived Barriers to Accessing VA Healthcare**Authors:** Hattersley G, Franco Z, Flower M, Curry B, Whittle J**Project Mentor:** Zeno Franco, PhD**Community Partner:** DryHootch

OEF/OIF veterans are a distinct and emerging health care population. Prior studies have looked at the utilization of VA healthcare by the veteran population and barriers preventing access. We asked, do OEF/OIF veterans have different reasons than previous service eras for not using the VA? Using a community based sample of 858 veterans from this previous study, OEF/OIF veterans were less likely to report they "had other insurance coverage" as their primary reason for not using the VA ($p=0.0178$, chi-square = 5.6128). OEF/OIF veterans were not significantly different than previous generations of veterans to answer 'no' because they, "do not need or want the services the VA offers" ($p=0.3679$, chi-square = 0.8106). Each generation of US veterans has much in common with other service eras, but also face distinct issues with reintegration and accessing healthcare. Service era specific barriers to accessing VA care are an important area for further research.

Alternative Water Collection Methods on the Shores of Lake Malawi**Authors:** Jensen P, Bootsma H, Bower P, Chombo J, Ngochera M**Project Mentor:** Paula North, MD, PhD**Community Partner:** University of Milwaukee, School of Freshwater Sciences

Lake Malawi is the primary source of drinking water for nearly all residents living on or near the lake. Sample collection focused on the region around Nguo, a lakeside fishing village on the southwestern shore of Lake Malawi. Preliminary shoreline sampling indicated consistently high *E. coli* concentrations. These studies attempted to identify temporal and special relationships of *E. coli* levels as well as determine the quality of *E. coli* as an indicator of human fecal contamination in this unique setting. qPCR results confirm microbiological culture results and indicate that poorer water quality correlates with higher beach use, shorter distance from shore, and lower wind speeds. This implies that small changes in the practices of water collection could significantly reduce the levels of *E. coli* concentrations in the drinking water of Nguo residents. Recommendations can be made to villagers and the Malawi Health Department to reduce the incidence of waterborne illness.

Burn Injury Approaches in Milwaukee and Rzeszow: A Comparative Study**Authors:** Kataria N, Nagórska M, Mazur A, Telega G**Project Mentor:** Grzegorz Telega, MD

WHO prioritized burn prevention as an area for global research and education. This was a multi-site study at Children's Hospital of Wisconsin (Milwaukee, USA) and Regional Medical Center in Rzeszow, Poland, with two components: retrospective review of eligible inpatient records and survey of parents. At each site, 100 charts were reviewed of burn patients admitted to the pediatric unit. Additionally, 25 standardized surveys were administered to parents at each site to evaluate knowledge about burn prevention. Of the charts reviewed, toddlers/infants (0-2y) were most represented. The number of procedures performed was higher in Milwaukee ($p < 0.001$). Survey results revealed low levels of education about smoke detectors in Rzeszow ($p < 0.02$) and about hot water temperature settings in Milwaukee ($p < 0.01$). Each city needs specific educational strategies to address gaps in knowledge about burn prevention. Both cities have similar burn injury patterns, optimal approach to treatment needs further investigation and standardization.

Reliability and Acceptability of the Jerrycan Pain Scale**Authors:** Hannan KE, Wiebe L, Loughran D, Rhodes M, Johnston B**Project Mentor:** Mary Rhodes, MD and Lauren Wiebe, MD

Background: This study aims to validate Hospice Africa Uganda's institutionally-created Jerrycan Pain Scale (JPS), by comparing its efficacy and consistency of use to the NHS and WBF within HAU's patient population. Methods: This prospective study of a convenience sample of HAU patients obtained patient pain ratings using the JPS, NHS, and WBF scales during clinical visits. The pain scale ratings were compared using a PWWK to analyze agreement between scales and a SWK to describe the variability of individual patients' use of the scales over time. Results: 183 patients were enrolled in the study. Overall, there was substantial agreement between the three scales (PWWK 0.66-0.77). Overall, the SWK statistics indicated good consistency of use across scales. Conclusions: Analysis showed that patients' reported pain scores when using the JPS had moderate to almost perfect correlation with standard scales and more consistent use when compared with the validated WBF and NHS scales.

Spiritual Distress Screening Using the Novel "Spirit 3" at Hospice Africa Uganda**Authors:** McSorley B, Zirimenya L, Cercone K, Frazer T, Visotcky A, Mwebesa E, Rhodes M, Wiebe L**Project Mentor:** Lauren Wiebe, MD and Mary Rhodes, MD

The aims are to assess the feasibility of the Spirit 3 in routine screening for spiritual distress in hospice and to understand whether HAU staff value using the Spirit 3 in routine clinical practice. The Spirit 3 was administered to consenting patients for four consecutive visits. The scale ranges from 3 to 15 with 15 representing an ideal state of spiritual well-being. 49 patients were enrolled in the study and completed the first assessment. 84% of those patients had untreatable, metastatic cancer and 16% had HIV/AIDS. 41% completed the second assessment; 16% completed all 4 assessments. Eight patients died prior to the second assessment; the remainder were lost to follow-up. At 86% of visits, a staff member performed an intervention to address the reported spiritual distress. Upon study completion, 75% of the HAU staff wished to use the Spirit 3 in routine clinical care, suggesting feasibility in clinical practice.

Identifying Risk Factors and Health Perceptions Across Lebanese University Students**Authors:** Rahhal G, Yacoubian HA, Yacoub S, Abdelhakiem M, Saleh J, Irani J, Rein L, Szabo A, Atallah E**Project Mentor:** Ehab Atallah, MD

Hookah has become an increasingly popular pastime in Lebanon, where as many as 34.8% of adolescents smoke hookah. To our knowledge, this is the first study to investigate potential triggers for first-time hookah smoking among university students in Lebanon. This study also looks at the prevalence of health misconceptions about hookah smoking. An online survey was sent out to students at two universities in Lebanon using REDCap. A total of 246 responses were analyzed. This study found that boredom and being around friends and family members who smoke were the main drivers in beginning hookah use. Peer pressure, stress, and being around hookah smokers were all more prevalent in the university setting. Interventions to help students cope with stress and peer pressure may positively impact deference. In addition, more public health education is needed in order to foster better understanding on the health effects of hookah.

Prioritizing Care for Cambodian Children with Congenital Heart Defects**Authors:** Rapp CT, Mitchell ME**Project Mentor:** Michael Mitchell, MD

For the past five years Dr. Michael Mitchell has visited Ankhor Hospital for Children in Siem Reap, Cambodia to perform repairs on children with congenital heart defects. It is important to be as efficient as possible with his time to maximize the benefit he is able to give to this community. The goal of this study was to analyze preoperative health status in these patients in the form of weight and height, correlated with the type of heart defect and age at time of repair. This would give Dr. Mitchell and his team one way of prioritizing which patients stood to benefit most from his care. This study did not demonstrate a correlation between defect type or age at surgery with preoperative weight and height, however as a whole these children fell more than three standard deviations below the international mean for weight and height. This may suggest that preferentially performing simpler repairs on the youngest patients may provide the greatest overall benefit, as more children can be treated who are, in terms of growth, equally ill.

Resource Management and Allocation during Mass Casualty Events**Authors:** Richman MA**Project Mentor:** David Gutterman, MD

By definition, mass casualty events (MCEs) encompass different scenarios, including warfare, man-made disasters and natural disasters. MCEs have been defined in terms of crisis standards of care in which there is a substantial change in the usual healthcare operation and the level of care it is possible to deliver for a sustained period of time. The purpose of this study is to compare the protocols of a Level 1 Trauma Centers in Israel with that of Froedtert Hospital in order to improve the standard of care and preparedness in Milwaukee medical institutions. The protocols of the two hospitals were reviewed in an attempt to compare and contrast initial in-hospital response and resource management and allocation during a mass casualty event. After reviewing the protocols of both hospitals, it is clear that both would benefit in implementing various aspects of the other's protocol in order to appropriately respond when disaster strikes.

A Review of Medical Device Regulation from the Perspective of TAVR Implementation**Authors:** Sinkoff J, Milosavljevic S**Project Mentor:** Staci Milosavljevic, MD

- The implementation of transcatheter aortic valve replacement (TAVR) varied significantly between the US and Europe providing an extraordinary example to explore medical device regulation and its impact on patients.
- A literature review was performed using PubMed and supplemented with Google and government databases from 2002 to 2015, using specific search criteria
- In broad strokes, the US system can be characterized as more conservative and bureaucratic, and the EU system as faster, using private for-profit companies, but with lower evidence thresholds. It can be estimated that 144,674 patients in the US may have benefited from TAVR during the 4-year delay period.
- We must weigh the cost of delayed approval times with the need for certainty in safety and efficacy. Though it is impossible to say which system is better for patients in the long term, we can learn from examples like TAVR to continue to optimize all aspects of patient care.

Outcomes of the Ponseti Method for Clubfoot in an Urban Setting**Authors:** Smith BJ, Blackwood S, Schwab JP, Van Valin SE**Project Mentor:** Jeffrey Schwab, MD

Introduction: This study examines compliance of the Ponseti method in the context of ethnicity and socioeconomics. **Methods:** This retrospective study was conducted at CHW from June 1, 2006, to March 1, 2015. Clinical data, insurance status and ethnicity were obtained from electronic medical records. Government-assisted insurance was used as a marker of low socioeconomic status. **Results:** We identified 98 patients; 61 were Caucasian and 37 were non-Caucasian, 79 were on private insurance while 19 were on government assisted insurance. Sixty-Four patients were compliant with treatment while 34 were non-compliant. Analysis found no significant difference when comparing ethnicity, type of insurance, or gender. **Conclusion:** Comparing compliance with treatment between different ethnic and socioeconomic groups found no significant difference. We were unable to achieve a high level of power for this study due to the small sample size. A larger prospective cohort may better examine whether ethnic or socioeconomics plays a role in compliance.

Absence of IAP Leads to Increased Inflammation in the Newborn Intestine**Authors:** Becker KS, Heinzerling NP, Koehler SM, Fredrich K, Gourlay DM**Project Mentor:** David Gourlay, MD

Intestinal alkaline phosphatase (IAP) inactivates bacterial endotoxin and LPS and regulates intestinal bacterial colonization. Premature newborns have decreased expression of IAP, as well as an increased risk of necrotizing enterocolitis (NEC). Supplemental IAP has been shown to decrease intestinal inflammation in premature rats. We used an IAP knockout rat model to investigate our hypothesis that the absence of IAP alone is associated with increased intestinal inflammation and that this inflammation can be reversed by supplemental enteral IAP. The absence of IAP in knockout pups was associated with significant increases in IL-6 and TNF \pm mRNA expression compared to wild-type pups. Preliminary results showed a trend toward decreased expression of inflammatory mediators in knockout pups fed supplemental enteral IAP. Our results suggest that IAP deficiency predisposes premature neonates to intestinal inflammation. A trend toward decreased inflammation IAP replacement suggests the potential of IAP as a prophylactic treatment in the prevention of NEC.

The Role of T and B Cells in Ischemic Reperfusion Injury of Kidney**Authors:** Bergquist M, Blunt J, Lund H, Mattson D**Project Mentor:** David Mattson, PhD

The immune system plays a role in acute kidney injury. We hypothesized Rag-1 and CD247 knockout rats will experience less injury and a quicker recovery. Rats were subjected to surgically induced reperfusion injury. Serum and urine was analyzed for serum electrolytes, microalbumin, and creatinine on Days -1, 1, 2, 3, and 8. CD247 and Rag1 knockout rats had a higher peak serum creatinine, 3.551 ± 2.37 (n = 4) and 5.331 ± 1.84 mg/dL (n = 5), than Dahl SS rats, 1.664 ± 1.49 mg/dl (n = 7). Microalbumin excretion rates were highest in SS rats on both Day -1 to 0 and Day 7 to 8, but the control SS rats had higher excretion rates than the SS injured rats (17.71 ± 14.08 mg/day n = 4 and 12.92 ± 9.34 mg/day n = 7) respectively on Day 8. eGFR from urine and serum creatinine on Day 8 was lowest in the SS injured rats ($0.328 \pm .09$ mL/min) and higher in the immunocompromised models with Rag-1 injured at $0.529 \pm .28$ mL/min and CD247 injured at $0.519 \pm .242$ mL/min. The results reject the hypothesis. The immunocompromised rats experienced less kidney injury.

In Vitro Expansion of PD1+ T Cells for Adoptive Immunotherapy of Myeloma**Authors:** Blitzer G, Jing W, Weber J, McOlash L, Gershan J, Johnson B**Project Mentor:** Bryon Johnson, PhD

Myeloma is difficult to treat with current standard therapies. Adoptive transfer of tumor-specific T-cells could be an effective treatment, but identification of the tumor-specific T-cells and effective cytokines for expansion of the T-cells are unclear. Programmed cell death protein 1 (PD-1) appears to be a marker for the tumor-specific T cells. These PD-1+ T-cells are known to be dysfunctional, preventing effective immune targeting of tumors. Data suggests that proliferation of the PD-1+ T-cells may allow them to recover their anti-tumor activity. IL-15/IL-21 combination was found to be effective at expanding normal T-cells in vitro, expanding the population over 15-fold. PD-1+ T-cells also expanded well with the IL-15/IL-21 combination and maintained their tumor specificity. In IFN- γ ELISPOT assays anti-tumor reactivity was detected in the expanded PD-1+ T-cells but not in the PD-1- population. Though PD-1+ T-cells are dysfunctional after exposure to tumor cells, they can be revived to target the tumor once again.

Assessing Photoreceptor Structure After Closed-Globe Blunt Ocular Trauma**Authors:** Braza M, Higgins B, Hammeke T, Stepien KE, Robison SE, Han DP, Remler BF, Carroll J**Project Mentor:** Joseph Carroll, PhD

Purpose: To evaluate retinal structure abnormalities in patients with visual complaints following closed globe blunt ocular trauma (cgBOT). Methods: Eleven eyes from nine subjects with visual complaints following cgBOT were imaged with spectral domain optical coherence tomography to assess outer retinal architecture, and confocal and split-detector adaptive optics scanning light ophthalmoscopy (AOSLO) to analyze photoreceptor mosaic integrity. Results: For 3 of 11 eyes, split-detector AOSLO imaging revealed remnant inner segment cone structure within hyporeflective areas on confocal AOSLO. These eyes, followed longitudinally, demonstrated improved photoreceptor mosaics. 8 of 11 eyes demonstrated healthy photoreceptor structure on both confocal and split-detector AOSLO imagery. Conclusions: Split-detector AOSLO demonstrated viable inner segment structure in patients with outer retinal disruption on confocal imaging, providing useful information and an invaluable tool for determining visual prognosis of cgBOT patients. Longitudinal imaging illustrated that photoreceptor disruption following cgBOT is neither permanent nor as common as previously described.

Altered PGC-1 α -SIRT-1 Signaling in Persistent Pulmonary Hypertension of the Newborn**Authors:** Callan E, Eis A, Michalkiewicz T, Afolayan A, Teng RJ, and Konduri GG**Project Mentor:** Girija Ganesh Konduri, MD

Introduction: PPHN presents as increased pulmonary vascular resistance (PVR) at birth, resulting in extra-pulmonary right-to-left shunting and hypoxemia. Impaired angiogenesis causes high PVR in PPHN. Pulmonary artery endothelial cells (PAECs) show altered metabolic regulation in PPHN, leading to decreased mitochondrial biogenesis and angiogenesis. Down-regulated Peroxisome Proliferator-Activated Receptor Gamma Co-Activator-1 \pm (PGC-1 \pm) and histone deacetylase, Sirtuin-1 (SIRT-1) leads to impaired mitochondrial biogenesis and angiogenesis in PPHN; conversely, over-expression of PGC-1 \pm and SIRT-1 in hypertensive PAECs restores mitochondrial biogenesis and angiogenesis, reversing the PPHN phenotype. Results: PPHN PAECs had decreased PGC-1 \pm and SIRT-1 levels vs. controls. PGC-1 \pm knockdown in control PAECs led to decreased tube formation, cell migration, and proliferation. PGC-1 \pm over-expression in PPHN PAECs led to increases in mitochondrial complex proteins, tube formation, cell migration, and proliferation. Conclusions: Down-regulation of PGC-1 \pm and SIRT-1 contributes to decreased mitochondrial biogenesis and angiogenesis in PPHN; therefore, up-regulating these proteins may offer a new PPHN treatment.

In Vivo Characterization of Macular Telangiectasia Type II using AOSLO**Authors:** Carll T, Scoles D, Dubra A, Carroll J**Project Mentor:** Joseph Carroll, PhD

Purpose: To characterize the photoreceptor and microvascular changes in Juxatafoveal Macular Telangiectasia using AOSLO with split detection scanning. Methods: Thirteen eyes with clinical MacTel underwent examination including OCT and AOSLO imaging with split detection and vascular mapping to generate projections of perifoveal retina at photoreceptor and inner-retinal layers which were evaluated for structural abnormalities. Results: Regions of retinal atrophy previously described with confocal AOSLO demonstrated variable photoreceptor morphology with temporal remodeling and RPE migration. Microcysts 5-100 μ m in diameter occupied full-retinal thickness and also exhibited temporal remodeling. Other known features found included crystalline deposits, vessel blunting/ectasis, and subretinal neovascular complex featuring retinal-retinal anastomosis. Conclusions: Split detection AOSLO allows for tracking and characterization of neurosensory and vascular features of MacTel. Photoreceptor remodeling within the central lesion appears to correlate with return of sensory function and precedes RPE migration. Microcysts are not associated with vascular changes and are not limited to the INL.

iPS Drug Screening in LDL Disorders: Discovery of LDL-Lowering Cardiac Glycosides**Authors:** Cayo MA, Duncan SA**Project Mentor:** Joseph Barbieri, PhD

Cardiovascular disease resulting from lipoprotein imbalances (LDL, HDL), regulated by the liver, represents the largest cause of morbidity and mortality worldwide. Familial Hypercholesterolemia (FH, LDLR-mutation) is the most common inherited dyslipidemia. Obtaining primary hepatocytes from patients is invasive/inconsistent/costly, and culture for more than 1-2 days isn't possible. Today, there are efficient methods for directed differentiation of iPSCs to hepatocytes. In this doctoral dissertation, we generated iPSCs from a historical FH patient, 'JD', and modeled this patient's liver-specific pathology. We adapted the iPSC-hepatocyte model of FH to a high-throughput screening platform for LDL-lowering compounds. We screened libraries comprised of FDA-approved and similar compounds and discovered that all cardiac glycoside compounds tested reduced VLDL secretion from FH iPSC-hepatocytes. We treated humanized FRGN mice (livers comprised of human hepatocytes), demonstrating human LDL-lowering effects. Finally, we mined de-identified Epic data from patients at Froedtert Hospital, confirming the previously unreported/unknown LDL-lowering effect of cardiac glycosides.

p66 Shc Knockout Mitigates Glomerular Injury in Hypertensive Rats**Authors:** Chong A, Miller B, Sorokin A**Project Mentor:** Andrey Sorokin, PhD

The autoregulatory response of renal preglomerular arterioles is important for maintaining vascular tone and renal blood flow. Derangements of the myogenic response, as seen in salt-sensitive hypertension, are implicated in the development of glomerular injury. Still, the molecular mechanisms underlying salt-sensitive hypertension-induced nephropathy remain unclear. The purpose of this study was to assess the contribution of adaptor protein p66Shc in the regulation of renal vascular tone and dysfunction associated with hypertension-induced nephropathy. By using innovative technology to modify the rat Shc1 gene, we have generated a panel of mutants on the genetic background of Dahl salt-sensitive rats. We show that the p66Shc knockout reduces the degree of albuminuria that normally occurs in susceptible hypertensive rats. We also report that p66Shc knockout mitigates glomerular injury on histologic comparison of rat strains. These results establish a role for p66Shc in the regulation of renal vascular tone and promotion of renal vascular dysfunction.

miRNA Extraction from FFPE Human Kidney Tissue via Laser-Capture Microdissection**Authors:** Davis S, Baker MA, Iczkowski K, Liang M**Project Mentor:** Mingyu Liang, MB, PhD

Introduction: MicroRNA (miRNA) are non-coding RNA molecules that regulate expression of genes through multiple mechanisms. miRNA have been implicated as potential diagnostic markers or therapeutic targets in various diseases. Hypothesis: miRNA can be extracted from glomeruli and proximal tubule (PT) isolated from formalin-fixed, paraffin-embedded (FFPE) human kidney biopsies via laser-capture microdissection (LCM). Study Methods: FFPE specimens from patients with diabetic nephropathy were cut from blocks and mounted onto slides. Glomeruli and PT were isolated individually via LCM. Each sample then underwent RNA extraction, and miRNA expression was quantified via qPCR. Results: 250-500,000 μm^2 of tissue was collected from each of 20 glomeruli and 20 PT samples. RNA qPCR demonstrated appropriate expression of tissue specific markers ($p \leq 0.05$), validating LCM efficacy. Expression of known miRNA was successfully quantified via miRNA qPCR. Conclusions: miRNA can be extracted from renal structures isolated from FFPE human biopsy specimens via LCM, and quantitatively measured via qPCR.

HNF1A-MODY Diabetes in the Human Stem Cell-derived Hepatocyte-like Cell**Authors:** Determan MR, Alemzadeh R, Duncan SA**Project Mentor:** Stephen Duncan, PhD

HNF1A-MODY is the most prevalent form of monogenic diabetes resulting from a haploinsufficiency of the transcription factor hepatocyte nuclear factor 1 alpha (HNF1A). HNF1A regulates gene expression in the beta-cell and hepatocyte. We hypothesize that a subset of the pathophysiology of HNF1A-MODY results from gene expression changes in the hepatocyte. Using cellular reprogramming, multiple human induced pluripotent stem cell (hiPSC) lines were generated from two novel HNF1A-MODY patients. Hepatocyte-like cells were produced using directed differentiation from hiPSCs. Microarray analysis identified genes whose expression was affected at ≥ 2 -fold difference (p-value with FDR correction < 0.001). Validation with real time qRT-PCR identified three targets consistently differentially expressed from controls in both patient backgrounds: AMDHD1, GSTT2, and IL1R2. Using HNF1A-MODY hiPSCs overexpressing wild-type HNF1A, specific induction was found for IL1R2, a decoy receptor for IL-1 signaling. Future work will confirm a functional decrease in IL1R2 and assess the contribution to diabetes in HNF1A-MODY.

Retrospective Review of Patients with Pediatric Microscopic Polyangiitis**Authors:** Guo M, Malloy M, Woo J, Olson JC**Project Mentor:** Judyann Olson, MD

Microscopic polyangiitis (MPA) is a rare disease in the pediatric population, and as such, there is very little literature on its presenting features, outcomes, and mortality. Therefore, the aim of this study was to examine the above in pediatric patients and additionally, assess for any medication exposure or infections in the six months preceding onset. The study reviewed five patients with symptom onset and diagnosis during a fifteen year period at a pediatric tertiary referral hospital. Review indicated that all patients had renal involvement, four had lower respiratory tract involvement, and four had anemia. None of the medications noted from the literature were reported to have been taken in the six months prior to onset, and only one patient had a H1N1 infection during this period. The results suggest that pulmonary involvement, renal involvement, and anemia are predominant manifestations in pediatric MPA patients, and they will help physicians better understand presenting features and expectations for outcome.

Emerging Roles of SGLT3 Family of Proteins in Vascular Function**Authors:** Hanna PE, Laudarji V, Paranjpe R, Bishell A, Duris, C Regner KR, Lazar J, Imig J, Lombard J, North P, Tabatabai N**Project Mentor:** Kevin Regner, MD

Poorly controlled high serum glucose levels in type 2 diabetics increase their risk of developing hypertension and kidney damage. Sodium-dependent glucose transporters, SGLTs, have been recently implicated in diabetes and may offer an insight into the mechanism behind this pathology. SGLT3, specifically, is a unique member that transports sodium across the cell membrane in a glucose-dependent mechanism, but glucose itself is not transported by SGLT3. Mouse SGLT3a is the homologue of human SGLT3 and our preliminary immunohistochemical studies have shown SGLT3a expression in mouse arterial vasculature. Our overall goal was to investigate the role of SGLT3 in the pathogenesis of diabetic nephropathy using mouse aorta as model. We hypothesized that hyperglycemia up-regulates SGLT3 activity in kidney vasculature, which leads to the development of hypertensive arterial vessels and ultimately causes kidney damage. Our studies have demonstrated that SGLT3a agonists increase arterial force tension leading to vasoconstriction and hypertensive vessels.

The Relationship Between Dietary Carbohydrates and Fasting Triglycerides: A Meta-Analysis**Authors:** Hawkins DR, Meurer LN, Sahoo D**Project Mentor:** Daisy Sahoo, PhD

Elevated fasting triglyceride levels (TGs) contribute to cardiovascular risk and dyslipidemia development. Low carbohydrate diets (LCD) have a controversial link with lower TGs. We hypothesized that LCD would lower TGs. Our goal was to analyze this hypothesis utilizing a DerSimonian-Laird random-effects meta-analysis. We identified relevant articles by a literature search of PubMed. The preset inclusion criteria required studies to be: (a) randomized control trials (RCT) or parallel crossover trials (CRXOT), (b) in humans, (c) comparing diets with >10% total caloric difference in carbohydrate content, and (d) with TG as an outcome. Two reviewers screened all relevant articles. After identifying and screening 1000 articles, 6 trials (3 RCT and 3 CRXOT) were included. In the 259 subjects represented, short-term TG reduction was significantly greater within the LCDs, with a 0.27 mmol/L or 23.9 mg/dL reduction ($p=0.02$). From our analysis, we conclude LCD lower short-term TG, but long-term effects are uncertain.

Propofol Induces Toxicity of Human Oligodendrocytes Generated from Stem Cells**Authors:** Jablonski S, Inagaki Y, Olson J, Bai X, Bosnjak Z**Project Mentor:** Zeljko Bosnjak, PhD

Propofol is a commonly used anesthetic that has been shown to cause apoptosis in developing neurons. Recent studies in fetal and neonatal non-human primate brains suggest that propofol may also be toxic to developing oligodendrocytes (OLs). No studies show the effect of propofol on oligodendrocytes in the human brain. We hypothesized that dose, time, and frequency- dependent propofol administration induces toxicity in human OLs differentiated from hESCs. OLs were exposed to a range of propofol concentrations representing control, clinical, and supraclinical doses. The duration and frequency of exposure was also analyzed. Cell death was measured using propidium iodide staining. There was a significant level of cell death to OLs exposed once to 20 $\mu\text{g/ml}$ of propofol (clinical dose) for 24 hours. Supraclinical doses also showed significant cell death. This research demonstrated for the first time that dose, time, and frequency- dependent propofol exposure induces human developing OL death.

Properties of CD4 T-cell Chemotaxis in Response to the Chemokine CCL28**Authors:** Jones SE, Buelow B, Thomas MA, Volkmar BF, Grayson MH**Project Mentor:** Mitchell Grayson, MD

Post-viral atopic disease depends on CCL28 to drive T-cell migration. Chemokines generally demonstrate cross-species conservation, and require proper conformation to function. We hypothesized that native human CCL28 drives mouse T-cell chemotaxis, but the unfolded form does not. CD4 T-cells from mouse spleens were placed in the upper chamber of a Transwell system, with folded or unfolded recombinant hCCL28 (0, 1, 3, 10, 30 $\mu\text{g/ml}$) in the upper or lower chamber. Number of cells migrating was determined by flow cytometry after 3 hours. The effect of chemokinesis was subtracted to isolate cells responding to chemokine. Recombinant hCCL28 induced significant migration of mouse T-cells at 3 and 10 $\mu\text{g/ml}$ ($p\leq 0.05$). Unfolded hCCL28 did not cause directed T cell movement. ($n=3-4$) Human CCL28 is capable of driving mouse CD4 T-cell chemotaxis; this effect requires proper chemokine conformation. This suggests that a mouse migration assay could be used as a screening test for anti-CCL28 compounds as potential human therapeutics.

Endocannabinoid Signaling and Early Life Stress**Authors:** Jones-Rosa, F**Project Mentor:** Cecilia Hillard, PhD

This study focuses on how early life experiences can produce long-lasting effects on the brain and its proper maturation. Early life stress (ELS) has been shown to increase the risk of psychological disorders which include depression, anxiety, addictive disorders and schizophrenia (McCrorry et al.). One of the goal of this lab is to find links between ELS and molecular changes that cause changes in brain function. Finding and understanding the processes that influence susceptibility and resilience to ELS-induced psychopathologies will ultimately aid in the development of treatments that can prevent the negative consequences of ELS. Previous studies have shown that ELS can suppress mRNA expression for three proteins in the endocannabinoid system (ECS): Monoacylglycerol lipase (MGL), diacylglycerol lipase (DAGL) and CB1R (Hill et al.) This study hopes to further understand the link between ELS and CB1R, a cannabinoid receptor involved in several physiological processes including memory, mood, and pain sensation.

Ventilatory Dysfunction in Tph2 Knockout Rats During Development**Authors:** Kaplan K, Echert AE, Massat B, Puissant MM, Palygin O, Geurts AM, Hodges MR**Project Mentor:** Matthew R Hodges, PhD

Sudden Infant Death Syndrome (SIDS) is the leading cause of post-neonatal infant mortality in the US, many with abnormalities in the central serotonergic (5-HT) system. A rat model was created with a central 5-HT deficiency to determine the specific contributions of 5-HT on ventilation. Ventilation for wild type, heterozygous, and Tph2 knockout (Tph2^{-/-}) rat pups was measured in a whole body plethysmograph at thermoregulatory equilibrium. Ventilations were recorded in room air for 20 minutes, then challenged for 10 minutes with either hypoxia (12% O₂, balance N₂) or hypercapnia (21% O₂, 7% CO₂, balance N₂). We found increased mortality at P0-P3 and P10-P17 in the Tph2^{-/-} rats coinciding with decreased minute volume, and decreased growth rate starting at P7. Tph2^{-/-} and control rats had similar responses in hypercapnia and hypoxia. Our data support that Tph2/serotonin is critical for growth and development, and for maintaining a stable eupneic minute volume during development.

First Five Minutes of CPR during Cardiac Arrest Correlate with the Entire Episode?**Authors:** Kinzel AJ, Jasti J, Boettcher M, Aufderheide TP**Project Mentor:** Tom Aufderheide, MD

A single study showed the first 5 minutes of CPR correlates with the entire resuscitation episode in a paramedic/nurse anesthetist-staffed EMS system. Validity when applied to other EMS systems with different infrastructures is unknown. Retrospective review examining 388 consecutive adult out-of-hospital cardiac arrests treated by Milwaukee County EMS in 2013. Compression depth, rate, and no-flow ratio [NFR] were analyzed. NFR was adjusted for necessary pauses due to shocks/pulse check. Paired t-tests were used to compare groups. For the first five minutes versus entire resuscitation episode, average compression depth was 5.12±1.0 versus 5.17±0.9 cm, p = 0.045, rate was 112±10.8 versus 115±9.2 compressions/minute, p = 0.0001, and NFR_{adj} was 15.6±10.2 versus 12.8±7.6%, p < 0.0001. Despite statistically significant differences in all metrics, these results were probably not clinically significant. CPR data for the first five minutes appears to be an acceptable approximation for the entire episode in a two-tiered EMS system.

Testing Wnt Activation in Parkinson's Disease Dopamine Neurons**Authors:** Kleist J, Ebert A**Project Mentor:** Allison Ebert, PhD

Hypothesis: We hypothesize LiCl will increase the length of neurites in Parkinson's disease neurons in response to Wnt activation. Aims: To determine if activating Wnt signaling extends neurite length in neurons with LRRK2 mutation, the most common genetic cause of Parkinson's disease. Methods: Induced pluripotent stem cells (iPSCs), from Parkinson's disease and control patients, were differentiated into dopaminergic neurons over 5 weeks using a differentiation protocol. At the beginning of week three of differentiation the cells were treated with 0, 1, 2, or 5 mM LiCl. The differentiated cells were then fixed and stained with fluorescent antibodies that targeted dopamine neurons, general neurons, and nuclei. The cells were then photographed with a fluorescence microscope, and the neurite length and cell numbers were measured and analyzed with MetaMorph software. Results: We found that LiCl treatment does not significantly extend neurite length in Parkinson's disease iPSC-derived dopaminergic neurons.

Development of Polyps as a Late Effect After Hematopoietic Cell Transplantation**Authors:** Knight B,erson L, Margolis D, Talano J, Casper J, Thakar M**Project Mentor:** Monica Thakar, MD

Advancements in the field of hematopoietic cell transplantation (HCT) have led to increased rates of survivorship in several childhood malignancies. These new long-term survivors, however, face a myriad of complications associated with their treatments. A recently identified secondary effect of bone marrow transplantation is gastrointestinal polyp formation, which accounted for five percent of all pathology cases at a major medical institution. We identified five patients who underwent HCT and developed polyps following transplantation, and here describe the treatment and relevant complications associated with their therapy and polyp development.

Curcumin Regulates Notch1/HES1/Survivin in Cholangiocarcinoma**Authors:** Koprowski S, Sokolowski K, Kunnimalaiyaan S, Gamblin TC, Kunnimalaiyaan M**Project Mentor:** T Clark Gamblin, MD, MS and Muthusamy Kunnimalaiyaan, PhD

Cholangiocarcinoma (CCA) is highly malignant and characterized by poor outcomes. Therefore, continued development of novel therapy is needed. Notch expression is upregulated in CCA, but the utility of its inhibition is not defined. Based on recent findings, we hypothesized that curcumin, a polyphenolic phytochemical, suppresses CCA growth in vitro via Notch1 regulation. CCA cell lines CCLP-1 and SG-231 were treated with varying concentrations of curcumin (0-20 μ M). Treatment efficacy was assessed through MTT assay, colonogenic studies, western blotting, and caspase 3/7 glo assay. Curcumin-treated CCA cells exhibited reduced viability and western analysis showed marked reductions in Notch1 signaling components. Apoptosis was evidenced through cleavage of poly [ADP] ribose polymerase and elevated caspase activity. These findings demonstrate that curcumin effectively induces CCA growth suppression and apoptosis. A concomitant reduction of Notch1, HES-1, and survivin expression provides novel evidence for a chemotherapeutic approach.

Analysis of Reconstituted HDL (rHDL)**Authors:** Lalehzari M, Holme R, Chadwick A, Choi B, Sahoo D**Project Mentor:** Daisy Sahoo, PhD

HDL protects against plaque buildup in the arteries by participating in reverse cholesterol transport (RCT) and promoting macrophage migration. Under oxidative stress, various components of HDL can become oxidized, reducing HDL's atheroprotective effects, and rendering it "dysfunctional". Our study aims to test a rHDL particle that can be used to therapeutically lower cholesterol levels. We hypothesize that the rHDL will exhibit similar functions of nHDL at various steps of the RCT pathway, however it will not promote macrophage migration. We verified that rHDL served as a better acceptor of free cholesterol from cells as compared to nHDL. Despite lower levels of binding to SR-BI, rHDL was able to efficiently deliver CE to cells via SR-BI-mediated selective uptake. Boyden chamber assays showed that rHDL did not promote macrophage migration similarly to nHDL. These findings hold promise for the future as further studies are performed to test the therapeutic efficacy of rHDL.

Fine Mapping the Idd9.1 Type 1 Diabetes Locus Controlling Regulatory T-cell Activity**Authors:** Lin B**Project Mentor:** Yi-Guang Chen, PhD

Suppression of Type I diabetes in the B10 strain of mice is attributed in part to the Idd9.1 region of chromosome 4. This region contains genes that promote regulatory CD4⁺Foxp3⁺ T-cell (Treg) function. Congenic strains carrying smaller Idd9.1 intervals were generated to further refine the Idd9.1 region. CD4⁺ cells from these strains were injected into NOD.Rag1^{-/-}.NY8.3 mice to test their diabetogenic activity, and T1D rates were compared with that of NOD mice, which are known for high T1D rate. Existence of protective genetic attributes between 119Mb and 129Mb as well as between 132Mb and 140Mb were found.

Effects of pH, CaCl₂, and SOD on H₂O₂ Release from Complexes I and III**Authors:** Lubbe RJ, Lindsay DP, Aldakkak M, Camara AKS, Stowe DF**Project Mentor:** David Stowe, MD, PhD

Increased extra-matrix Ca²⁺, decreased extra-matrix pH, and substrate utilization change contribute to enhancing reactive oxygen species (ROS) during cardiac ischemia/reperfusion injury. We tested the combined effects of these factors on mitochondrial H₂O₂ release. Guinea pig heart mitochondria were suspended in buffer (pH 7.15, 6.9, or 6.5), ± exogenous superoxide dismutase (SOD), and ± 150 μM CaCl₂. Mitochondria were energized with pyruvate (P) and rotenone (R, complex I blocker) or succinate (S) and antimycin A (AA, complex III blocker). H₂O₂ release was compared for P+R and S+AA. For P+R, there were no significant differences in H₂O₂ release at all pHs with added SOD and no added CaCl₂. H₂O₂ release increased at pH 7.15 and 6.9 ± SOD after adding CaCl₂. In contrast, with S+AA there were no significant differences in H₂O₂ release at all pHs with exogenous SOD and ± added CaCl₂. Further studies are necessary to uncover the mechanism of Ca²⁺-induced ROS emission during cardiac ischemia.

Solving the Mechanism of HHV-6&7 U20 Using Biotinylating Fusion Proteins**Authors:** Maier W**Project Mentor:** Amy Hudson, PhD

The U20 protein of human Herpesvirus (HHV)-6b and HHV-7 are immunoevasins known to interfere with host cell inflammatory and apoptotic responses, but their mechanisms of action remain unknown. U20's mechanisms may involve associations with cellular proteins; identifying these proteins would help elucidate U20's mechanisms. However, these associations may be unstable and/or transient. To detect possible associations, I am utilizing the BioID method, which involved linking HHV-6b U20 and HHV-7 U20 to the E. coli promiscuous biotin ligase BirA. When supplied with biotin, BirA will biotinylate nearby proteins. When expressed as fusion proteins in mammalian cell culture, U20(6b)-BirA and U20(7)-BirA will biotinylate nearby host cell proteins when biotin is added to the cells. Biotinylated proteins can be isolated using streptavidin following cell lysis, and then identified with mass spectrometry. Toward this goal, my project consisted of designing, creating, and sequencing 4 fusion constructs to be expressed in mammalian cells.

Co2+ Increases Angiogenesis by Inducing Intracellular Ca2+ Release**Authors:** Man JH, Struve JA, Weihrauch D, Wu HE, Ninomiya JT**Project Mentor:** James Ninomiya, MD, MS

Metal-on-metal (MOM) hip implants can cause pain and early implant loosening through an unknown mechanism. Previous studies suggest that dissolved cobalt ions indirectly elicit an immune response. However, recent data show that cobalt ions can also directly activate the vascular endothelium by up-regulating HIF-1 α , a pro-angiogenic protein expressed during oxidative stress. We hypothesized that cobalt ions act through a mechanism similar to oxidative stress to induce angiogenesis. The methods used were cell culture, Western blot, ratiometric Ca²⁺ microfluorimetry, and tube formation assay. The results show that the addition of cobalt ions to the cells increased HIF-1 α , intracellular Ca²⁺, and angiogenesis. Dantrolene, a ryanodine receptor inhibitor, dampened the increase in intracellular Ca²⁺ and blocked angiogenesis. In conclusion, cobalt ions cause angiogenesis, a key feature of failed MOM hip implants, by increasing intracellular Ca²⁺ while Dantrolene blocks this and may prevent MOM hip implant failure.

Development of Metastatic Xenograft Model of Cutaneous Squamous Cell Carcinoma**Authors:** Olasz E, Michalski B, Schock A, Duncan N, Lopez A, Neuburg M, Flister M, Lazarova Z**Project Mentor:** Zelmira Lazarova, MD

Cutaneous squamous cell carcinoma (cSCC) is the second most common human cancer. In immunocompromised patients, cSCC shows a high risk of recurrence and metastasis resulting in 25% of all skin cancer deaths. The goal of this study was to develop a metastatic animal model of human cSCC. We injected human cSCC cells into two strains of rats: athymic nude rats and an immunodeficient knockout (KO) rat strain. At 45 days post-implantation all animals were sacrificed and tumor tissue, regional lymph nodes and lung tissue were collected. Histologic and qRT-PCR inspection of the tissues revealed the presence of metastatic cells in the regional lymph nodes and lungs in our KO rats. This novel animal model is the first model that allows the escape of cSCC cells from subcutaneous tissue and dissemination into local and distal tissues, thus enabling us to study metastatic processes and new treatment modalities for metastatic cSCC.

Effect of Novel MC2R Antagonists on the Corticosterone Response to ACTH in the Neonatal Rat.**Authors:** Nensey NK, Bodager J, Gehrand AL, Raff H**Project Mentor:** Hershel Raff, PhD

Stress-induced increases in corticosterone demonstrate a unique shift from ACTH-independence to ACTH-dependence between post-natal day two (PD2) and eight (PD8) in newborn rats. This shift could be due to binding of a bioactive, non-immunoreactive, plasma ligand to the adrenocortical MC2R. To evaluate this phenomenon, we investigated the corticosterone response to ACTH(1-39) injection in rat pups pretreated with MC2R antagonists (GPS1573 and GPS1574), which have not been tested in vivo. GPS1573, GPS1574 or vehicle were injected intraperitoneally 10 min before baseline sampling and ACTH injection. Blood samples were subsequently obtained for plasma corticosterone measurement. Pretreatment of PD2 pups with GPS1573 demonstrated augmentation, rather than inhibition, of the corticosterone response. Pretreatment with GPS1574 attenuated the corticosterone response to ACTH at 30 min in PD2 pups. The activity of these two compounds in vivo do not match their potency in vitro, with GPS1573 leading to augmentation in vivo, while GPS1574 resulted in inhibition.

Assessing Genetic Risk in a Familial Case of Ebstein's Anomaly**Authors:** North LM, Mahnke DK, Stamm KD, Liang HL, Geddes G, Willes RJ, Mitchell ME, Tweddell JS, Frommelt MA, Tomita-Mitchell A**Project Mentor:** Aoy Tomita-Mitchell, PhD

Ebstein's Anomaly (EA) is a congenital heart defect (CHD) of the tricuspid valve causing significant morbidity. It has been associated with myosin heavy chain 7 (MYH7) and transcription factor NKX2.5. Our study describes a family spanning three generations affected with EA. Whole exome sequencing (WES) was performed on five family members. Genetic variants were filtered for rarity, predicted deleterious/damaging effect, and known association with cardiac or muscle development. Variants were further evaluated to determine inheritance pattern. Chart review revealed seven of twelve relatives with EA, five with left ventricular noncompaction, three with atrial septal defect, and two non-viable pregnancies due to known CHD detected prenatally. WES revealed 30 possible genetic variants. Sanger sequencing for five of these genes has not revealed an inheritance pattern associated with cardiac phenotypes. Our study demonstrates the clinical application of next generation sequencing to better counsel and potentially treat families with inheritable disease.

Improving Health Care Communication in Abnormal Newborn Screening Test Disclosure**Authors:** Nunez LN, La Pean Kirschner A, Paradowski J, Beaudry H, O'Tool F, Dimmock D, Farrell MH**Project Mentor:** Michael Farrell, MD

Every newborn is screened at birth for a panel of metabolic and genetic diseases. Studies have demonstrated that parents of carriers have the potential to experience adverse psychosocial outcomes including misconceptions and anxiety. There are no current guidelines to disclose an abnormal result in a newborn screening test (NBS). We created a "Facilitated Interactive Communication" (FIC) suite of tools which provide previously identified desirable content messages, leaves spaces for parent questions, and encourages mutual engagement in communication during the NBS disclosure encounter. The FIC tools include a paper "prop" meant to be read through by provider and parent together. We evaluated non-verbal communication behavior during the use of this prop in a standardized parent-provider encounter in which cystic fibrosis (CF) carrier status was disclosed. Our aim was to examine non-verbal communication cues between parents and physicians while the prop was used to support parent education.

Disruption of TBC1D20 Causes Eye and Testicular Abnormalities in Mice**Authors:** Park AK**Project Mentor:** DJ Sidjanin, PhD

Mutations in TBC1D20 cause Warburg Micro syndrome 4 (WARBM4), which is a syndromic disorder characterized by eye, brain, and genital abnormalities. Blind sterile (bs) mice have a Tbc1d20-null mutation and exhibit eye and testicular phenotypes similar to those in human patients. The goal of this study was to establish the phenotypic consequences in mice caused by disruption of Tbc1d20 as there may be another possible mutation existing within the bs linkage disequilibrium contributing to the phenotypes. Zinc finger nuclease (ZFN) mediated genomic editing generated an in-frame deletion encoding a putative TBC1D20-ZFN protein. The evaluation of Tbc1d20ZFN/ZFN mice eyes identified severe cataracts and thickened pupillary sphincter muscle and male mice were infertile with disrupted acrosomal formation. The compound heterozygote, Tbc1d20ZFN/bs mice, failed to complement establishing bs and Tbc1d20ZFN/ZFN mice as allelic variants. The bs and Tbc1d20ZFN/ZFN mice are excellent models for study TBC1D20-mediated molecular and cellular functions.

Acute vs Chronic Systemic Reduction in Regulatory T-cells**Authors:** Reichert H, Santoro J, Rohlfing M, Buell E, Grayson M**Project Mentor:** Mitchell Grayson, MD

Rationale: Regulatory T cells (Treg) control immune responses. We hypothesized acute/severe versus chronic/mild reduction in Tregs would drive different immune responses. Methods: B6-Foxp3DTR mice were used to deplete Tregs with diphtheria toxin. PMA and ionomycin cultured spleen CD4 T cell skewing was determined by intracellular flow cytometry. Serum total IgE was measured by ELISA. Mucous cell metaplasia (MCM) was measured by Periodic acid-Schiff. Results: Acute/severe reduction increased IL5, 13, 17 and IFN γ producing T cells ($p < 0.05$, $n=5$), while chronic/mild reduction had a much more variable effect. IgE increased by day 4 with acute/severe, but not chronic/mild treatment ($p < 0.05$, $n \geq 4$). MCM developed by day 12 in acute/severe reduction, but only by day 21 with chronic/mild reduction. Conclusions: Acute/severe depletion of Tregs drives increases in Th1 and Th2 cells. Chronic/mild depletion leads to an initial Th1 increase, with a subsequent skewing towards Th2 cells after 21 days of depletion.

Methotrexate-Induced CD30(+) T-cell Lymphoproliferative Disorder of the Oral Cavity**Authors:** Saleh JZ, Lee LH, Schieke SM, Hosking PR, Hwang ST**Project Mentor:** Sam T Hwang, MD, PhD

Introduction Methotrexate's (MTX) oncogenic potential is of special significance for the clinician prescribing this drug. We report a case of a CD30+ T cell lymphoproliferative disorder (LPD) of the oral cavity in a patient taking MTX for Rheumatoid arthritis (RA). Case Report A 66-year old female with a 5-year history of MTX use for RA presented to our clinic with a 10-month history of a painful lesion of her oral cavity. Immunoperoxidase stains of a biopsy specimen were suggestive of a T cell lineage, with Epstein-Barr encoded RNA (EBER) positivity in lymphocytes suggesting an immunodeficiency-related LPD. After discontinuing MTX, patient reported complete resolution of her symptoms. Discussion A high index of suspicion for immunosuppression-related LPDs is needed when treating patients on immunosuppressants. Our case highlights the importance of clinical-pathologic correlation in challenging diagnoses. It is thus critical for clinicians to monitor patients closely for mucocutaneous LPDs when taking MTX.

Application of Clinical Genomics in Three Genetic Diseases**Authors:** Schuler BA**Project Mentor:** Howard Jacob, PhD

Next Generation Sequencing (NGS) approaches are increasingly applied to diagnose Mendelian genetic disorders refractory to other diagnostic tests. We applied NGS to three different clinical cases without diagnoses. We identified a gene called Mucin 1 as responsible for an autosomal dominant kidney disease in a large family and created a mutant-mucin 1 rat that recapitulated aspects of the human kidney disease. PYCR2 dysfunction was likely responsible for a neurodevelopmental disorder in two brothers through a mitochondrial dysfunction mechanism. We were unable to diagnose the final case, but this work provided insight into the application of NGS clinically. We were able to diagnose previously undiagnosed individuals, learn about disease risk, and generate hypotheses about disease pathophysiology and therapeutic options. We also highlighted weaknesses including: gaps in sequence coverage, cost of experimental validation, and return of research results. Continued application of NGS will require a large, multidisciplinary team, sustainable funding, and broader application.

Using MS-ASTRA for Rapid Antibiotic Resistance Identification in K. Pneumoniae**Authors:** Tse L, Coon C, Riebe K, Ledebner NA**Project Mentor:** Nathan Ledebner, PhD

While current methods require overnight incubations, we adapted the novel Mass Spectrometric-Antibiotic Susceptibility Test Rapid Assay (MS-ASTRA) to determine meropenem, ceftriaxone, and cefepime resistance from clinical isolates of *Klebsiella* spp. We evaluated 59 *K. pneumoniae* isolates, of which 41 were determined by Phoenix (BD, Sparks, MD, USA) to be susceptible to all three and 18 that were determined to be resistant by Phoenix and confirmed by PCR to be *Klebsiella pneumoniae* carbapenemase (KPC) or oxacillinase (OXA-48) producing. Amount of growth in the presence of antibiotics (determined by amount of protein) were compared to that in the absence of antibiotics, which gave the relative growth (RG). Various values of RG and antibiotic concentrations were used to determine the optimum values to minimize very major (resistant strains that tested susceptible) and major errors (susceptible strains that tested resistant) with statistically significant results as determined by 2 tail McNemar test.

Antiviral Role of Ccr5-Dependent Inflammatory Pathway in Pancreatic Islets**Authors:** Voss M, Shaheen ZR, Stafford J, Naatz A, Corbett JA**Project Mentor:** John A Corbett, PhD

Type 1 Diabetes development is multifactorial with virus infection being one possible trigger. Extracellular viral molecules activate a Ccr5-dependent pathway in macrophages, producing IL-1² prior to intracellular double-stranded RNA (dsRNA) recognition. IL-1² stimulates ²-cell nitric oxide production, which has known antiviral effects, but has long been thought to contribute to virus-mediated ²-cell death. Preliminary data suggested ²-cells might express Ccr5 protein with specific microRNA deficiencies, which could generate increased ²-cell damage during infection. We hypothesized Ccr5 is transcriptionally accessible in ²-cells, but our Chromatin Immunoprecipitation results were inconclusive. Additionally, we thought this Ccr5-dependent pathway might exist to slow viral replication, providing time to mount antiviral responses. We show EMCV infected ²-cells don't express type I interferons (T1IFNs), but intracellular dsRNA alone stimulates ²-cell production of T1IFNs. ²-cells pretreated with T1IFNs are protected against EMCV-induced death, suggesting a protective antiviral role for this Ccr5-dependent pathway in pancreatic islets.

B-Adrenergic Receptor Regulation of Rap1 Prenylation in Breast Cancer Metastasis**Authors:** Wilson, JM**Project Mentor:** Carol Williams, PhD

Rap1B is a small GTPase that regulates cell adhesion. In breast cancer, a decrease in Rap1B prenylation and subsequent loss of Rap1B at the plasma membrane decreases cell-cell adhesion and increases cell scattering, which promotes the metastatic phenotype. Recent studies show that protein kinase A (PKA)-mediated phosphorylation of Rap1B inhibits its binding to SmgGDS-607, a protein that assists in prenylation. Inhibition of Rap1B binding to SmgGDS-607 leads to an inhibition of Rap1B prenylation. PKA is activated by G protein-coupled receptors (GPCR) that stimulate G \pm s. In these studies, I investigated whether the general G \pm s activator, cholera toxin, and agonists of the β -adrenergic receptor (β AR), which is a G \pm s-coupled GPCR, promote Rap1B phosphorylation and inhibit its prenylation. We show here that cholera toxin and β AR activation phosphorylate Rap1B and inhibit its prenylation and membrane localization, reducing cell-cell adhesion and promoting cell migration.

Mapping Auditory Cortex Connectivity During Sound Localization Processing using fMRI**Authors:** Wirtz K, Humphries C**Project Mentor:** Colin Humphries, PhD

The encoding of auditory information by cortical neurons in dorsal and ventral auditory streams forms the basis for sound localization. Dorsal streams extending from primary auditory cortices process spatial sound localization, whereas the ventral streams process non-spatial information. Functional imaging studies have used task-based paradigms to localize these pathways and show distinct cortical areas for sound localization, speech recognition, and speech motor tasks. However, the functional interconnections and extent of these pathways is not known. This study utilizes fMRI connectivity measures to better delineate between the cortical pathways involved in sound localization. Sound stimuli tasks with varying frequency and location features were found to elicit greater differences between the anterior and posterior fields compared to rest, providing further evidence for division between dorsal and ventral auditory pathways. The interpretation of inter-pathway connections remains difficult due to the lack of defining features.

Implementation of Lean Methodology in a Free Clinic**Authors:** Cohen BA, Decker CM**Project Mentor:** M Chris Decker, MD**Community Partner:** Saturday Free Clinic for the Uninsured

Medical-students have demonstrated difficulties acting as phlebotomists at the Saturday Free Clinic, resulting in a negative impact on patient care and safety. Our improvement project aims to use Lean methodology in order to standardize the laboratory environment to increase performance of student phlebotomists. Our objectives are to decrease duration of visit by four minutes, decrease the number of patients needing >2 attempts to draw blood by 10%, and eliminate all laboratory-related errors. We used process-mapping, spaghetti-diagrams and identified wastes to establish current-state conditions. We implemented 5S organizational strategies and re-trained phlebotomists to the new process flow. The duration of encounters, number of needle-stick, and laboratory errors were tracked through time studies. The implementation of 5S organizational strategies was shown to decrease the duration of patient encounters and laboratory-related errors. By implementing a simple and standardized process, students had greater success, which translated into a positive impact on the patient experience.

Pediatric Skin Failure**Authors:** Cohen KE, Scanlon M, Behmanian A, Schindler CA**Project Mentor:** Matthew Scanlon, MD

Purpose: In the pediatric population, skin injury continues to be grouped indiscriminately as pressure ulcers. This study aims to identify and describe the phenomenon of skin failure in the critically ill pediatric population.

Methods: Retrospective chart review of 19 patients who developed serious skin injuries between January 2012 and December 2013. Results: All patients (N=19) had pressure ulcer prevention measures in place prior to the development of a serious skin injury. All injuries were full thickness on the day they were identified. 18 of 19 patients had multi-organ dysfunction syndrome (MODS) in the week leading up to the skin injury. All patients with MODS had at least 2 dysfunctional systems. Conclusion: Although the traditional paradigm is that pressure ulcers are preventable, a subset of pressure ulcers in critically ill children may actually represent acute skin failure as a consequence of MODS.

Body Morphology and Thoracolumbar Fractures in Motor Vehicle Collisions**Authors:** Rao R, Delbar K**Project Mentor:** Raj Rao, MD

Little work has been done characterizing relationships between body morphology and fractures to the thoracolumbar (T1-L5) spine. We worked to elucidate associations of height, weight, and BMI with spinal fracture patterns, mortality, and associated injuries in occupants of motor vehicle collisions. By utilizing a retrospective analysis of the prospectively gathered database known as the Crash Injury Research and Engineering Network, we were able to analyze spinal fracture patterns of 631 subjects. These subjects were divided into major and minor injuries groups using a modified Denise system. They were then placed into their BMI stratification of underweight, normal weight, overweight, and obese. Results demonstrate associations with more cephalad injuries in higher BMI occupants, as well as an elevated average BMI for occupants suffering fatality relative to survivors. This study supports the inclusion of higher BMI manikins in collision testing and of spinal criteria in crash safety standards.

An Evaluation of Pediatric Hospice Resources in the State of Wisconsin**Authors:** Delorme AA, Atwood M**Project Mentor:** Melissa Atwood, DO, MA

The families of pediatric patients with life limiting or chronic conditions often feel best supported in a hospital setting. As a result, most pediatric deaths occur in the hospital. However in the adult population, most choose to die in the comfort of their homes. This project involved performing a needs assessment to assess familiarity of pediatric hospice resources among providers. Information from Wisconsin and surrounding area hospice facilities and services was gathered. A literature review was conducted to evaluate barriers to pediatric hospice care. Additionally, a directory of hospice resources was created to use as an intranet resource for providers.

Approximately 65% of Wisconsin and surrounding area home hospices services and 47% of hospice facilities were identified as able to offer services to pediatric patients. This information allows providers to be more comfortable when recommending hospice services and more efficient in identifying a facility or home service for their patients.

Gait Speed and Medical and Functional Status of Geriatric Patients**Authors:** Godhardt L, Cook L, Burns E**Project Mentor:** Edith Burns, MD

Introduction: Gait speed serves as a convenient tool for measuring health in a diverse population. This study examined the relationship between gait speed and various health markers in a geriatric population to determine if gait speed could serve as an indicator of overall health. Methods: Any patient with an appointment at the Milwaukee VA Medical Geriatric Clinic from November 2013 - April 2015 was eligible for inclusion. Gait speeds were measured over a four-meter distance. A retrospective chart review was conducted to compare gait speed and other select measures of health. Results: A significant negative correlation was found between age and gait speed. No significant correlation was found between gait speed and other recorded health measures. Conclusion: No conclusion can be made about the correlation of gait speed and other measures of health based on this study. A larger sample size may be necessary to draw out these correlations.

Recognition of Knee Dislocations in the Emergency Department**Authors:** Harper MW, Bauwens J, Vetter C**Project Mentor:** Carole Vetter, MD

Knee dislocations are an orthopaedic emergency. The goal of this project was to identify factors that result in the under recognition of knee dislocations in the emergency department. Electronic medical records for patients treated for a knee dislocation between November 2009 and December 2014 were identified. An investigation was performed to evaluate the presentation and care of knee dislocations. Dislocations presenting to the ED were not recognized as a dislocation in 67% of cases upon initial presentation. A Lachman was attempted in 3% of patients, ABI on 10% patients and a lower extremity neurological exam in 47% of cases. Knees that spontaneously reduced were not diagnosed with a knee dislocation 91.5% of the time by the ED. There is a lack of documentation in many crucial exam components including ligamentous and neurovascular exam. An educational intervention and knee exam template will be designed to improve recognition of knee dislocations.

Patients with Resectable Pancreatic Cancer Receiving Neoadjuvant Therapy**Authors:** Christians KK, Heimler JW, Krepline AN, George B, Ritch PS, Erickson BA, Johnston F, Evans DB, Tsai S**Project Mentor:** Susan Tsai, MD, MHS

Background: A surgery-first approach for resectable PC is associated with a median survival of 22-26 months. Methods: We identified all resectable PC pts treated with neoadjuvant therapy from 2009-2013. We excluded patients treated on clinical trials. Results: NeoTx was initiated in 69 pts. Median CA 19-9 after NeoTx was 37 (median decline of 66%). 60 patients were resected. Median survival of all 69 patients was 32 months; 37 months for the 60 pts who completed all NeoTx and resection as compared to 11 months for the 9 pts who were not resected (log rank $p < 0.001$). Median survival among LN negative versus LN positive pts was 46 mo and 26 mo ($p = 0.14$), respectively. Conclusions: NeoTx for resectable PC is associated with a longer median overall survival as compared to a surgery-first approach. A small proportion of patients will not complete all NeoTx due to metastatic disease progression.

Handoffs: Analysis of Effective Communication Between High Risk Units**Authors:** O'Byrne W, Ghadiali H, Zundel T, Lauer K, Avdeev J, Ingram D, Jast J**Project Mentor:** Daniel Stein, MD

A handoff is the process of transferring responsibility for care between caregivers. This prospective observational study with cross-sectional survey of observed subjects included nurses, residents, and faculty who participated in OR to PACU or OR to SICU handoffs at Froedtert Hospital to identify vulnerabilities of the handoff process. 70 patient handoffs were observed over 21 weeks. Results revealed handoff start/end clearly announced 12.9% (9, p=0.004), non-related conversations occurred during handoff 30% (21, p=0.713), >10/21 critical data points communicated during handoff 31.4% (22), and receiving resident was present during handoff 11.4% (8, p=0.007) of the time. Handoffs teams are frequently incomplete, handoff start/end times rarely announced, and certain information is often omitted from handoffs. In order to provide optimal patient care, transitions of care need to be more complete.

Handoffs: Analysis of Effective Communication Between High Risk Units**Authors:** O'Byrne W, Ghadiali H, Zundel T, Lauer K, Avdeev J, Ingram D, Jast J**Project Mentor:** Kathryn Lauer, MD

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Improvement of Froedtert Birth Center HCAHPS scores**Authors:** Jilot, BR**Project Mentor:** Timothy Klatt, MD

A major determinant of quality of health care is patient satisfaction. The Froedtert Birth Center had been scoring below target on pain management and communication with physicians measures. I hypothesized that changing expected pain goals, using a "communication board," and instituting quiet hours would increase these measures. Specific aims were to increase both scores by 5% within 6 months. I followed a plan-do-study-act cycle. Educational materials were updated, and providers instructed to use "communication boards." This was audited by my attendance at classes and shadowing providers. Quiet hours were instituted from 1200-1600. We found no improvement in either score, likely due to diversion of resources to building the new birth center. The project was redirected to include length of stay as hospital bed space was decreasing and patient volume increasing. We instituted new recommendations regarding discharge and realized significant improvement with length of stay decreased to 1.05 days from 1.2.

The Addition of a PET-CT Increases Anal Cancer Staging Effectiveness**Authors:** Johnson C, Longo J, Erickson B, Ludwig K, Ridolfi T**Project Mentor:** Timothy Ridolfi, MD

Introduction: Chemoradiation is now the standard of care for anal canal carcinoma. Thus, accurate pretreatment staging is extremely important, as radiation fields and doses are dependent upon nodal involvement. We report the impact of PET-CT on pretreatment staging. Methods: A retrospective chart review was completed for patients diagnosed with squamous cell carcinoma of the anal canal between August 2005 and June 2014. Each patient was given a TNM stage based on clinical exam and CT and/or MRI. This stage was then compared to the original TNM stage, which incorporated PET-CT results. Results: Forty-three patients were included with a median age of 55. The addition of PET-CT altered the TNM stage in 40% of the patients. PET-CT identified previously undetected perirectal, pelvic, or inguinal lymph nodes in 28% of patients. Conclusion: Our data suggests that PET-CT is an important tool in the staging of anal cancer and should be utilized in pretreatment staging for all patients with T2-T4 squamous cell carcinoma of the anal canal.

Perspective Integration of the Therapeutic Intervention Scoring System with an EMR**Authors:** Katz AJ, Scanlon M**Project Mentor:** Matthew Scanlon, MD

Nurse staffing represents a significant cost to hospitals. The Therapeutic Intervention Scoring System was developed to measure nurse workload in the context of an intensive care units. Our goal was to evaluate TISS criteria in the context of a commercial EHR in order to test the feasibility of future integration. For each potential TISS-C element, the EHR test system was reviewed for the presence of the element or its components. Elements were categorized into one of four categories: "In EHR," "In EHR with modification," "Components of Element in EHR partially missing," and "Not in HER." The majority of elements (75%) necessary to calculate TISS-C using an EHR were available with minimal changes. For the remaining elements, additional fields would be required in the EHR for use. This suggests that automating TISS-C is moderately feasible. Next steps include incorporation of missing elements into EHR documentation, and piloting use in daily care.

Analysis of Antiemetic Prescribing Practices in an Adult Emergency Department**Authors:** Pace C, Polzin A, Larson M, Turk E, Eastwood D**Project Mentor:** Caroline Pace, MD

OBJECTIVE: This study investigates if choice of antiemetic significantly impacts patient based outcomes in the ED including efficacy of treatment and length of stay. METHODS: Retrospective chart analysis was completed on 961 patients receiving antiemetic therapy (ondansetron, prochlorperazine, metoclopramide, droperidol, and meclizine). Data collected included demographics, number of administrations, and ED Length of Stay. Efficacy is defined as need for repeat dosing. RESULTS/CONCLUSIONS: Of 961 first doses administered, 87% were ondansetron, and 11% were prochlorperazine. Repeat dosing was required for 22.1% of patients receiving ondansetron compared to 6.6% of patients receiving prochlorperazine ($p < 0.002$). Median ED length of stay compared to first antiemetic administered was 4.1 hours for ondansetron and 3.2 hours for prochlorperazine ($p < .0002$). This data shows that ondansetron is most commonly used for first and second administrations of antiemetics, and it may not be the most effective when comparing length of stay and need for repeat administration.

Using Simulation to Improve House Staff ACLS Skills**Authors:** Lindeke M, Carnahan J, Fletcher KE**Project Mentor:** Kathryn Fletcher, MD, MA

INTRODUCTION: Our objective was to determine the efficacy of a simulation-based ACLS curriculum to improve the preparation of house staff to lead code teams. **METHODS:** We performed a pre/post analysis to assess the ACLS knowledge, confidence, and leadership of residents who have completed a simulation-based ACLS curriculum. The intervention consisted of a didactic lecture and small group simulation exercises. **RESULTS:** In a pre/post comparison, house staff showed a non-significant increase of confidence leading codes after completing the simulation session (3.33/5 vs. 4.00/5; P=0.15, N=16). House staff who completed the training also showed a significantly higher confidence in their knowledge of ACLS algorithms (4.33/5 vs. 3.96/5; P=.034). ACLS and CRM performance, as graded by a chief resident, improved from the first to second simulations (7.5/18 vs. 11.4/18; P=.084). **CONCLUSIONS:** Our results suggest that a simulation based ACLS intervention may increase house staff confidence, knowledge, and leadership when leading a code team.

Functional Impairments After Neck Dissection and Adjuvant Treatment**Authors:** Liu J, Mencias TA, Eickmeyer S, Visotcky A, Stadler ME**Project Mentor:** Michael Stadler, MD

Objective: Shoulder dysfunction, lymphedema, and xerostomia are known treatment-related impairments of head and neck cancer. The purpose of this study is to determine the associations for these impairments in patients who underwent neck dissection. **Methods:** Demographics, cancer history, and symptoms of shoulder dysfunction, lymphedema, and xerostomia were recorded of patients who had ten or more lymph nodes removed via neck dissection from 2008-2012. **Results:** 155 patients were identified. 92 patients received post-operative radiation. 29 patients had shoulder dysfunction. Receiving < 60 Gray of adjuvant radiation was associated with less shoulder dysfunction (p=.0004). 39 patients had documented lymphedema. Receiving adjuvant radiation (p=.001) or having a drain in place for >4 days post-operatively (p=.002) were significant predictors of lymphedema. 72 subjects had documented xerostomia, with adjuvant radiation being the primary risk factor for xerostomia (p=< .001). **Conclusion:** Adjuvant radiation appears to be associated with shoulder dysfunction, lymphedema, and xerostomia after neck dissection.

Factors that Motivate Disclosure of Sexual Orientation to Healthcare Providers**Authors:** McCauley, N**Project Mentor:** Andrew Petroll, MD**Community Partner:** Milwaukee LGBT Community Center

Individuals who identify as lesbian, gay, bisexual, transsexual, and queer (LGBTQ) have worse health outcomes and exhibit higher rates of health-related risk behaviors compared to the general population. Recent studies have shown that while a significant portion of LGBTQ-identified individuals have not "come out" to their healthcare providers, those individuals that do experience better outcomes and a positive impact on the quality of their care. This study sought to identify factors in the clinical environment that may positively motivate LGBT-identified patients to share this information with providers. Four focus groups of six volunteers each, two made up of LGBTQ youth and two made up of LGBTQ "older adults" were held to solicit potential motivating factors. These data were analyzed qualitatively to identify factors cited by multiple individuals and to compare themes between the two age groups. [Data and qualitative analysis are pending the completion of the final focus group session].

The Pit Crew Model For CPR Delivery**Authors:** Merker S**Project Mentor:** Tom Aufderheide, MD

Cardiovascular Pulmonary Resuscitation (CPR) is one of the hallmarks of emergency medical services. Its' mechanical basis exemplifies medicine at its most elementary level and yet the fundamental idiosyncrasies of its delivery can be the difference between life and death. Every year in the United States approximately 400,000 adults and children experience a cardiac arrest. Less than 15% of those people survive. Unfortunately, an incredibly large gap exists between current knowledge of CPR and its optimal implementation. This leads to thousands of preventable deaths and poor neurologic outcomes. The Pit Crew Model, a new approach to resuscitation, is designed to improve efficiency and effectiveness. Initial studies of this model show a 19.7% increase in survival. 91.4% of the patients discharged were neurologically intact. The potential impact is enormous. This model provides the framework for efficiently delivering care in today's EMS systems and a framework to build off of for the future.

Infections and Challenges of Inpatient Psychiatric Setting: Review and Case**Authors:** Miroballi, YM**Project Mentor:** Michael McBride, MD

INTRODUCTION: The inpatient psychiatric setting poses unique challenges through prevalence of infectious diseases and means of controlling infections. Our objectives are to describe infections in the inpatient psychiatric setting through review of literature and case report, highlight challenges of infection control and the impact on patient care, and present possible solutions. METHODS: A PubMed search was executed. Studies were included if the investigation took place in the US, after 1990, and in the inpatient setting. RESULTS: Seven studies were selected. Infections occurred in the inpatient setting and included adenovirus-35 pneumonia; methicillin-resistant Staphylococcus aureus; tuberculosis; hepatitis A, B, and C viruses; and HIV. Several studies cited the group environment and poor hygiene as possible risk factors for infection transmission in this setting. CONCLUSION: The environment of the inpatient psychiatric setting is at a disadvantage for adequate infection control, as evidenced by prevalence of specific infections and outbreaks.

Implementation of Depression Screening as Routine Component of Type 2 Diabetes Care**Authors:** Mohnen MM, Hulbert K**Project Mentor:** Karen Hulbert, MD

Background: It is well-documented that diabetes can be a trigger and consequence of depression. With approximately 30% of type 2 diabetic patients also having depression, lack of routine depression screening is a gap in quality care. Aims: (1) develop and implement a sustainable procedure for depression screening in an outpatient setting, (2) increase the frequency of depression screening in the diabetic population, with a balancing measure of (3) avoiding extra time away from the physician-patient interaction. Results: We increased depression screening by 34% system-wide and up to 58% for an individual provider. Success was analyzed with a balancing measure of time required to room a patient; for the small number of patients followed, no difference was observed. Conclusions: We were able to develop a procedure for depression screening that did not disrupt the local workflow and increased the frequency of depression screening in the type 2 diabetic population, albeit briefly.

Validation and Implementation of Portable Audiometric Screening for Ototoxicity**Authors:** Nelson SP, Stadler M, Friedland D, Runge C, Kelly E**Project Mentor:** Michael Stadler, MD

Background: Cancer patients receiving chemotherapy may experience the side effect of ototoxicity, making ototoxicity monitoring necessary. In efforts to provide more convenient and cost-effective point of care ototoxicity testing, portable automated audiometry applications have been identified to test patients within the cancer center. Methods: Three commercially available tablet-based automated audiometric applications were trialed in an outpatient audiology clinic. Hearing thresholds obtained from the applications were compared to those of conventional audiometry testing. Results: Descriptive analysis showed that of three automated audiometric applications trialed, the EarTrumpet application provided the most accurate hearing thresholds, compared to conventional audiometry testing. Patients enrolled using EarTrumpet recorded 93% of threshold values within 10dB of the conventional test thresholds. The remaining two applications trialed resulted in 73% and 77% within 10dB of conventional test threshold values. Conclusions: Portable tablet-based audiometric testing applications, specifically the EarTrumpet application, may represent promising tools for point of care ototoxicity screening.

Pasteurella Multocida Infection in a Primary Shoulder Arthroplasty**Authors:** Ding D, Orengo A, Alaia M, Zuckerman J**Project Mentor:** Matthew Scanlon, MD

Pasteurella multocida is a gram-negative coccobacillus transmitted to humans via a cat scratch or bite, with the potential of homogenous spread throughout the body. This homogenous spread poses a threat to joint arthroplasties, and a cat scratch anywhere on the skin will spread via the bloodstream to the hardware incorporated in shoulder, knee, or hip arthroplasties. Although uncommon, *Pasteurella multocida* infections of the knee and hip joint arthroplasties have been reported. However, we report an unusual case of *Pasteurella multocida* infecting a shoulder arthroplasty following a cat scratch. Previously, no other reports of infected shoulder arthroplasties have been reported. With surgical irrigation, debridement, head exchange of the hardware, and six weeks of intravenous antibiotics, the shoulder arthroplasty was successfully treated without any further intervention required. In conclusion, cat scratches on the skin pose a threat to joint arthroplasties, and *Pasteurella multocida* should be considered with any acutely infected joint arthroplasty.

Patient Education About Psoriasis, Cardiovascular Disease, and Obesity: A QI Project**Authors:** Patel M, Chiu Y, Galbraith S**Project Mentor:** Yvonne Chiu, MD

A link between psoriasis, obesity, and cardiovascular disease has been noted in the pediatric population but patient education regarding this association has been limited. We developed a standardized method to educate patients about this topic and analyzed the rate of patient education in the Pediatric Dermatology clinic at CHW pre- and post-implementation of the patient education handout. The aim was to double our rate of patient education and to provide education to all psoriasis patients regardless of BMI category. Pre- and post-implementation education rates were found to be 3.45% and 9.66% of all patients with psoriasis, respectively. Using a two-tailed z-test, this difference was found to be statistically significant with a p-value of 0.05. Though our aim was met, this topic should be the focus of future quality improvement efforts as the rate of patient education could be further improved.

Incidence and Risk Factors for Acute Kidney Injury Following the Fontan Procedure**Authors:** Patteron TJ, Hehir D, Mitchell M, Buelow M, Simpson P, Zhang L, Scott JP**Project Mentor:** John Scott, MD

Background: Children with single ventricle heart disease require multiple staged surgeries with cardiopulmonary bypass, concluding with the Fontan procedure, in order to create a functional series circulation. Acute kidney injury (AKI) is common following bypass and is associated with increased perioperative morbidity and mortality. Results: AKI occurred in 54% of patients; 49% of patients developed AKI within 2 days of surgery. Subjects with AKI had lower RPP (49 mmHg vs 57 mmHg) and higher VIS (14 vs 8). Increased total blood transfusion, albumin administration, and chest tube output were also associated with AKI development. Conclusions: AKI occurs frequently following the Fontan procedure. Factors associated with AKI development include renal perfusion pressure, high vasoactive medication requirements, and large volume colloid shifts. Identification of risk factors may allow for targeted hemodynamic interventions with the goal of reducing the incidence and duration for post Fontan AKI development.

Cardioprotection of Modified MGF-E on DMD iPSC-Derived Cardiomyocytes**Authors:** Quinn A, Goldspink P, Strande J**Project Mentor:** Jennifer Strande, MD, PhD

Mechano growth factor-E (MGF-E) is a splice variant of IGF-1 that is up-regulated in skeletal muscle after injury. It is thought to protect against damage by decreasing reactive oxygen species and contribute to repair by increasing myoblast proliferation. However, MGF-E is absent in skeletal muscle in patients with Duchenne muscular dystrophy (DMD). If MGF-E is protective against muscle injury, then we propose that its absence may cause increased injury in DMD. This study used cardiomyocytes derived from induced pluripotent stem cells containing dystrophin mutations (DMD-iCMs) to measure stress-induced cell injury and death after pretreatment with modified MGF-E peptides. Findings suggest that pretreatment with phosphomimetic (PM), phospho-mutant (PU), or scrambled (Scr) MGF-E peptides do not protect DMD-iCMs from stress-induced injury. Furthermore, pretreatment with PM peptide does not show protection against stress-induced cell death. However, pretreatment with high dose PU showed protection against stress-induced DMD-iCM cell death.

Eliminating Abbreviations to Reduce Communication Errors**Authors:** Harker-Murray, P**Project Mentor:** Paul Harker-Murray, MD, PhD

Communication failures are the leading root cause of medication errors; with abbreviations acting as a key component of these sentinel events. Within the last decade, there have been guidelines and recommendations that have been published to standardize and limit the use of abbreviations. However, there are limited studies describing direct efforts to eliminate abbreviations from clinical documents. Use of tools in the electronic medical record may provide an efficient method to eliminate abbreviations from clinical documents, and thus provide disambiguation and clear communication between interprofessional disciplines. This paper will describe the effectiveness of using the Epic dictionary tool to eliminate abbreviations from clinical documents.

FieldNote Method of Clinical Feedback**Authors:** Thorne P**Project Mentor:** Leslie Ruffalo, PhD

Introduction: The purpose of this study was to examine the usefulness of FieldNotes in MCW's Clinical Apprenticeship (CA) course. Methods: We identified seven medical student competencies (Sentinel Habits). CA preceptors completed FieldNotes for medical students designed to provide formative and summative feedback and students completed a survey at the end of the CA course. Results: 58 FieldNotes were collected from 6 students. Survey results revealed 5 of 6 felt feedback from FieldNotes improved clinical performance, and all 6 reported that it took less than 3 minutes to complete. 5 of 6 felt the FieldNote could complement or replace the competency checklists used for student evaluation. Conclusions: Students feel FieldNotes improve the quality of clinical feedback, and could act as an improvement or supplement to current feedback methods in the CA course while focusing students on competency based learning. FieldNotes allow for tracking of student competencies, improvement, and patient exposures.

Comparison of Cochlear Implant Models' Acoustic Hearing Preservation**Authors:** Tomlin B, Friedland D, Runge C**Project Mentor:** Christina Runge, PhD

Background Traditionally, cochlear implantation has resulted in loss of residual hearing however recent surgical studies have shown this to be false. Cochlear implant patients with preserved residual hearing have better outcomes and newer "hearing preservation" electrodes have thus been developed. Objective To determine whether hearing preservation electrodes improve the ability to preserve residual acoustic hearing. Methods Retrospective chart review of 143 patients with measurable hearing before implantation. Preoperative audiograms were compared to postoperative measures using the Hearing Group hearing preservation formula. Results There was no significant difference in hearing preservation between individual electrodes. There was a trend toward significance when comparing all hearing preservation electrodes to all non-preservation electrodes ($p=0.0659$) Conclusions This study was unable to find a specific electrode that performed significantly better than others. Newer electrodes may preserve hearing better and further studies with a larger population are being pursued.

Identifying Barriers to Acute Ischemic Stroke Therapy: A Pre-Hospital Perspective**Authors:** Urness J, Castonguay A, Lazzaro M, Zaidat O**Project Mentor:** Marc Lazzaro, MD

Ischemic strokes are the leading cause of preventable long term morbidity in the United States and treatment with IV-tPA is time sensitive, thus it is imperative for prompt identification of symptoms and arrival to the ED within the treatment window. We performed a comprehensive retrospective chart review characterizing the differences between patients who presented within the treatment window and those who did not. We found patients who presented during the treatment window were more likely to have developed symptoms with a witness present and somewhere other than their home, were more likely to be transported by EMS, have a higher functional baseline, and arrive with higher NIHSS and more severe typical symptoms, less common posterior circulation symptoms, compared to the group who presented after the treatment window. We concluded the at-risk patient population needs further education on broader stroke symptoms and to call EMS immediately for the best outcomes.

Paperwork Process in the Internal Medicine Clinic**Authors:** Vrolijk H, Mitchell J**Project Mentor:** Julie Mitchell, MD

Paperwork is an issue that affects everyone in healthcare from the patient to the physician. The IM clinic was having problems getting durable medical equipment (DME) forms done on time due to the volume, number of duplicates, and the fact that they are a low priority. Our goal was to determine how the current DME process worked, establish and implement a new process, and determine if the new process made a difference on our efficiency. The original process had 29 steps completed by a nurse and we were hitting our goal TAT about 50% of the time. In contrast, our ideal process has 15 steps completed by a medical assistant and we were hitting our goal TAT about 97% of the time. Our overall goal was to improve patient centered care, but we also learned that process maps can make a big difference when trying to improve a process.

Reducing Fluid Ordering Errors in Pediatric DKA Patients**Authors:** Ferguson C, Wong M, Chang F**Project Mentor:** Catherine Ferguson, MD

Background: DKA patients, requiring pharmacy-mixed intravenous fluids, are at risk of receiving incorrect fluids when electrolyte shortages force physicians to order through a custom infusion builder instead of premade order sets. Purpose: In 2014, 2 cases of cerebral edema occurred in pediatric DKA patients receiving fluids incorrectly absent of NaCl. Our purpose is to identify interventions able to reduce such errors. Methods: In a pediatric ED, the custom builder was replaced with a new electronic order panel and a system capable of reacting to electrolyte shortages. Number of pharmacy interventions were measured 3 months before and after the intervention. Results: The post-intervention period showed a significant decrease in pharmacy interventions compared to the pre-intervention period, with a significant increase in order set usage. Conclusions: Reducing opportunity for error through use of revised order panels can reduce the incidence of fluid ordering errors in DKA patients.

Nutritional Quality of Inventory at a Milwaukee Food Pantry**Authors:** Agyemang P, De Vita J, Fitzpatrick N, Noth V, Nelson DA**Project Mentor:** David Nelson, PhD, MS**Community Partner:** Friedens Community Ministries - Riverwest Food Pantry

Background: Food pantries help alleviate the burden of food insecurity for millions of Americans, yet quantity remains the priority. Studies are needed to assess the quality of foods offered by pantries. This study evaluated the quality of inventory at Riverwest Food Pantry as it compares to recommendations outlined in the Dietary Guidelines for Americans 2010. Method: Cross sectional study of the February 2015 inventory, with a focus on pantry items present in large quantity. An algorithm was used to measure the nutrient density of one serving of each item and assign a rank of Green/ Yellow/ Red. Foods were scored based their percent daily value for the nutrients of interest. Results: 372 unique labeled items and over 100,000 servings of food was included in the analysis. 11% of total inventory volume ranked Green and 38% Red. Conclusion: Nutritional quality of pantry foods is important to provide healthier options for pantry-users.

Addressing the Challenges of Coping with Stress/Anxiety in Youth**Authors:** Saxena A, Ansari I**Project Mentor:** Sabina Diehr, MD**Community Partner:** Walker's Point Youth & Family Center

Poverty, mental illness, and addiction can leave individuals living an essentially marginal existence. Limited access to mental health resources only perpetuates the issue. Subsequently, problems originating in adolescence often go unnoticed. This project intends to provide youth with coping mechanisms to appropriately handle stress. Specifically, it aims to introduce self-help tools for when external resources are unavailable. This is done through monthly sessions at Walker's Point, a youth halfway home. The presentations discuss the effects of stress/anxiety and include interactive activities (meditation/mindfulness, breathing exercises, etc.). Results show that 96% of participants learned new methods to reduce stress/anxiety. Only 3.5% indicated no interest in further sessions. Preliminary results indicate that the sessions are effective and beneficial. Though focused on adolescents, these methods could certainly be applicable to adults. The sessions provide youth with tools to attain a better state of mind through which they can achieve an improved quality of life.

A Systematic Review of Pediatric Abusive Head Trauma Interventions**Authors:** Anthony, AI, Kelly, T**Project Mentor:** Teresa Kelly, MD

Abusive head trauma (AHT) is a form of infant abuse with the potential for devastating outcomes. In Wisconsin, the yearly average of recorded deaths due to AHT from 2010-2014 was 5 deaths per year. We performed a systematic review of 11 published AHT intervention studies for consideration of which method(s) might be strongest for adaptation. The different interventions utilized similar media including pamphlets, brochures, videos presentations, and posters. Vehicles of information delivery were research assistants, nurses, or physicians. Eight studies measured effectiveness by determining general knowledge and risk factors of AHT post-intervention, while three studies measured effectiveness by via post-intervention AHT geographical incidence. Results from two of the studies question the effectiveness of video presentations, and only three of the studies actively sought fathers/father-like figures for inclusion in their interventions – a noteworthy observation given that research has pointed to fathers and father-like figures as the most common perpetrators.

MCW / FAM Allies Asthma Management Program at La Causa Charter School**Authors:** Cancel M, Glover B, Grady M, Hendrix G Grayson M, Lee E, Nitschke J**Project Mentor:** Mitchell Grayson, MD**Community Partner:** Fight Asthma Milwaukee (FAM)Allies, and La Causa Charter School

Introduction: Approximately 14% of students at La Causa Charter School (LCCS) have asthma, significantly more than the national average. Purpose: The goals of our project are to increase asthma awareness at LCCS and develop lasting community partnerships. Methods: Over the last few years, LCCS has participated with Fight Asthma Milwaukee (FAM) Allies, in the implementation of Asthma Smarts. Asthma Smarts consists of interactive classes where students with asthma learn about asthma and how to better control their symptoms. We created a survey to evaluate the program's effectiveness and distributed it to all LCCS children in 3rd-5th grade. Results: A significant difference was found in the number of school absences between students with asthma enrolled in Asthma Smarts and students without asthma not enrolled in Asthma Smarts, but no significant difference was found in the number of emergency room visits, hospitalizations or primary care visits for asthma. Discussion: The evaluation is ongoing and will direct the future of the project.

The Attitudes of Pregnant Women Before and After Safe Exercise Education**Authors:** Dhillon N, Michael S, Damitz B**Project Mentor:** Beth Damitz, MD

Maternal obesity has been shown to increase the risk of fetal morbidity and mortality. Exercise during pregnancy decreases this risk and presents an ideal opportunity to encourage lifestyle changes. Although many studies have looked into the association between exercise and its benefits, few studies have been published on the views of pregnant women about exercise. The goals of this study were to understand the opinions of pregnant women, educate them about safe exercise, and inform them about the advantages to maternal and fetal health. Despite our results showing that women are knowledgeable about exercise during pregnancy, they found our safe exercise education motivational and worthwhile. Based on our results, safe exercise education is accepted and encouraged, suggesting a need for more education to improve maternal and fetal health.

IUD Discontinuation and Satisfaction**Authors:** Olson A, Garrison C, Djabiras C**Project Mentor:** Adam Olson, MD and Camille Garrison, MD

This is a retrospective cohort study establishing discontinuation rates and satisfaction with intrauterine devices (IUDs) at Columbia St. Mary's Family Health Center. Using billing data, we identified 274 women who had an IUD inserted from 2007-2014. Women were solicited by phone to complete a mailed survey. Data from chart reviews and surveys was compared to the Contraceptive CHOICE Project data. In our study, 12- and 24-month continuation rates of the 5-year levonorgestrel IUD were 65% and 47%, respectively, compared to 88% and 79% in the CHOICE Project; 12- and 24-month continuation rates of the copper IUD were 45% and 24%, respectively, compared to 85% and 77% ($P < 0.01$). Satisfaction scores were also poor. The etiology of the discrepancies remains unclear. As IUD use rises in the United States and patient satisfaction and cost-effectiveness are increasingly emphasized in healthcare, it is imperative to identify and address healthcare delivery inefficiencies, especially in areas with implications as profound as unintended pregnancy.

MCW's Family Medicine Accelerated MD Program- Family Medicine (AMP-FM)**Authors:** Evans MM, Mays B**Project Mentor:** Leslie Ruffalo, PhD, MS

The Medical College of Wisconsin's future Accelerated MD Program-Family Medicine (AMP-FM) goal is to increase the primary care workforce in urban Milwaukee areas by increasing the overall number of well-trained medical students choosing a career in Family Medicine. The purpose of this project was to create an admissions policy brief for selecting students for the program who are most suitable for matriculating into the intense 3 year curriculum. To inform the development of the admission policy brief, we conducted 5 interviews with Family Medicine Residency Faculty to elicit their feedback on accelerated MD training. Thirteen themes emerged from the qualitative analysis. Several of the themes centered on student qualities and characteristics. While other themes highlighted the importance of preparation and experiences. Obtaining feedback from Family Medicine Residency Faculty is a valuable step to create admissions policies that will assist program planners in selecting appropriate students for accelerated MD training programs

A Snapshot of Female Street Sex Workers in Milwaukee**Authors:** Farahzad M, Cassidy L, Seal D, Young S, Hietpas D, Johnson S, Beyer K, Williams G**Project Mentor:** Staci Young, PhD**Community Partner:** Benedict Center Sisters Program

Background: Female street sex workers (FSSWs) experience high levels of stigma, poverty, violence, substance use, and depression. Little research has focused on the lives of FSSWs and the many factors that influence them.

Methods: Fifty-one FSSWs completed ACASI questionnaires that probed demographics, pregnancy history, depressive symptoms, substance use, and sexual behavior. Results: Trauma was highly prevalent, with 72.5% of participants reporting 5 or more ACEs. Depressive symptoms were common, with a median CES-D score of 27 (4-53). Recent substance use was reported by 60.1% of women, with only 26.1% reporting hard drug use. Nearly half of participants (n=21) reported trading sex in the previous 30 days; they reported more recent hard drug use and higher depressive symptoms. Conclusion: FSSWs have substantially higher ACE scores, depressive symptoms, and rates of substance use than the general population. Recent sex work is associated with both recent hard drug use and higher CES-D scores.

MCW / FAM Allies Asthma Management Program at La Causa Charter School**Authors:** Cancel M, Glover B, Grady M, Hendrix G Grayson M, Lee E, Nitschke J**Project Mentor:** Mitchell Grayson, MD**Community Partner:** Fight Asthma Milwaukee (FAM)Allies, and La Causa Charter School

Introduction: Approximately 14% of students at La Causa Charter School (LCCS) have asthma, significantly more than the national average. Purpose: The goals of our project are to increase asthma awareness at LCCS and develop lasting community partnerships. Methods: Over the last few years, LCCS has participated with Fight Asthma Milwaukee (FAM) Allies, in the implementation of Asthma Smarts. Asthma Smarts consists of interactive classes where students with asthma learn about asthma and how to better control their symptoms. We created a survey to evaluate the program's effectiveness and distributed it to all LCCS children in 3rd-5th grade. Results: A significant difference was found in the number of school absences between students with asthma enrolled in Asthma Smarts and students without asthma not enrolled in Asthma Smarts, but no significant difference was found in the number of emergency room visits, hospitalizations or primary care visits for asthma. Discussion: The evaluation is ongoing and will direct the future of the project.

MCW / FAM Allies Asthma Management Program at La Causa Charter School**Authors:** Cancel M, Glover B, Grady M, Hendrix G Grayson M, Lee E, Nitschke J**Project Mentor:** Mitchell Grayson, MD**Community Partner:** Fight Asthma Milwaukee (FAM)Allies, and La Causa Charter School

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The Unique Healthcare Needs of Children in Foster Care**Authors:** Gwidt KL, Zetley L**Project Mentor:** Lisa Zetley, MD**Community Partner:** Children's Community Health Plan - Care4Kids

According to the American Academy of Pediatrics, children in foster care are classified as children who have special health-care needs because of their high prevalence of medical, emotional, behavioral, developmental, educational, and dental health-care problems. Pediatricians must recognize the complex needs of foster children, provide guidance for foster parents and encourage follow up and increased well-check periodicity. In order to improve the healthcare of foster children in Wisconsin, a program piloted in southeastern Wisconsin called Care4Kids aims to provide coordinated care from a team of professionals trained in the needs of foster youth. In this project, resources about foster care were reviewed, practicing pediatricians were interviewed, and meetings were set up with Care4Kids representatives in order to create an educational presentation for physicians in the Care4Kids network. The presentation provides valuable information for physicians to help them address the unique healthcare needs of children in foster care.

Mindful Eating as a Strategy in Worksite Wellness with Clinical Implications**Authors:** Heller LR, Ruffalo L, Nelson DA**Project Mentor:** Leslie Ruffalo, PhD**Community Partner:** Silver Spring Community Center

Data shows that lifestyle modifications can prevent Type 2 Diabetes and halt the progression of the disease in patients with diabetes. The use of mindfulness-based interventions have been shown to improve eating behaviors among participants with obesity-related issues. Further studies have shown the efficacy of mindfulness-based interventions in the worksite. I developed of a mindfulness-based curriculum that integrates stress reduction techniques with mindful eating strategies in a worksite wellness setting. The purpose of the curriculum is to serve as a cost-effective educational tool for the prevention and management of Type 2 Diabetes in a worksite (or other community setting). I created the tool after beta testing and vetted it through a two part expert review. The two panels consisted of clinicians, dieticians, public health advocates, community partners and students. The feedback provided by the review panels has led to a finalized curriculum, ready for implementation in the Milwaukee community.

MCW / FAM Allies Asthma Management Program at La Causa Charter School**Authors:** Cancel M, Glover B, Grady M, Hendrix G Grayson M, Lee E, Nitschke J**Project Mentor:** Mitchell Grayson, MD**Community Partner:** Fight Asthma Milwaukee (FAM)Allies, and La Causa Charter School

Introduction: Approximately 14% of students at La Causa Charter School (LCCS) have asthma, significantly more than the national average. Purpose: The goals of our project are to increase asthma awareness at LCCS and develop lasting community partnerships. Methods: Over the last few years, LCCS has participated with Fight Asthma Milwaukee (FAM) Allies, in the implementation of Asthma Smarts. Asthma Smarts consists of interactive classes where students with asthma learn about asthma and how to better control their symptoms. We created a survey to evaluate the program's effectiveness and distributed it to all LCCS children in 3rd-5th grade. Results: A significant difference was found in the number of school absences between students with asthma enrolled in Asthma Smarts and students without asthma not enrolled in Asthma Smarts, but no significant difference was found in the number of emergency room visits, hospitalizations or primary care visits for asthma. Discussion: The evaluation is ongoing and will direct the future of the project.

Mothers and Maternal Support Program**Authors:** Hiltunen A, Stief H, Farez R**Project Mentor:** Rahmouna Farez, MD

Infant mortality rates in Milwaukee illuminate a horrific disparity in birth outcomes between women of different races. Infant mortality is "the number of infant deaths per 1,000 live births", and in 2013, this number for Non-Hispanic White women was 5.7, compared to 17.9 for Non-Hispanic Black women.¹ The Mothers and Maternal Support (MoMS) Program at MCW matches medical students with pregnant women who need extra support during their pregnancy. By advocating for the mothers throughout their pregnancy, we hope to improve birth outcomes while offering a unique enrichment opportunity for MCW students. For consenting women, data is retrieved from their medical records and surveys are given to moms and students. By advocating for underserved women, MoMS hopes to create an environment for mother and infant health outcomes to improve.

Investigating the Effect of a Fitness and Nutrition Program on Students and Parents**Authors:** Peyton M, Jensen MC, Ovide J, Helm R**Project Mentor:** Robin Helm, MD**Community Partner:** Clara Barton Elementary School

The cause of childhood obesity is multifactorial and health intervention programs have been applied to improve children's diet and physical activity. We implemented a five-week curriculum with two third grade classes focusing on food groups, reading nutrition labels, healthy alternatives, and promoting physical activity. Curriculum effectiveness was assessed with a 20-question pre- and post-test and self-knowledge appraisal was assessed with a 15-question survey given to students (n=32) and parents. Student knowledge of fitness and nutrition improved 18.1% (p< 0.05) and self-reported lifestyle choice improved 9.0% (p=0.09). Parental involvement was poor, which indirectly reflects the curriculum's limited diffusion into the home environment. Familial and cultural conventions strongly influence the student's behavior, which warrants developing more suitable methods of communicating these lessons with parents at the community level. Although there are limitations, incorporating health intervention programs at school is an effective method to promote healthy dietary habits.

Adapting a SET Ministry Education Curriculum for Low-Health-Literacy**Authors:** Jensen T, Burns E**Project Mentor:** Edith Burns, MD**Community Partner:** SET Ministry, Inc.

Multiple studies have shown that patients who are more actively engaged in medical interviews have significantly better health outcomes than less actively engaged patients. The ability to communicate effectively with patients is another important factor that can significantly improve engagement and outcomes. In addition to knowledge, medical students also need to acquire competence in communication, and awareness of community resources to better assist their patients. In this project, MCW students conduct monthly sessions to teach health topics, debunk medical myths and educate low-income elders on resources within their community. Assessment of baseline health literacy using SAHL-E showed that 50% of the 32 participants were in the low health literacy category (LHL), and 37.5% of these scored in the very low range. Ongoing efforts are being made to improve verbal communication skills, presentation effectiveness, and awareness of resources within the Milwaukee community to address LHL.

Use of a Data Bank to Measure HRQoL and Service Utilization in Homeless Men**Authors:** Keegan J, Vareka K, Bernstein R**Project Mentor:** Rebecca Bernstein, MD, MS**Community Partner:** Guest House of Milwaukee

Background: The high comorbidity of chronic health issues in homeless individuals is associated with large reductions quality of life and significant utilization of medical and other public services. With this in mind, a data bank was created to simultaneously assess the health status of Milwaukee's homeless population while also delivering useful data to a local service provider for funding and quality improvement purposes. Methods: Using a secure online database, counselors at a local shelter administered surveys to homeless individuals on a monthly basis. In addition to basic demographic information, detailed data regarding health service utilization and quality of life was collected. Results: As of May 2017, over 100 unique clients have been entered into the data collection system. Counselors have reported great improvements in the ease of collecting and reporting data, as well as a substantial increase in the breadth of information that can easily be obtained and organized.

Value Stream Mapping to Improve Diabetes Care**Authors:** Kuehn E, Li L, Le A**Project Mentor:** John Meurer, MD

As the number of Americans coping with diabetes continues to grow, there is increasing pressure on clinicians to provide timely and effective services to these patients requiring intensified care. This project was intended to introduce value stream mapping to medical and graduate students to enhance patient experiences and reduce waste in care processes. Seven medical and graduate students performed clinic observations of 28 adult patient visits for diabetes services in primary care clinics. Students, clinicians, and researchers collaborated to identify waste in care processes. After 2-3 months of VSM improvements, results of the CAHPS survey demonstrated improved patient satisfaction exceeding 97%, better provider communication above 90%, timely access to care improved 68% to 80%, and staff courtesy and respect increased to 81%. This pilot QI project resulted in new, more efficient processes that enhanced patient experiences, which proved to be a useful learning experience for medical and graduate student collaboration.

Mindfulness for Medical Students: Increasing Empathy and Reducing Bias**Authors:** Luthar JR, Weisman S, Simpson P, Zhang L, Johnson S**Project Mentor:** Sheri Johnson, PhD

Background: Disparities in health care can be perpetuated through implicit biases held by physicians. Empathy is known to decrease over the course of medical training. Mindfulness practices can prevent this decline, and decreases implicit biases in the general population. Methods: Medical students who enrolled in a six-week mindfulness elective were recruited. Pre and post demographics and validated measures of interpersonal reactivity, perceived stress, and self-reported confidence managing implicit bias were collected via electronic survey. Results: Seventeen of 34 enrolled students participated in the research. Participants reported increased meditation practice ($p=.031$). A significant increase in empathic concern was found ($p=0.014$). Women showed a decrease in perceived stress ($p=0.046$). No change in confidence managing implicit bias was found. Conclusion: A six-week mindfulness-based curriculum can increase empathic concern in pre-clinical medical students. These findings provide preliminary support for utilizing a mindfulness-based curriculum to reduce practitioner bias to address health care disparities.

A Novel Triage Level System for Children Entering Foster Care**Authors:** Manda D, Nugent M, Simpson P, Hodges K**Project Mentor:** Kelly Hodges, MD

Children in foster care have high levels of unmet health care needs, and benefit from health care coordination (HCC) services. Data is lacking about how to best triage these children so limited HCC resources can be allocated effectively. We aimed to: 1) utilize a Triage Tool (TT) to stratify children based on unmet health care needs at the initial foster care health exam (IFCHE), and 2) determine if the TT predicts health care utilization and cost. We found that most children (61.6%) had the lowest level (Level 3), 29.5% had a moderate level (Level 2), and 9.9% had the highest level (Level 1) of unmet needs. We found no statistically significant difference among average total cost per Triage Level. Therefore, although the TT is clinically useful for allocating HCC resources, the Triage Level assigned does not correlate with health care utilization or costs during the first 60 days post-IFCHE.

AMP-FM Admissions Policy Brief**Authors:** Evans M, Mays B**Project Mentor:** Leslie Ruffalo, PhD, MS

Over the past years, there has been a trend of rapid decline of primary care specialty choice among graduates of US medical schools which is insufficient to ensure access to health care for the general population. The Medical College of Wisconsin's future Accelerated MD Program-Family Medicine goal is to increase the primary care workforce in urban Milwaukee by increasing the number of well-trained medical students choosing a career in Family Medicine. The purpose of this project was to create an admissions policy brief for selecting students for the program who are suitable for matriculating into a 3 year curriculum. We conducted 5 interviews with Family Medicine Residency Faculty to elicit their feedback on accelerated MD training. Thirteen themes emerged encompassing student qualities and preparation. Obtaining feedback from faculty is a valuable step to create admissions policies that will assist planners in selecting students for accelerated MD training programs.

Personal Health Records for Residents of a Homeless Shelter**Authors:** Thomas C, McPhee JW**Project Mentor:** Sabina Diehr, MD**Community Partner:** Guest House of Milwaukee

Medical care for homeless individuals often is disjointed and irregular, resulting in a shorter life. This project attempted to use a personal health record (PHR) to facilitate continuity of care based on previously identified needs. Information regarding specific needs and barriers was gathered through partner meetings with employees and residents of a local homeless shelter, the Guesthouse of Milwaukee. A literature review identified approaches to creating PHRs and several free on-line PHRs. Only two homeless individuals agreed to create an online PHR account. This project faced many barriers, such as lack of trust in online security, improved access to regular primary care providers lessening the need for a PHR, and high turnover of residents of the homeless shelter. Similar future projects would benefit from more frequent meetings and needs re-assessments to gauge interests and barriers. Interestingly, employees of the homeless shelter showed more interest in the project than the residents.

Community Engagement at Cream City Gardens**Authors:** Mehring MM**Project Mentor:** Sabina Diehr, MD**Community Partner:** Guest House of Milwaukee - Cream City Gardens

The Cream City Gardens (CCG) are community gardens started in 2009 by a group of MCW students from the HOME project (Homeless Outreach in Medical Education) in conjunction with our community partner, Guest House of Milwaukee (men's homeless shelter). The gardens provide fresh produce to the Guest House and Friedens food pantry. A needs assessment at a CCG committee meeting in 2014 revealed the greatest need to be man power to maintain and harvest the gardens. My project became researching and providing the CCG committee with community engagement strategies that worked for them and could be used on an annual basis. During three growing seasons working with CCG, we improved total number of volunteers, total volunteer hours and the total pounds of produce each year. Cream City Gardens cannot function without volunteers and the garden committee will continue using the identified community engagement strategies to recruit volunteers in the future.

The Attitudes of Pregnant Women Before and After Safe Exercise Education**Authors:** Dhillon N, Michael S, Damitz, B**Project Mentor:** Beth Damitz, MD

Maternal obesity has been shown to increase the risk of fetal morbidity and mortality. Exercise during pregnancy decreases this risk and presents an ideal opportunity to encourage lifestyle changes. Although many studies have looked into the association between exercise and its benefits, few studies have been published on the views of pregnant women about exercise. The goals of this study were to understand the opinions of pregnant women, educate them about safe exercise, and inform them about the advantages to maternal and fetal health. Despite our results showing that women are knowledgeable about exercise during pregnancy, they found our safe exercise education motivational and worthwhile. Based on our results, safe exercise education is accepted and encouraged, suggesting a need for more education to improve maternal and fetal health.

Emergency Physician Perceptions and Utilization of the Wisconsin PDMP**Authors:** Hernandez-Meier J, Muscott R, Zosel A**Project Mentor:** Amy Zosel, MD

Prescription opioid abuse is a major public health problem. Our objective was to characterize emergency physician (EP) utilization of a prescription drug monitoring program (PDMP), as well as to identify barriers to use and how it changes practice. A survey was disseminated to EPs. Descriptive statistics were performed using STATA. About a quarter of the physicians were not registered for the PDMP and main reasons for this included not knowing how and not having a DEA number. The majority of EPs found the PDMP useful for confirming suspicion of drug abuse and indicated that the PDMP information often changed their management of patients. Physicians who used the PDMP were more likely to refer patients to substance abuse treatment and to write fewer prescriptions, especially for opioids and benzodiazepines. Common barriers to use were the complicated log-in process and the amount of time needed to use the program. Our data indicated that educating EPs on use and printouts of the PDMP information at triage may increase PDMP utilization.

Parent Perceptions of Infant Distress in Abused and Non-abused Infants**Authors:** Olson NL, Nugent M, Simpson P, Sheets LK**Project Mentor:** Lynn Sheets, MD

Nearly 1600 children died from abuse and neglect in the United States in 2011 alone, with younger children being at a much higher risk for fatal abusive injuries. Often, perpetrators of infant abuse report infant crying as a trigger to the abuse. We aimed to characterize parental help-seeking behaviors for perceived infant distress. This was a retrospective study that compared parent reports of prior infant distress in abused infants versus non-abused infants. All subjects were <12 months and had been evaluated by CHW's Child Protection Team for suspected physical abuse. The results revealed that abused infants have significantly higher reports of prior infant distress than infants who are not abused. For those with infant distress, 23% were not abused and 77% were abused, $p \leq 0.001$. Regression analysis showed that with a history of infant distress, abuse was more likely, with an odds ratio of 2.7. It is important for medical providers to recognize these patterns of infant distress, as these infants may be at higher risk for future abuse.

Improving Compliance in Shoulder Physical Therapy Patients**Authors:** Ortiz DJ, Whittle J**Project Mentor:** Jeffrey Whittle, MD, MPH

Patient compliance is a significant problem for many medical specialties, including physical therapy, because noncompliance is associated with poorer health outcomes. We partnered with the Zablocki VA Medical Center PT Department to help them reduce missed appointments by their patients. After their first visit, we interviewed 43 shoulder PT patients with a set of questions aimed to assess how well patient understood the purpose, plan and goals of physical therapy. The attendance, our measure of patient compliance, was also recorded. No question asked had strong positive predictive value for attendance. Whether they knew what exercises they were expected to perform at home, feeling able to perform those exercises, understanding the therapist's goals, and if they are performing home exercises were correlated with specificity over 90%. No question asked was able to predict or identify which patient may fail to attend their follow up appointment.

EMR Smoking History Does Not Accurately Identify Lung Cancer Screening Candidates**Authors:** Wu Y-C, Perkovich MT, Woldemichael KM, Gilbert IA**Project Mentor:** Ileen Gilbert, MD

The NLST demonstrated a 20% decrease in lung cancer mortality for high-risk individuals undergoing annual screening with LDCT. USPSTF recommends screening for smokers aged 55-80 who have used tobacco within 15 years with > 30 pack-years smoking histories. Froedtert & MCW's EMR determines smoking history using cigarettes smoked/day and number of years smoked. We developed a detailed calculator queries variances in cigarettes used throughout a patient's lifetime. The difference between EMR and calculator was greater for men, those with less education, and Medicaid patients vs. women, those with > a high school degree, and Medicare and privately insured individuals ($p < .05$ for each). Overall, EMR vs. Calculator missed 35% of patients potentially eligible for screening, and 20% of EMR-identified candidates did not meet pack-year requirements as determined via the calculator method ($p < .001$). Enhanced training and detailed tools are needed for staff obtaining tobacco use histories.

Investigating the Effect of a Fitness and Nutrition Program on Students and Parents**Authors:** Peyton M, Jensen MC, Ovide J, Helm R**Project Mentor:** Robin Helm, MD**Community Partner:** Clara Barton Elementary School

The cause of childhood obesity is multifactorial and health intervention programs have been applied to improve children's diet and physical activity. We implemented a five-week curriculum with two third grade classes focusing on food groups, reading nutrition labels, healthy alternatives, and promoting physical activity. Curriculum effectiveness was assessed with a 20-question pre- and post-test and self-knowledge appraisal was assessed with a 15-question survey given to students (n=32) and parents. Student knowledge of fitness and nutrition improved 18.1% ($p < 0.05$) and self-reported lifestyle choice improved 9.0% ($p = 0.09$). Parental involvement was poor, which indirectly reflects the curriculum's limited diffusion into the home environment. Familial and cultural conventions strongly influence the student's behavior, which warrants developing more suitable methods of communicating these lessons with parents at the community level. Although there are limitations, incorporating health intervention programs at school is an effective method to promote healthy dietary habits.

Violence Prevention Education for Homeless Youth**Authors:** Renov V**Project Mentor:** Sabina Diehr, MD**Community Partner:** Walker's Point Youth & Family Center

While violence affects people of all demographics, it is especially prevalent in urban communities and lower socioeconomic classes. IPV is correlated with risky behaviors and negative health outcomes for adolescents thus it is necessary to break this cycle of violence for the health of our community. I created an interactive course on violence prevention and healthy relationships for teens at Walker's Point Youth & Family Center to educate young people on ways to identify and prevent interpersonal violence defining healthy relationships, types of relationships teens engage in, and how power and control dynamics play a role. Via pre- and post-test analysis I showed that adolescents gained an understanding of core concepts regarding power and control, as well as the ability to identify common types of interpersonal violence and ways in which dating violence can manifest. Participants also reported that they found the session engaging and helpful for maintaining healthy relationships.

Establishment and Revision of the HOME Project Website**Authors:** Samdani, A**Project Mentor:** Sabina Diehr, MD

The HOME Project was established in 2009 by MCW students and a faculty advisor to pursue service learning projects that benefited the local homeless population. The purpose of this scholarly project was to create a website for the HOME project that could function as a repository of the group's educational resources and modules. The website was meant to benefit HOME volunteers and the community by providing a single access point for these materials and to prevent the loss of files by keeping backups in an online storage service. Member feedback was used to determine what features and information volunteers felt would be most beneficial to have access to on the website. To track whether the website was utilized as a resource, page views were tracked and recorded over a set period of time. The results showed a positive reaction from members but significant gaps in site access, suggesting that further work must be done to integrate the site into HOME activities.

A Social Network Approach for Rural Intimate Partner Violence Survivors

Authors: Saripalli A, Hoormann K, Bub-Standal C, Connolly K, Harteau C, Giebel M, Kistner A, Wolff M, Tittman S, Beyer K

Project Mentor: Kirsten Beyer, PhD, MPH, MS

Community Partner: Wisconsin Rural Women's Initiative, and Harbor House

Intimate partner violence (IPV) encompasses physical, sexual or psychological harm inflicted by a current or former partner. Rural women suffering from IPV face unique challenges associated with rural environments. In collaboration with the Wisconsin's Rural Women's Initiative (WRWI) and Harbor House Domestic Abuse Programs, this pilot intervention study combined wellness programming and social support generation to improve rural IPV survivors' levels of health and social support. Program elements of the pilot intervention included Gathering Circles, information presentation, socializing and a focused creative activity. The intervention was evaluated using both baseline and post-intervention surveys and semi-structured interviews. Participants experienced increased levels of perceived power and competence, increased ability to express their anger and confront others, and more autonomy after the intervention. Overall, findings show that a social network approach to improve health among rural women affected by IPV may be effective, and future work in this area is needed.

Addressing the Challenges of Coping with Stress/Anxiety in Youth

Authors: Saxena A, Ansari I

Project Mentor: Sabina Diehr, MD

Community Partner: Walker's Point Youth & Family Center

Poverty, mental illness, and addiction can leave individuals living an essentially marginal existence. Limited access to mental health resources only perpetuates the issue. Subsequently, problems originating in adolescence often go unnoticed. This project intends to provide youth with coping mechanisms to appropriately handle stress. Specifically, it aims to introduce self-help tools for when external resources are unavailable. This is done through monthly sessions at Walker's Point, a youth halfway home. The presentations discuss the effects of stress/anxiety and include interactive activities (meditation/mindfulness, breathing exercises, etc.). Results show that 96% of participants learned new methods to reduce stress/anxiety. Only 3.5% indicated no interest in further sessions. Preliminary results indicate that the sessions are effective and beneficial. Though focused on adolescents, these methods could certainly be applicable to adults. The sessions provide youth with tools to attain a better state of mind through which they can achieve an improved quality of life.

Transportation Barriers to an Urban Food Pantry

Authors: Sterba DS, Draeger-Pederson C, Ramsey M, Meurer A, Cuadra FM, Nelson DA

Project Mentor: David Nelson, PhD, MS

Community Partner: Friedens Community Ministries

Introduction: Studies show low-income individuals in urban communities struggle to acquire nutritious food and reliable transportation. The USDA concluded automobile access may be the most significant determinant of whether or not low-income residents can obtain healthy food. Not much is known about barriers to accessing food from pantries. **Objective:** This study investigates transportation barriers to an urban food pantry. **Methods:** Adult guests of a Milwaukee pantry completed written surveys from September 2015 to April 2016. Transportation modes, demographics, travel time/distance, and ease/difficulty of performing various tasks were investigated using Likert-type scales and semantic differentials. **Results:** 233 guests were surveyed. 28.9% of respondents drive, 16.8% find rides, 27.6% walk, and 24.1% take the bus. 72.8% do not own automobiles; 67.7% reported difficulty affording transportation. **Conclusions:** Most guests do not own cars and rely on walking, bus, and sharing rides. The majority of guests report difficulty travelling to and from the pantry.

Personal Health Records for Residents of a Homeless Shelter**Authors:** Thomas C, McPhee J, Diehr S, Krahenbuhl C**Project Mentor:** Sabina Diehr, MD**Community Partner:** Guest House of Milwaukee

Medical care for homeless individuals often is disjointed and irregular, resulting in a shorter life. This project attempted to use a personal health record (PHR) to facilitate continuity of care based on previously identified needs. Information regarding specific needs and barriers was gathered through partner meetings with employees and residents of a local homeless shelter, the Guesthouse of Milwaukee. A literature review identified approaches to creating PHRs and several free on-line PHRs. Only two homeless individuals agreed to create an online PHR account. This project faced many barriers, such as lack of trust in online security, improved access to regular primary care providers lessening the need for a PHR, and high turnover of residents of the homeless shelter. Similar future projects would benefit from more frequent meetings and needs re-assessments to gauge interests and barriers. Interestingly, employees of the homeless shelter showed more interest in the project than the residents.

Resource Use and Extracardiac Comorbidities in Congenital Heart Disease**Authors:** Tuomela KE, Gordon JB, Cassidy LD, Johanningmeir S, Kessel M, Hehir DA, Frommelt MA, Ghanayem NS**Project Mentor:** Nancy Ghanayem, MD

Background: Congenital heart disease (CHD) is associated with extracardiac comorbid conditions (ECC) and high resource utilization. Objective: Describe ECC and resource utilization in CHD following hospital discharge from the index cardiac procedure. Methods: IRB-approved chart review of infants <1 yr who had surgery (2006-2011). Demographics, diagnoses, procedures, STAT score, ECC and resource utilization were identified for 2 years after index procedure. Data compared using Mann Whitney Rank Sum Test ($p < 0.05$ significant). Results: 876 patients with median STAT score of 3 had surgery at mean age 60 days. Over half had 1+ ECC. Most common ECC were GI, respiratory and genetic. ECC group had more hospital days (9 vs 0, $p < 0.001$), clinic visits (14 vs 7, $p < 0.001$), and charges after discharge from index surgery (\$78K vs 7K, $p < 0.001$). Conclusions: ECC are common in children with CHD and are associated with greater resource use. A cardiac complex care program could decrease costs while improving quality of life for patients.

An Evaluation of Elecciones Saludables at Sixteenth Street Community Health Center**Authors:** Vassar, C Zusevics, K Maida, T**Project Mentor:** Sheri Johnson, PhD**Community Partner:** Sixteenth Street Community Health Center

Obesity in the US is an extremely concerning issue but is even more concerning in the Hispanic community as health disparities exist. Obesity rates are higher for every age group when compared to whites but especially in younger children. Reducing obesity rates in the Hispanic community is a challenging task that requires immediate intervention. "Elecciones Saludables/Healthy Choices" is a unique 16-week obesity prevention and intervention program targeted at the Latino community and tailored to the family as a unit. This program specifically incorporates both Spanish and English as well as other cultural components to better facilitate education involvement and serve participants. An evaluation of BP, BMI, and Weight in participants showed statistically significant decreases in weight ($p = .001$) and BMI ($p = .048$). These results are promising as they show that culturally and linguistically tailored obesity prevention programs can play an important role in reducing obesity in the Hispanic community in the future.

Impact of the Affordable Care Act on Uninsured Patients**Authors:** Veling A, Johnston B, Bernstein R**Project Mentor:** Rebecca Bernstein, MD, MS**Community Partner:** Bread of Healing Clinic

The experiences of the uninsured who have gained coverage under the ACA has not been well-explored. We designed a 5-minute telephone survey aimed to characterize previously uninsured patients' experiences since obtaining insurance. Participants were previous patients of Bread of Healing (BOH), a free primary care clinic in inner city Milwaukee. 90 respondents completed the survey. 74% of respondents had been seen by a new PCP/clinic since last visiting BOH. 62% reported benefits with their new source of medical care; 88% of those respondents said they would not have been able to receive those benefits prior to coverage. The most reported benefit of coverage was preventive care, and the most reported barrier was cost. The majority of respondents had been seen by a new PCP/clinic, reported benefits that they would not have been able to receive prior to coverage, and are confident in their ability to access care. This is evidence that the ACA and expansion of BadgerCare eligibility in Wisconsin are helping people gain access to healthcare.

Promoting Engagement & Mentorship in Health Careers at James Madison Academic Campus**Authors:** Verhasselt A, McMillan D, Stewart R, Letellier S, Meurer L**Project Mentor:** Linda Meurer, MD, MPH**Community Partner:** Milwaukee Area Health Education Center, and James Madison Academic Campus

Minorities make up >30% of the population, but only 9% of physicians. This program exposed minority high school students to health fields and provided mentorship/training to support pursuit of health careers. Medical College of Wisconsin (MCW) students partnered with Milwaukee AHEC Youth Health Service Corps (YHSC) and James Madison Academic Campus (JMAC), a Milwaukee public school in a lower income, predominantly African-American community. MCW students led monthly meetings/learning activities in JMAC classroom and in MCW's simulation center and anatomy lab. To meet YHSC's need to increase member engagement, they emphasized hands-on enrichment activities. Engagement was measured by session evaluations and observation guides. JMAC students strongly agreed that they were more engaged and participatory when enrichment activities were involved. Hands-on sessions further fostered relationships between MCW and JMAC students, enhancing engagement. Overall, this program moved toward creating a 'pipeline' of motivated and prepared students more likely to pursue healthcare education.

Trauma Quality of Life: Evaluation for Use with Older Adults**Authors:** Wilcox KA, Wanner JP, Brasel K, deRoon-Cassini T**Project Mentor:** Terri deRoon-Cassini, PhD

Background: For older trauma patients, current focus on hospital survival cannot predict post-discharge outcomes. The Trauma-Specific Quality of Life (TQOL) was developed to measure the bio-psychosocial outcomes of trauma patients. Objective: To assess the psychometric properties of the TQOL when administered to older trauma patients. Methods: Data from administration of the TQOL, PTSD Checklist – Civilian (PCL-C), and Short Form 36 (SF-36) to trauma patients three months post-injury were analyzed. Respondents were grouped into older or younger adults based on age at injury \geq or $<$ 65. Results: All results describe the older adults group. Four TQOL subscales have good reliability. The Peritraumatic Experience and Functional Limitations subscales have poor acceptability. TQOL totals correlated with the SF-36 Physical Component Scale but not with the Mental Component Scale (MCS). Conclusions: The TQOL performs in a manner distinct from the SF-36 and PCL-C, and may have predictive value.

EMR Smoking History Does Not Accurately Identify Lung Cancer Screening Candidates**Authors:** Wu, Y C**Project Mentor:** Ileen Gilbert, MD

Abstract Summary RATIONALE: The National Lung Screening Trial demonstrated a 20% decrease in lung cancer mortality for high-risk individuals undergoing annual screening with low dose chest CT scans (LDCT). The United States Preventative Services Task Force recommends lung cancer screening for smokers aged 55-80 years who have used tobacco within 15 years and have a > 30 pack-year total cigarette smoking history. The Centers for Medicare & Medicaid Services (CMS) cautions, "...Providers must ascertain smoking history accurately, taking into consideration intermittent periods of not smoking or reduced amounts, to ensure optimal screening outcomes." In conclusion, EMR smoking histories may preclude optimal identification of lung cancer screening candidates. Inaccuracies appear greater in populations at higher risk for adverse outcomes- men and those with less of education and Medicare insurance. Enhanced training and detailed tools are needed for staff obtaining tobacco use histories.

EMR Smoking History Does Not Accurately Identify Lung Cancer Screening Candidates**Authors:** Wu Y-C, Perkovich MT, Woldemichael KM, Gilbert IA**Project Mentor:** Ileen Gilbert, MD

The NLST demonstrated a 20% decrease in lung cancer mortality for high-risk individuals undergoing annual screening with LDCT. USPSTF recommends screening for smokers aged 55-80 who have used tobacco within 15 years with > 30 pack-years smoking histories. Froedtert & MCW's EMR determines smoking history using cigarettes smoked/day and number of years smoked. We developed a detailed calculator queries variances in cigarettes used throughout a patient's lifetime. The difference between EMR and calculator was greater for men, those with less education, and Medicaid patients vs. women, those with > a high school degree, and Medicare and privately insured individuals ($p < .05$ for each). Overall, EMR vs. Calculator missed 35% of patients potentially eligible for screening, and 20% of EMR-identified candidates did not meet pack-year requirements as determined via the calculator method ($p < .001$). Enhanced training and detailed tools are needed for staff obtaining tobacco use histories.

Community Engagement in PATHWAYS

Pathway students can serve the community while learning how to connect with community resources that promote health.

Service Learning

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

Key features of Service Learning:

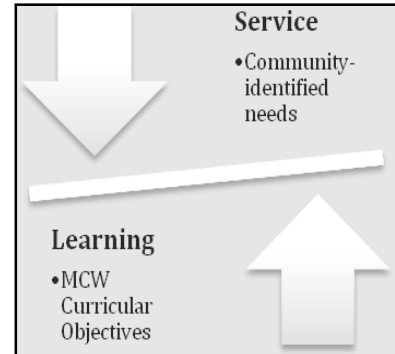
- Curricular - results for academic credit
- Places equal value on community-defined service objectives, and curricular learning objectives
- Is planned and implemented in a 3-way partnership - student, faculty member and site-based community staff

Site Visits

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

Core Sessions

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



Community Collaborations

All Saints Family Care Center	Guest House Milwaukee	Muslim Community Health Center at the Islamic Center of Milwaukee
Ascension	Harbor House	NeuLife Community Development
Benedict Center	High School for the Health Sciences (HS ²)	Nicolet High School
Bread of Healing Clinic	James Madison Academic Campus	Progressive Community Health Center
Bronze Optical	Journey House	Project Ujima
Children’s Community Health Plan – Care4Kids	La Causa Charter School	Saturday Free Clinic for the Uninsured
CHW Child Protection Center	Lake Valley Camp	Sebastian Family Psychology Practice
Clinica Latina	Lutheran Social Services – Refugee Program	SET Ministry, Inc,
Columbia St. Mary’s Family Care Center	Milwaukee Academy of Science	Sixteenth Street Community Health Center
Despensa de la Paz	Milwaukee Area Health Education Center	Walker's Point Youth & Family Center
Downtown Health Center	Milwaukee Ballet	Walnut Way Conservation Corp.
DryHootch	Milwaukee Health Department	United Community Center
Fight Asthma Milwaukee (FAM) Allies	Milwaukee Lesbian Gay Bisexual & Transgender Community Center	University of Milwaukee, School of Freshwater Sciences
Fondy Food Center	Milwaukee Women’s Center	Wisconsin Rural Women's Initiative
Friedens Community Ministries		

Milwaukee Regional Medical Center (MRMC) affiliates:

Blood Center of Wisconsin
 Children’s Hospital of Wisconsin
 Froedtert Memorial Lutheran Hospital
 Zablocki VA Medical Center

Thank you for being a Project Mentor to the Class of 2017!

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