MCW
Milwaukee

SCHOLARLY PATHWAYS
SCHOLARSHIP FORUM
CLASS OF 2019

Director of Scholarly Activities: Pat Lye, MD

Scholarly Pathway Directors

Bioethics	Cynthiane Morgenweck, MD, MA Arthur Derse, MD, JD
Clinical & Translational Research	David Brousseau, MD, MS Joseph Carroll, PhD
Clinician Educator	Joseph Budovec, MD
Global Health	Bruce Campbell, MD Stephen Hargarten, MD, MPH
Health Systems Management & Policy	John Meurer, MD, MBA William Hueston, MD
Molecular & Cellular Research	Jennifer Strande, MD, PhD
Quality Improvement & Patient Safety	Catherine Ferguson, MD
Urban & Community Health	Linda Meurer, MD, MPH Rebecca Bernstein, MD, MS

Scholarly Pathway Coordinators

Meaghan Hayes, MEd
Jen Kraus
Sarah Leineweber

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 132 Class of 2019 students were accepted to participate.

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

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

MCW

CLASS OF 2019

SCHOLARLY PATHWAYS SCHOLARSHIP FORUM

THURSDAY, JUNE 28, 2018

1:00 PM WELCOME — KERRIGAN AUDITORIUM

Zachary Telfer, Junior Medical Student, Emcee

Opening Remarks
John R. Raymond, Sr., MD
President and CEO, MCW

1:15 PM PODIUM PRESENTATIONS — KERRIGAN AUDITORIUM

Drumil Bhatt — **Health Systems Management & Policy Pathway**
A survey of the uninsured in Milwaukee

Zach Carlson — **Urban & Community Health Pathway**
Impact of a fruit and vegetable prescription program on utilization of farmers markets

Samuel Engelsgjerd — **Molecular & Cellular Research Pathway**
Xanthohumol increases DR5 expression / enhances growth suppression with TRAIL in neuroblastoma cell lines

Brian Gooley — **Clinician Educator Pathway**
Perceptions of first-year clinical students on their Internal Medicine Hospitalist rotation

Joseph Hodapp — **Bioethics Pathway**
Measuring satisfaction with pediatric pain management

Adaku Idika — **Global Health Pathway**
Barriers to diabetic retinopathy treatment in Nigeria: U.S. methods that may improve access and treatment

Adam Miller — **Clinical & Translational Research Pathway**
Transcatheter Aortic Valve Replacement (TAVR) in older adults improves symptoms but not physical function

Haverly Snyder — **Quality Improvement & Patient Safety Pathway**
The hospital experience through the patients' eyes

Students Moderators: Junior Medical Students
Samantha Durbin, Alexander Fox, Rachel Henning and Michael Reis

2:45 PM POSTER PRESENTATIONS — ALUMNI CENTER

Refreshments served

4:15 PM ADJOURN

BIOETHICS

Cynthiane Morgenweck, MD, MA
Arthur Derse, MD, JD

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

CLINICAL & TRANSLATIONAL RESEARCH

David Brousseau, MD, MS
Joseph Carroll, PhD

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

CLINICIAN EDUCATOR

Joseph Budovec, MD

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

GLOBAL HEALTH

Bruce Campbell, MD
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.

M3 SCHOLARSHIP FORUM

The M3 Scholarship Forum celebrates the Scholarly Projects completed by each member of the graduating Class of 2019. Projects not listed as POSTER or PODIUM were presented previously. HALLWAY posters are special featured projects.

HEALTH SYSTEMS MANAGEMENT & POLICY

John Meurer, MD, MBA
William Hueston, MD

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

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.

QUALITY IMPROVEMENT & PATIENT SAFETY

Catherine Ferguson, MD

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

URBAN & COMMUNITY HEALTH

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.

Addesso, Luke — Clinical & Translational Research

Impact of Medical Scribes on Provider Efficiency

Authors: Addesso L, Nimmer M, Visotcky A, Brousseau DC
Project Mentor: David Brousseau, MD, MS

Emergency department physicians spend a significant amount of time on documentation, decreasing clinical productivity. One proposed way to increase productivity is utilizing medical scribes. We hypothesized that: 1) scribes would increase physician productivity with no negative effect on patient experience, and 2) physicians would show a preference for working with scribes, while nurse satisfaction would be unchanged. This observational study compared pre-scribe and post-scribe productivity metrics including patients per hour and work relative value units per hour (wRVUs/hour). Satisfaction surveys were administered to patient families, physicians, and nurses. Following scribe implementation, efficiency increased by 0.21 patients/hour (12.48%) and 0.68 wRVUs/hour (23.60%). Patient experience was unchanged, with 80% satisfaction without a scribe compared to 84% with a scribe ($p>0.05$). Most physicians (92%) preferred working with a scribe. For nurses, 47% preferred scribes and 49% were indifferent. Overall, medical scribes increased ED efficiency and provider satisfaction without decreasing patient or nurse satisfaction.

Adenuga, Oluwatosin — Global Health

Attitudes Toward Cryopreserved Embryos Among Couples Seeking Care for Infertility

Authors: Adenuga OS, Duthie EA, Cooper A, Davis JB, Schoyer KD, Sandlow J, Strawn EY, Flynn KE.
Project Mentor: Kathryn Flynn, PhD

Background: For couples pursuing parenthood through in vitro fertilization (IVF), "leftover" embryos are routinely cryopreserved and stored for future treatment attempts. Couples' perceptions of cryopreserved embryos may affect their decisions about which treatments to pursue. Among couples seeking care for infertility, we explored knowledge and attitudes regarding cryopreserved embryos and assessed whether and how these perceptions affect treatment decision-making.
Methods: 37 couples participated in up to 6 semi-structured interviews over 12 months after scheduling an initial consultation with a reproductive specialist. Patients and their partners were interviewed separately regarding embryos at one-week and 12-months post-consult. Data were thematically analyzed in Nvivo. In addition, participant comments were classified into one of four categories: positive, negative, ambivalent, no opinion.
Results: At one week, many participants expressed that they had no strong feelings regarding autologous cryopreserved embryos, often admitting that they were unaware of what they were. At 12 months, more patients and their partners were familiar with the concept and discussed specific pros and cons associated with freezing embryos and their storage. Those who opposed cryopreservation often cited moral or religious objections, but very few had strong negative views about embryo disposition to deter them from considering IVF. For most, other considerations, especially finances, were the primary barrier to pursuing IVF.
Conclusions: Most participants did not have strong views about autologous cryopreserved embryos initially because they were unfamiliar with the concept. At 12 months, stronger attitudes were apparent, but very few had strong enough negative views about embryo disposition to deter them from considering IVF. Provider counseling should take into account patients' understanding, attitudes, beliefs, and values regarding their options for family building.

Alcasid, Nathan — Clinical & Translational Research

Nogo-B Receptor (NgBR) Modulates Endoplasmic Reticulum Stress in Pulmonary Artery Endothelial Cells

Authors: Alcasid N, Jing X, Konduri G, Teng RJ.

Project Mentor: Xigang Jing, PhD; Ru-Jeng Teng, MD; Ganesh Konduri, MD

Introduction: In persistent pulmonary hypertension of the newborn (PPHN), standard initial therapy with oxygen allows for ventilation but has been shown to cause an increased risk of developing poor neurological outcomes through formation of ROS. Increased ROS has been shown to lead to impaired angiogenesis in fetal pulmonary artery endothelial cells (PAEC). To understand how the PAEC responds to ROS, the endoplasmic reticulum (ER) membrane protein, NgBR, was studied to see its role in the modifying downstream proteins that allow the cell to survive.
Hypothesis: NgBR assists the ER to cope with the damaging effects of ROS to preserve organelle function and allow the development of adequate angiogenesis in PAECs.
Study Methods: In-utero constriction of the ductus arteriosus from 80%-gestation to term-8fetal lambs was surgically performed to create the PPHN phenotype, while fetal lambs with no surgical constriction allowed for control PAECs. The hypertensive (PPHN) and normotensive fetal lamb (NFL) PAECs were isolated and used to measure NgBR protein levels via immunoblotting. NFL PAECs transfected to knockdown NgBR and PPHN PAECs were transfected to induce overexpression of NgBR.
Results: Compared to NFL, NgBR levels in PPHN cell lines decreased. The NgBR-knockdown in NFL produced a phenotype that was similar to the PPHN cell line, and the overexpression of NgBR in PPHN corrected the phenotype, displaying the critical role of NgBR in allowing normal and stable growth by modulating the cell's stress response

Amherdt, Sarah — Poster 13 — Global Health

Effectiveness of Digital Multimedia Educational Aids Produced by Intensive Care Unit Providers

Authors: Amherdt S, Kim U, Basir, M.

Project Mentor: Mir A. Basir, MD, MS

Objective: Determine effectiveness of low-cost digital multimedia educational materials developed by healthcare providers lacking extensive multimedia production training.
Design: Non-randomized, single arm design.
Setting: A total of 36 family members of an infant currently in-patient at tertiary level NICU participated in the study.
Method: A panel of parents of premature infants identified topics for education of parents anticipating a premature birth. Six topics selected for development of multimedia materials included 1) Intraventricular Hemorrhage, 2) Lungs and Breathing, 3) Feeding and Nutrition, 4) Retinopathy of Prematurity, 5) Patent Ductus Arteriosus, and 6) Neonatal Intensive Care Unit Discharge Criteria. In collaboration with institutional neonatologists, utilizing an iterative process, a medical student using a free iPad app created modules for each topic. Modules were uploaded to YouTube, presented via iPad to NICU family members who are ≥18 years and English literate. Family members who reported previously receiving information about the topic were excluded. Participation was voluntary and anonymous. To test understanding of key information, 4 questions about each topic were identified by institutional neonatologists. After viewing the module, participants answered the 4 topic-specific questions. If participants could answer 75% correctly, the educational material was considered successful.
Results: 36 participants (6 per topic) were consented and completed the study. Overall, 83% answered 100% of the questions correctly and the remaining 17% answered 75% correctly, demonstrating basic understanding of the topic and success of the multimedia educational material.
Conclusions: This study shows that it is feasible for healthcare providers to develop low-cost digital multimedia educational materials that improve parent understanding of their child's medical problems.

Anderson, Sean — Health Systems Management & Policy

The Role of Protein-Tyrosine Phosphatase Shp1 in GHV-infected B Cells

Authors: Anderson S, Schmitz K, Aurubin C, Stoltz K, Tarakanova V
Project Mentor: Vera Tarakanova, PhD

Gammaherpesviruses, including Epstein-Barr Virus (EBV), are widespread pathogens that establish life-long infections in the majority of humans worldwide and are associated with the development of B Cell Lymphomas through manipulation of B Cells in the differentiation phase by stimulating germinal center (GC) reactions. It has been shown that Interferon-Regulatory Factor 1 (IRF-1), counteracts the virus-driven stimulation of these GC and is under-expressed in human GHV-driven lymphomas; the downstream effectors of this attenuation system have yet to be described. We hypothesize that the phosphatase Shp1 is a key effector protein expressed and/or activated by IRF-1 to oppose the hyperproliferation of B Cells in response to GHV infection. We designed a mouse model with B-cell-specific Shp1 deficiency using the Cre-Lox system (Ptpn6f/f;CD19-cre+). The Ptpn6f/f;CD19-cre+ mice were infected with MHV68 (a murine EBV analog) and at 16 days splenocytes were extracted and tested for viral latency and reactivation as well as for immune cell profiling. We found that the absence of Shp1 in B Cells decreased the number of infected splenocytes as well as the viral reactivation in these, contrary to our predictions. We also found a decreased number of GC B Cells and an increased number of Tfh Cells in these experimental mice. Overall, these findings suggest that too little Shp1 in a host cell may be detrimental to the virus in establishing chronic infection, although this environment likely leads to a robust initial B Cell proliferation that is quickly self-limited through mass apoptosis.

Anhalt, Brandon — Poster 14 — Quality Improvement and Patient Safety

The Cultural Norms of Communication in a Pediatric Trauma Team, an Ethnography

Authors: Anhalt B, Koeller C, Ferguson C
Project Mentor: Cassie Craun Ferguson, MD

Background: As a Level 1 Trauma Center, The Children's Hospital of Wisconsin (CHW) in Milwaukee, WI receives patients that are in the most critical condition and need the most expertise and specialized care. To provide the highest level of care, an ad hoc team of healthcare professionals forms when a trauma page is received. This study seeks to determine different aspects that affect the culture of the trauma room and devise measures that can be taken to maximize successful communication.
Objective: The aim of this research is to define the set of norms of communication used in the CHW trauma room and to identify obstacles that hinder successful communication.
Design: Qualitative interview study.
Setting: Single site academic medical center.
Interview Subjects: 16 trauma participants from the following disciplines involved in trauma interactions: registered nurse, advanced practice nurse, PICU attending physician, PICU fellow, radiology attending physician, radiologic technologist, social worker, EM attending physician, EM fellow, surgery attending physician, anesthesiology attending physician, pharmacist.
Measurements: Semi-structured interviews followed by qualitative and quantitative thematic analysis.
Results: The three major factors found to affect the culture of the trauma team are: 1) patient status, 2) team leader, and 3) giving feedback and/or speaking up. The three most important attributes of a good team leader were found to be: 1) verbalizing priorities and expectations, 2) establishing and maintaining leadership throughout the trauma interaction, and 3) being direct and assertive.
Conclusion: This conceptual model identifies the factors affecting how trauma team members communicate during trauma interactions and aspects that affect this communication and the overall culture of the trauma room. It also provides insight as to characteristics that make a good team leader and possible areas for improvements and interventions.

Apolinario, Michael — Clinical & Translational Research

Relationship of Anthropometrics and Throwing Biomechanics in Youth Baseball Pitchers

Authors: Apolinario M, Fehr S, Liu XC
Project Mentor: Shayne D Fehr, MD

INTRODUCTION: Youth baseball pitchers are predisposed to a particular subset of conditions and injuries of the upper extremity (UE) that are associated with anatomical and developmental deficits. Accumulation of micro-trauma experienced from repetitive throwing motions lead to many UE injuries.
Correlations between anthropometrics and kinematic/kinetic evaluations of the shoulder and elbow of youth baseball player pitching motions have not been well defined.
METHODS: Twenty-six youth baseball pitchers were recruited from the Milwaukee area baseball clubs. First, participants completed a health questionnaire and anthropometric measurements were taken. For kinematic analysis, pitching motions were recorded with Vicon motion capture cameras. A segmented biomechanical model was created allowing kinematic measurements of the shoulder and elbow. For kinetic analysis, isokinetic and isometric external rotation (ER) and internal rotation (IR) shoulder strength was assessed by maximum torque generated on the Biodex. Grip strength was measured using Jamar Dynamometer.
RESULTS: Kinetic analysis showed there was a significant correlation between age, BMI, hand size and grip strength with peak torque at shoulder ER, especially grip strength having significant relationships with both isometric and isokinetic external rotation torque. BMI or hand size coupled with grip strength significantly correlated with shoulder rotations in the coronal or transversal plane at deceleration or late cocking phase.
CONCLUSION: Torque produced by IR muscles at the shoulder during the pitching motion is opposed by the ER muscles therefore, highlighting the ER muscle's protective role in deceleration and preventing injury. These anthropometric variables may be used as strength and motion predictors to prevent injury.

Applin, Dylan — Clinician Educator

Biomechanical Comparison of Tension Band Fixation of Patella Transverse Fractures: Headless vs Headed Screws

Authors: Applin DT, Martin J, McGrady LM, Wang M, Schmeling GJ
Project Mentor: Mei Wang, PhD

Objective: Determine whether headless screws produce similar stability and strength as headed screws in fixation of transverse patella fractures. Methods: Six pairs of cadaveric knees with transverse osteotomies created at the patellar midpoints were surgically fixed, with one knee of each pair receiving either headless or headed screws. Specimens were tested on a servo-hydraulic load frame, first at 150N to measure stiffness and inter-fragmentary motion, and then to 1000N to determine strength. Failure was defined as either a sudden drop in force or 2mm of fragment separation, whichever occurred first. Results: Mean inter-fragmentary motion was 0.31±0.28° and 0.10±0.06° respectively for the headed and headless screws, mean stiffness was 895±550 N/° and 1866±818 N/° respectively for the headed and headless groups, and mean clinical failure strength was over 40% greater with the headless screws. Conclusions: Headless screws demonstrated superior biomechanical behaviors with higher rigidity, smaller inter-fragmentary motion, and greater fixation strength.

Arora, Anisha — Clinical & Translational Research

Feasibility of photosensitivity measurements using the BPEI photosensitivity tester

Authors: Arora A, Carroll J
Project Mentor: Joseph Carroll, PhD

INTRODUCTION: Increased sensitivity to light is a hallmark feature of achromatopsia (ACHM), an autosomal recessive cone dysfunction disorder. Thus, the ability to quantify this photosensitivity threshold could be used as an outcome measure in patients receiving gene therapy. Here we sought to assess the feasibility of using the 2nd generation BPEI Photosensitivity Tester for functional evaluation in clinical trials.
STUDY METHODS: Subjects (>18 yrs) with no preexisting ophthalmic conditions were tested using the enhanced and normal modes in the Photosensitivity Tester. The enhanced mode uses smaller light stimulus step-sizes and is intended for photosensitive patients while the normal mode has large step-sizes intended for more general use. To assess repeatability within subjects across modes and multiple time-points, subjects were tested using a randomly-selected mode, and then re-tested one hour later using the alternate mode. The reciprocal test-retest procedure was repeated between 20 and 47 hours later. The initial test procedure was repeated for each subject >30 days later. Thresholds and duration were recorded for each test.
RESULTS: Normal mode average threshold for 10 healthy subjects was 1091.10 lux taking an average of 5.36 minutes, and the enhanced mode was respectively 489.87 lux and 10.00 minutes. Using the Wilcoxon signed-rank test, we found the threshold value differences between the two protocols were statistically significant ($p<0.002$).
CONCLUSIONS: Previous studies have used the intraclass correlation coefficient to suggest repeatability of this device and reliability between modes. Based on our data, both enhanced and normal modes yield significantly different threshold values within individual subjects. Therefore, these protocols cannot be used to reliably determine photosensitivity differences between healthy and achromatopsia patients. Ultimately, this study shows that alternate psychophysical algorithms should be explored.

Barta, Lauren — Poster 15 — Global Health

Barriers to Retention in Care in HIV-Positive Patients at AIDS Resource Center of Wisconsin (ARCW)

Authors: Barta L, Cockerham L, Quinn K
Project Mentor: Leslie Cockerham, MD, MAS

Untreated, HIV will eventually lead to AIDS and death. However, antiretroviral therapy (ART) has resulted in vast improvements in survival such that HIV infection is now considered a manageable, chronic disease. Entry into and retention in HIV medical care is critical to the provision of ART, and adherence to ART is among the key determinants of HIV treatment success. HIV transmission risk is also primarily dependent on behavior (sexual and injection drug use) and HIV viral load. ART reduces the HIV RNA plasma concentration to undetectable concentrations in most treated individuals, so its use is also important in the prevention of new infections. Therefore, retention in care is essential as it provides opportunities to monitor response to HIV therapy, prevent HIV-associated complications, and provide ancillary services. However, retention in care is the most challenging step along the HIV care continuum. Poor retention is connected to increased morbidity and mortality of patients and increases the risk of HIV transmission to others. This project attempts to identify the barriers that are preventing patients from being continuously engaged in their medical care. In order to identify these barriers, the study is looking at patients who have re-engaged in care at ARCW after being lost to follow-up for at least 10 months. This project aims to accomplish four tasks: identify systemic/structural barriers that prevent individuals from engaging in HIV medical care at ARCW, identify risk factors for poor engagement, identify attitudes/beliefs about providers and healthcare that prevent patient retention, and improve the services provided by ARCW in response to feedback from participants.

Bauer, Eric — Quality Improvement and Patient Safety

Implementing Inter-Professional Input into ICU Hand-offs (I4H)

Authors: Bauer E, Fletcher K, Nanchal R
Project Mentor: Kathlyn Fletcher, MD, MA

Patient hand-offs represent a significant opportunity for medical error and adverse events. The process is largely dependent on the quality of communication putting it at substantial risk for errors of omission and misunderstandings caused by inadequate inter-professional communication.
Important patient care information pertinent to the hand-off process often remains siloed due to poor inter-professional communication during rounds. We can increase this through conversation cards designed with the MICU's needs in mind.
We began with presentations to the staff to outline 1) the need for this project, 2) the interventions we intend to do and 3) the ways in which we would collect data. Our measurement tools included a survey of the hand-off process distributed prior and then on a weekly basis. We also used weekly observations of rounds (1 per team) as well as hand-off observations for the provider and nursing teams. The intervention consisted of a conversation card with question stems designed to stimulate the exchange of patient information.
We collected 52/72 nurse pre-intervention surveys and 36/61 post. We found significant changes for 2 questions, both about job satisfaction in relation to the quality (4.08 to 3.56) and quantity (4.02 to 3.22) of communication. This signifies an increase in inter-professional communication. For the Physician/APP surveys we collected 10/21 pre-intervention and 29/49. The rate at which providers gave input increased from 0.4 to 0.79 and the rate of reception increased from 0.3 to 0.75. Furthermore, the nurse and P/APP satisfaction increased from 3.37 to 3.5 and 3.4 to 3.83 respectively.
Our observations highlighted factors impacting the amount of inter-professional collaboration accomplished during an individual rounding period. The intervention increased the communication frequency of our chosen elements during rounds and individual hand-offs, in addition to an increase in the staff satisfaction of the hand-off process.

Bhatt, Drumil — PODIUM — Health Systems Management & Policy

A survey of the uninsured in Milwaukee

Authors: Bhatt D, Schellhase K
Project Mentor: Kenneth Schellhase, MD, MPH
Community Partner: Outreach Community Health Center

Introduction. Despite implementation of the Affordable Care Act (ACA) and expansions in Medicaid eligibility, Wisconsin continues to have a 5.7% uninsured rate. In Milwaukee, it is not known what proportion of the uninsured may be currently eligible for health insurance, and why the eligible have not enrolled.
Objective. The goal of this project was to characterize this uninsured population and understand the reasons for why they remain uninsured.
Methods. We developed anonymous surveys for a free/low cost health clinic in Milwaukee to ask their attendees why they remain uninsured. The surveys were distributed by clinic staff and collected information on attendees' income levels, employment status, and plans for obtaining health insurance. 100 surveys were optionally completed and all responses were self-reported.
Results. 51% of respondents primarily cited insurance being "too expensive" as the reason for lacking health insurance, even though 39% of all respondents qualified for Medicaid. 67% of survey respondents were employed, but of those, 71% either were not offered insurance through their employer or indicated insurance premiums were too expensive. Finally, based on their self-reported income, 56% of respondents were misinformed about their Medicaid eligibility while 69% were misinformed about their Marketplace eligibility.
Conclusion. Nearly half of uninsured respondents attending a free clinic were not taking advantage of their eligibility for Medicaid. Moreover, a majority of the respondents were misinformed about their eligibility for ACA subsidies. These data show that additional efforts are needed to educate uninsured Milwaukee residents about different health plans to maximize health insurance coverage.

Birkey, Trevor — Global Health

Cardiopulmonary Exercise Testing for Surgical Risk Stratification in Adults with Congenital Heart Disease

Authors: Birkey T, Dixon J, Jacobsen R, Ginde S, Nugent M, Yan K, Simpson P, Kovach J
Project Mentor: Joshua Kovach, MD

Background: Adults with congenital heart disease (ACHD) often require cardiothoracic surgery for which few preoperative risk assessment tools exist. In the general population, preoperative cardiopulmonary exercise testing (CPET) predicts morbidity after non-cardiac surgery. The utility of CPET for risk assessment in ACHD is not established. Methods: Retrospective chart review was conducted on 78 ACHD who underwent cardiothoracic surgery. Demographics, CPET results, and perioperative surgical data were collected. Results: Postoperative length of stay (LOS) correlated with increased VE/VCO2 (rho=0.27, p=0.039). Prolonged intubation correlated with decreased exercise time (rho=0.34, p=0.003), heart rate response (rho=0.30, p=0.009), and peak VO2 (rho=0.26, p=0.049). Postoperative complications occurred in 56% of patients. Trends were noted between complications and CPET measurements, but did not meet statistical significance. Conclusions: In a young ACHD cohort, exercise capacity correlated with postoperative LOS and intubation time. Future study is required to elucidate the relationship between exercise capacity and postoperative morbidity in ACHD.

Blaszak, Scott — Molecular & Cellular Research

Coronary Artery Disease Associated Correlation with Decreased Electron Transport Chain Complex Activity

Authors: Scott Blaszak, Ait-Aissa K, Gutterman DD, and Beyer AM
Project Mentor: Andreas Beyer, PhD

Cardiovascular disease is the leading cause of death worldwide and abnormalities in mitochondrial function are increasingly recognized in association with cardiomyopathy, heart failure, and coronary artery disease (CAD). However, the direct contribution and mechanism of mitochondrial dysfunction on the development of CAD is not fully determined. Our laboratory has demonstrated that several pathways involved in the protection from mitochondrial damage are reduced in patients with CAD compared to non-CAD patients.
It has been established for some time that the failing heart relies mostly on glycolysis for ATP production rather than mitochondrial oxidative phosphorylation. Additionally, metabolic defects associated with mitochondria are associated with poor cardiovascular outcomes. Currently, the mechanism and role of mitochondrial dysfunction with the development of CAD is not fully understood. We have previously found that mitochondrial DNA damage is significantly elevated in subjects with CAD. However, the functional consequences of these results have not been explored. We hypothesize that in the heart from subjects with CAD, mitochondrial respiration is decreased resulting in decreased mitochondrial ATP production due to defects in the electron transport chain (ETC).

Blinka, PhD, Steven — Poster 16 — Molecular & Cellular Research

Super-enhancer Control of Nanog Expression

Authors: Blinka S, Agrawal P, Pulakanti K, Rao S
Project Mentor: Sridhar Rao, MD, PhD

Enhancers are cis-regulatory elements (CREs) that control spatial and temporal gene expression during development. Recently, a rare class of highly active and transcribed enhancers, termed super-enhancers, were shown to cluster near genes critical to cell-identity and disease. Mouse ESCs are an ideal model to further our understanding of super-enhancer function as the transcription factor (TF), coactivator, and chromatin interaction networks have been well described genome wide. Specifically, the extended Nanog locus is an intriguing genomic region to study transcriptional regulation as it contains three super-enhancers (within 100 kb of Nanog) and multiple co-regulated genes during early development. All three super-enhancers have nearly identical epigenetic signatures, interact with Nanog and demonstrate similar activity in reporter assays. However, CRISPR-mediated deletion of each putative CRE in situ revealed strikingly different roles in Nanog transcriptional output with only the most proximal CRE (-5 kb) necessary for Nanog expression and pluripotency. Previous studies have suggested that this proximal may function as an alternative promoter during pluripotency and primordial germ cell lineage commitment. Promoters, in contrast to enhancers, regulate genes in a distance and orientation dependent manner. To test whether the essential function of the -5 CRE is as an enhancer or promoter we inverted the -5 CRE in both alleles resulting in no change in Nanog expression, suggesting the critical function of this CRE in ESCs is as an enhancer. Finally, we inserted in the -5 CRE downstream of Nanog and showed 50% expression demonstrating position on the linear chromosome is essential to enhancer function.

Blumenthal, Shoshana — Molecular & Cellular Research

p66Shc regulates vascular function in diabetic rats

Authors: Miller BS, Wright K, Imig JD, Sorokin A
Project Mentor: Dr. Andrey Sorokin, PhD

Background: Increased expression of adaptor protein p66Shc has been associated with progression of diabetic nephropathy. Afferent arteriolar dilation and glomerular hyperfiltration in diabetes are due to increased KATP channel availability and activity.
Methods: Afferent arteriolar responses were assessed in wild type Dahl SS (SS) rats and two strains of genetically modified Dahl SS rats, which either lack p66Shc (p66ShcKO), or express p66Shc mutant (p66Shc-S36A). Afferent arteriolar diameter responses were determined using the juxtamedullary nephron technique following STZ-induced diabetes. Hyperglycemia, urination, body weight, albuminuria and glomerular injury were evaluated in all rat groups.
Results: Albuminuria and glomerular injury were mitigated in p66ShcKO and p66Shc-S36A rats with STZ-induced diabetes. SS rats with STZ-induced diabetes had a significant increase in the afferent arteriolar diameter, whereas p66ShcKO rats did not. STZ SS rats, but not STZ p66ShcKO or p66Shc-S36A rats had an increased vasodilator response to pinacidil. Likewise, KATP inhibitor gibenclamide resulted in a greater decrease in afferent arteriolar diameter in STZ SS rats compared to STZ-treated SS p66ShcKO and p66Shc-S36A rats. However, nitroprusside vasodilator responses were similar in all rat strains.
Conclusion: Taken together, these results indicate that deletion of the adaptor protein p66Shc decreases afferent arteriolar KATP channel activity and decreases renal damage in diabetic SS rats.

Boateng, Samuel — Poster 17 — Clinical & Translational Research

Enteric Fistula Treatment & Management: Results of an Institutional Inpatient Treatment Protocol.

Authors: Kugler WN, Boateng S, Webb TP, Trevino CM
Project Mentor: Travis P. Webb MD, MPHE

Background: Enterocutaneous fistulae (ECF) are abnormal communications between the gastrointestinal tract and skin that may result following an abdominal operation and may result in significant morbidity and even mortality. Standardized care of patients with ECF has not been implemented at the majority of tertiary hospitals. We sought to evaluate the benefits of a multidisciplinary team utilizing an evidence based clinical treatment protocol for inpatient management of ECF. We performed an Institutional Review Board approved retrospective analysis of outcomes after the implementation of an evidence based clinical treatment protocol for patients admitted with ECF to the acute care surgical service at a large academic medical facility. Patients managed prior to the established protocol were considered part of the pre-protocol cohort (PRE) while patients managed following implementation were included in the post-protocol cohort (POST). In the PRE cohort, the average length of stay was 37 days ranging from 16-67 days with a 16% spontaneous closure rate resulting in a 67% requiring operative management for closure as a single patient was not offered surgery due to significant co-morbidities. The POST cohort demonstrated an average length of stay at just 16 days ranging 4-28 days with an 84% spontaneous closure rate leading only 16% to require operative closure. Utilization of a standardized treatment approach results in high spontaneous closure rates with a decreased hospital length of stay.

Borchardt, Lauren — Poster H3 — Clinical & Translational Research

Clean Catch Urine Analysis as an Alternative to First Void Urine for Diagnosing Chlamydia and Gonorrhea

Authors: Borchardt L, Pickett M
Project Mentor: Michelle Pickett, MD, MS

Background: Adolescents with chlamydia or gonorrhea may present with symptoms mimicking urinary tract infections. The Center for Disease Control guidelines recommend a clean catch urine (CCU) sample for urine tract infection diagnosis and a first void urine (FVU) or vaginal swab for sexually transmitted disease diagnosis. The aim of this study was to determine the sensitivity and specificity of CCU samples for detecting chlamydia and gonorrhea in comparison to FVU.
Methods: This was a prospective study of adolescent females, 14-22 years old, undergoing chlamydia and gonorrhea testing in the emergency department or adolescent clinic. Nucleic acid amplification testing for chlamydia and gonorrhea was performed on the vaginal swab, CCU, and FVU. Sensitivity and specificity for CCU and FVU were determined using vaginal swab as the gold standard.
Results: 265 participants (median age= 17 years, range= 13-22 years). CCU sensitivity was 80% (28/35) for chlamydia and 90% (10/11) for gonorrhea with a specificity of 99% (176/178) for chlamydia and 99% (204/205) for gonorrhea. FVU sensitivity was 83% (30/36) for chlamydia and 100% (11/11) for gonorrhea, with a specificity of 99% (178/179) for chlamydia and 99% (206/207) for gonorrhea.
Conclusion: Both CCU and FVU were within 10% of the gold standard vaginal swab for sensitivity and specificity for gonorrhea, and specificity for chlamydia. However, both were also at least 15% less sensitive at detecting chlamydia. Future studies with a greater number of participants are required before the final determination of the utility of CCU for diagnosis can be established.

Camara, Alhaji — Global Health

Persistent Type II Endoleaks Following Endovascular Aneurysm Repair: Graft Type Matters.

Authors: Rossi P, Wohlauer M, Brown K, Lewis B, Hieb R, Patel P
Project Mentor: Cheong Jun Lee, MD

Objectives: Persistent type II endoleak is associated with increased risk of aneurysm growth and reintervention following endovascular aortic repair (EVAR). We sought to determine whether significant perioperative and graft-specific risk factors exist for development of type II endoleak following EVAR with current generation endografts.
Methods: A retrospective review of a prospectively collected database of patients undergoing EVAR between 2008 and 2015 was performed. Persistent type II endoleak was defined as the presence of a type II endoleak at 12 month follow up. Patient demographics, procedural variables, and endograft types were collected.
Results: Two hundred and twenty-three patients undergoing EVAR during this time period met inclusion criteria. The overall incidence of type II endoleaks at the time of EVAR was 21.5 % (48/223). At 12 months follow up the incidence remained similar at 21.3% (46/216, 7 patients had indeterminate endoleak). Smoking status was protective against persistent typeII endoleaks ($p = 0.007$). The presence of a patent IMA was associated with the development of persistent type II endoleaks ($p =0.016$). The rates of persistent type II endoleaks were dependent on endograft type ($p = 0.004$): Cook Zenith 12.3% (8/65), Endologix AFX 0% (0/17), Gore Excluder 30.6% (26/91), Medtronic Endurant 24.5% (12/50). On multivariate analysis, smoking status was independently protective ($p = 0.0061$), and the Gore Excluder device was associated with a higher rate of type II endoleak ($p < 0.01$). Persistent type II endoleaks were not associated with aneurysm size, presence of iliac artery aneurysms, number of device implants, or COPD status.
Conclusion: With current endograft iterations, short body configurations such as the Medtronic Endurant and the Gore Excluder had the highest rates of persistent type II endoleak (25 % and 31 %) while long body configurations such as the Cook Zenith and Endologix AFX had the lowest (12 % and 0%).

Carlson, Zach — PODIUM — Urban & Community Health

Impact of a fruit and vegetable prescription program on utilization of farmers markets.

Authors: Carlson Z, Kruse C, Stoming C, Bernstein R, Casey J, DeNomie M, Kilkenny M, Ruffalo L
Project Mentor: Leslie Ruffalo, PhD
Community Partner: Fondy Food Center, Columbia St. Mary's

Dietary intake of fruits and vegetables is a known strategy to reduce the risk of chronic disease or assist in management of the disease. However, access to fruits and vegetables is not equitable for all people. Despite the upswing in the number of farmers markets that accept federal nutrition benefits, farmers markets are still underutilized by low income families due to a lack of awareness in redeeming benefits at local farmers markets. To increase awareness, we piloted a Fruit and Vegetable Prescription Program with a local family medicine clinic that serves a predominately under-resourced population. Patients completed a baseline, 4-week and 8-week follow-up survey to collect data on the use of the voucher and their dietary habits. We also collected information about the barriers and facilitators that healthcare providers and patients encountered while participating in the program.

Casillas Plazola, David — Poster 18 — Clinical & Translational Research

Acquired Cystic Kidney Disease: Prevalence, Risk Factors and Incidence of Renal Cell Carcinoma

Authors: Casillas Plazola D, Roza A, Cohen E, Johnson C
Project Mentor: Allan Roza, MD

Aquired Cystic Kidney Disease (ACKD) is cyst formation in a non-cystic failing or failed kidney, increasing the risk of Renal Cell Carcinoma (RCC). Previous studies are troubled by small cohorts and questionable conclusions regarding incidence, risk factors and chronological development of ACKD. We retrospectively studied 805 patients with end stage renal disease (ESRD) referred for consideration of renal transplantation at Froedtert Hospital from 2000 to 2010. Patients' exclusions were: no CT imaging, prior nephrectomies, Autosomal Dominant Polycystic Kidney Disease. Prevalence of ACKD (5 cysts or >) was determined by CT scan review, along with patients' demographics including age, gender, race, underlying diagnosis, smoking and alcohol consumption, development of RCC and years on dialysis at imaging.
We analyzed 547 patients. ACKD was present in 30%; 15% developed cysts but failed to meet ACKD criteria. Statistically significant risk factors for ACKD were (1) African American race, odds ratio (OR) of 2.3 (CI 1.6-3.3, $p<0.001$). (2) Duration of dialysis >3 years, OR of 4.0 (CI 2.7-5.9, $p<0.001$). RCC was present in 24 (15%) patients and was closely linked to ACKD with an OR of 5.0 (CI 2.4-9.9, $p<0.001$). ACKD was more prevalent in males but this was not statistically significant (males 32%, females 27%, $p=0.18$).
ESRD patients are not routinely imaged. The results of our study suggest the importance of yearly CT scans, most importantly after three years of dialysis. Early detection of RCC with timely nephrectomy is often curative. Development of RCC can delay consideration for transplantation, whereas, failure to recognize an underlying RCC following transplantation can be catastrophic.

Ceesay, Mamaram — Clinical & Translational Research

Dyspareunia in pre-menopausal women with sickle cell disease

Authors: Karafin M, Singh M, Ceesay M, Koduri S, Zhang L, Simpson P, Field J
Project Mentor: Joshua J. Field MD, MS.

Chronic pain is common in women with Sickle cell disease (SCD). The relationship between the existence of chronic pain and dyspareunia in premenopausal women with SCD is unknown. To determine whether chronic pain is associated with an increased prevalence of dyspareunia in pre-menopausal women with SCD, we performed a prospective cohort study. 91 pre-menopausal women with SCD were administered a standardized questionnaire for dyspareunia and systematically assessed for chronic pain. The median participant age was 29 years. 32% of women reported recurrent dyspareunia. Compared to women without recurrent dyspareunia, women with recurrent dyspareunia were more likely to have a history of chronic pain (90% versus 61%, $P=0.006$). Using a multi-variable classification tree analysis, number of days of pain experienced per week was an important predictor of recurrent dyspareunia ($P=0.001$). Based on these results, providers should assess women with SCD for dyspareunia, especially those with a chronic pain syndrome.

Chen, Kristen — Poster 19 — Clinician Educator

Pilot Study: Exploring Anatomy through Art

Authors: Chen K, Budovec J, Krippendorf B
Project Mentor: Beth Krippendorf, PhD

It is widely accepted that clinical diagnosis involves observation, description, and interpretation of visual information. Despite this, evidence suggests medical students lack competency in such practices. In the last twenty years, several medical schools in the US and Europe have aimed to address this concern by teaching "visual literacy", the ability to interpret information from careful unbiased observation. This study aims to (1) assess whether first year medical students at the Medical College of Wisconsin are interested in studying superficial anatomy through the visual arts, and (2) to improve medical student's ability to identify superficial bony and muscular structures through training in visual observation. This was a prospective, randomized pre- vs. post- study using mixed-methods data analysis. We developed an online educational course called, Exploring Art through Anatomy. The course consisted of a pre- and post- survey, a 20-question teaching module with explanations and image overlays, and a separate 20-question quiz module. Survey responses and percent correct on the quiz module were compared between control and experimental groups. 15 of 290 first year medical students expressed interest in the course; 10 completed the study. Following the course, participants demonstrated an increased interest in utilizing the visual arts to improve their visual observation skills in the context of studying superficial anatomy. Quiz results between control and experimental groups did not show statistical significance; this may be attributable to the small sample size, short duration intervention, or lack of in-person discussion.

Chiao, Cassandra — Clinical & Translational Research

Head-Ultrasonography(HU) as a Predictive Tool for Neurodevelopmental-Delay(ND) in Hypoplastic-Left-Heart-Syndrome(HLHS)

Authors: Chiao C, Geddes G, Maheshwari M, Stamm K, Tomita-Mitchell A, Mussatto K
Project Mentor: Aoy Tomita-Mitchell PhD and Kathleen Mussatto PhD, RN

Introduction: HLHS newborns are at-risk for ND and undergo HU preoperatively. Ciliary function gene variation is linked to HLHS murine models. Ciliary dysfunction causes ND due to abnormal neuronal migration/recycling extra-axial cerebrospinal fluid (eaCSF). Hypothesis: We hypothesized HLHS/ND patients will have ciliary-dysfunction markers on HU. Our aim was discovering if HU could be utilized as a predictive tool for ND. Methods: Retrospective analysis measuring eaCSF on newborn HLHS HU: twenty-four HUs of HLHS neonates 0-13 days-old, seven measurements each. Measurements made twice by two phenotypically-blinded observers. Developmental assessments performed by Bayley-Scales-of-Infant-Development-III. Results: 12 subjects had ND, 12 did not. Counted the number of subjects in ranges (X-subjects with eaCSF 0.1-0.19mm, 0.2-0.29mm etc, 0mm=unmeasurable). 10 of the 24 subjects showed eaCSF=0mm. Cortical brain width measurements correlated with ND status ($p<0.01$). Conclusion: Retrospective ultrasonography is not adequate to measure eaCSF predicting ND. Cortical brain width shows promise for predicting ND in HLHS.

Collins, Jamie — Poster 20 — Quality Improvement & Patient Safety

Post-Traumatic Stress Disorder in the Hospital: Patient and Nurse Experiences

Authors: Collins JA
Project Mentor: Kathlyn Fletcher, MD, MA

Post-Traumatic Stress Disorder is a significant comorbidity facing patients in the VA hospital. Inpatients with PTSD often experience severe anxiety, PTSD triggers, and sleep disturbances while hospitalized. In our study, we interviewed inpatients with PTSD and nurses about their experiences with PTSD in the hospital and their recommendations for improving care for inpatients with PTSD. The results from the nurse interviews are presented here. The main themes that emerged from the interviews were patient experiences, communication, the impact of nurses discussing PTSD with patients, nurses' role in PTSD care, ideas for improvement, the impact of using a PTSD questionnaire for patients on admission, and the value of the intervention. We identified several areas for improvement, including minimizing environmental triggers like light and sound, reducing sleep interruptions, individualizing patient schedules, normalizing discussions about PTSD between patients and providers, and routinely identifying and addressing patients' PTSD triggers.

Crouch, Samantha — Poster 21 — Clinical & Translational Research

We Don't Have To Go it Alone: A Thematic Analysis of Physician Resilience Research

Authors: Crouch S, Ferguson C, Thomas D, Khammar A
Project Mentor: Dr. Alexander Khammar

Aim: This paper intends to investigate the role that resilience plays in the prevention of physician burnout and includes a systematic literature review that identifies the most effective strategies to enhance resilience in physicians and physicians-in-training.
Background: Physician burnout generates far-reaching adverse effects on a system-wide level within healthcare; medical errors rise, quality of care declines, and highly skilled providers choose to leave the field prematurely. The concept of 'burnout' within medicine is not new, yet there is limited data identifying proactive means of mitigating it. The promotion of resilience among physicians and physicians-in-training is a promising approach to decreasing burnout.
Data Sources: The OVID literature database was searched from 2009 to 2017 using two distinct search phrases: 1) "resilience, psychological" AND "physicians", and 2) "resilience, psychological" AND "burnout" limited to the English language. Papers were included if they either contained an intervention to promote resilience among physicians or physicians-in-training, or if they included surveys completed by providers that described techniques employed to maintain their resilience. Fourteen total articles were analyzed for common themes and measures of effectiveness.
Findings and Conclusion: Eleven themes associated with resilience were identified. Fostering supportive relationships was the most prevalent and effective method found to enhance resilience, and this review suggests that fostering these relationships both within and outside of the workplace should be an important theme in the implementation of future interventions. Research trials utilizing various interventional strategies to strengthen relationships, the development of a validated resilience scale specific to physicians, and the completion of longitudinal studies that measure burnout levels during resilience-promoting programs would all serve as powerful assets in the burnout battle.

Cysewski, Nicholas — Clinical & Translational Research

Outcomes of rotator cuff repair in patients with metabolic syndrome

Authors: Cysewski N, Redlich N, Mickschl D, Grindel S
Project Mentor: Steven Grindel, MD

Background: Metabolic syndrome, characterized by high blood pressure, hypertriglyceridemia, low HDL, high fasting glucose, and/or central obesity, affects ~35% of the US population. Previous studies show increased complications and worse outcomes in patients with metabolic syndrome, but no study to date has investigated complications or outcomes in patients with metabolic syndrome undergoing rotator cuff repair. This study aims to investigate this.
Methods: This was a retrospective cohort study of 117 patients with more than 12 months of recovery. Records were reviewed to gather information for ASES shoulder scores and SST shoulder scores. Scores from the group with metabolic syndrome were compared to the control group. 182 patients charts were reviewed for operative and post-operative complications. These patients' charts were also reviewed in order to calculate Charlson Comorbidity Index (CCI).
Results: CCI of the metabolic syndrome group was not significantly different from the control group (p 0.052). Metabolic syndrome was not associated with a difference in outcomes compared to the control group in ASES scores (Dif 1.10, 95% CI -6.76-8.96, p 0.784) or SST scores (Dif -0.15, 95% CI -1.19-0.88, p 0.772). The two groups did not differ statistically in complication rates (p 0.815).
Conclusion: In this study we have shown that metabolic syndrome does not significantly affect ASES or SST shoulder scores or operative/post-operative complication rates in rotator cuff repair. Future studies should continue to study metabolic syndrome in other procedures, as poor outcomes have been seen in some procedures.

Davani, Ariea — Molecular & Cellular Research

The Mitochondrial Adenine Nucleotide Pool Contributes to the Matrix Ca2+ Buffering System

Authors: Davani AJ, Heisner J, Mishra J, Stowe DF, Camara AKS
Project Mentor: Amadou Camara, PhD

Introduction: Mitochondria buffer cytoplasmic calcium within cardiomyocytes during periods of high influx. During ischemia and reperfusion (IR) injury, pathologically elevated calcium levels exceed mitochondrial calcium retention capacity (CRC), causing membrane permeability transition pore (mPTP) opening and ultimately cardiomyocyte death. Adenine nucleotides (AdNs) play a role in the matrix calcium buffering system and may have a protective role during IR injury. This study explores methods to modify the AdN pool and increase CRC.
Methods: Mitochondria isolated from guinea pig hearts were exposed to 2 mM ADP bolus or combination of 2 mM ADP and 10 µM oligomycin (OMN, an ATP synthase inhibitor). CRCs were determined by challenging mitochondria with CaCl2 boluses until mPTP opening occurred. Calcium levels were measured in the intra-matrix (IM) space and extra-matrix (EM) space. Bioenergetic variables, membrane potential (ΔΨm) and NADH levels, were assessed during CaCl2 challenge. Fluorometry was used to conduct experiments.
Results and Conclusions: CRCs were measured as nmol of Ca2+ per mg of mitochondrial protein. Analysis of EM calcium dynamics show that ADP bolus increased CRC from 144 ± 23 to 296 ± 36 (n=5). The ADP/OMN combination increased CRC to 370 ± 105 (n=3). Regarding IM experiments, ADP bolus increased CRC from 146 ± 23 to 280 ± 22 while the ADP/OMN treatment increased CRC to 346 ± 23 (n = 3). Bioenergetic variable analysis show increased stability of NADH (n=3) and ΔΨm (n=3) in mitochondria treated with ADP during calcium challenge vs control. Thus, expanding the AdN pool increases CRC and allows mitochondria to remain in a bioenergetically stable state during periods repeated Ca2+ flux.

Dayton, PhD, Alex — Poster 22 — Molecular & Cellular Research

Dynamic Bayesian graphical modeling to predict regulatory networks in hypertensive rats

Authors: Dayton A, Bukowy JD, Evans LC, Yang C, Liu P, Kurth T, Ahn KW, Komas S, Stingo FC, Laud PW, Vannucci M, Liang M, Cowley AW Jr.
Project Mentor: Allen W. Cowley, PhD

Hypertension is the number one modifiable risk factor for cardiac death, the number one cause of mortality worldwide. Hypertension is a complex, multigenic disease, and over 100 genes have been linked to human hypertension by GWAS. However, for many of these GWAS nominated genes there is no physiological link to blood pressure regulation.
In order to find connections between transcripts related to hypertension, we isolated medullary thick ascending limb tubules and stimulated them with stimuli related to hypertension. After stimulation, we collected samples each half hour for 8 hours, followed by RNA-seq. In total, 192 RNA-seq datasets were collected. This data was analyzed using a Bayesian graphical model algorithm, which looks at the sequence of activation/inactivation of genes to predict functional relationships between them. For example, if gene A turns on before gene B consistently, and in multiple strains, a high probability would be assigned to the relationship "A activates B." Using this method, we estimated the most likely connections between the expressed transcripts. This approach proposed connections regulating a wide variety of genes, including NKCC2, epoxide hydrolase 2, and Plekha7.

Deshpande, Rasika — Poster 23 — Global Health

How Funding Allocation Influences Programs and Goals for Small to Large Scale Global Organizations

Authors: Deshpande R, Somani S, Sanger J
Project Mentor: James Sanger, MD, FACS

Introduction: Illnesses requiring surgical intervention make up an estimated 11% of the global healthcare burden. This review compares how the budgets and resources of three organizations affect their ability to deliver global care. The Bill and Melinda Gates Foundation (BMGF) represents a large, multibillion-dollar group. Operation Smile (OS) is a multimillion-dollar global organization. The Milwaukee Medical Mission (MMM) is a local organization with a small budget working in one country.
Analysis: The massive resources of the BMGF allows them to fund other organizations and influence public health policy in various countries. From 2003 to 2015, their program expenses grew by $6 billion, while management expenses were stagnant, indicating a commitment to global health policy programs. OS initially focused on surgical care, but evolved to emphasize education and sustainability. Education began as 2.6% of their budget in 2002 and grew to 25.2% in 2016. The MMM's goals are education and service, with long-term partnerships between the Medical College of Wisconsin and the Universidad de Santander in Colombia. 100% of their budget is used for the volunteer run medical mission.
Conclusions: Large organizations are able to focus on research and development and influence global policy, making them leaders in public health. Medium-sized organizations operate globally year round, delivering direct care with a narrow focus on particular procedures. To increase effectiveness and reduce complications, OS increased emphasis on training of local specialists. Small organizations focus on direct care for a finite time frame and education through resident and physician exchange programs.

Douglas, Elena — Clinical & Translational Research

Studies of foxe3 and pitx3 Transcription Factors in Zebrafish

Authors: Douglas E, Semina EV, Sorokina E.
Project Mentor: Elena Semina, PhD

Purpose: Ocular development occurs with the coordination between various transcription factors. We predict that pitx3 is upstream of foxe3, and will observe if FOXE3 p.C240X variant is a recessive mutation, and whether FOXE3 c.943insG is dominant negative using zebrafish. Methods: Wild type (WT) and knockout pitx3 zebrafish embryos were injected before 4-cell stage with variants of FOXE3 mRNA prepared with PCR. Phenotypes were observed 96 hours post fertilization. Results: WT embryos injected with FOXE3 c.943insG mRNA on two occasions produced 2.4% and 2.8% unilateral anophthalmia. WT embryos with FOXE3 p.C240X produced no dysgenesis. Statistical analysis was performed with Chi-square, and western blot confirmed presence of desired proteins. Conclusions: Data suggests that FOXE3 p.C240X may be recessive. Dominant negative nature was not seen with FOXE3 c.943insG. Continuing injection studies with the predictable knockout pitx3 phenotype in the future will provide a better understanding of the interactions that produce anterior segment dysgenesis.

Durbin, Samantha — Poster 24 — Quality Improvement and Patient Safety

TQIP Analysis of Risk Factors for Surgical Site Infections in Trauma Patients

Authors: Durbin S, Dodgion C
Project Mentor: Chris Dodgion, MD, MSPH, MBA

Introduction: Surgical site infections (SSIs) historically have a substantial impact on economic and health indexes for hospitalized patients and healthcare institutions. SSIs lead to increased patient morbidity and mortality rates, duration of hospital stays, and 30-day readmissions. The aim of this study was to identify risk factors for surgical site infections in trauma patients using a national cohort.
Methods: A retrospective analysis of all adult trauma patients treated within the Trauma Quality Improvement Database (TQIP) who underwent an abdominal operation from 2010-2015 within the TQIP database was performed. Logistic regression was used to identify risk factors for SSIs.
Results: 2,173/33,603 (0.065%) patients developed an SSI following an abdominal or other operation. For all type of wound infections, BMI, Injury Severity Score (ISS) and black or African American race were significant risk factors for wound infections ($p < .001$). Additionally, perforations of the small bowel, colon, stomach, duodenum, or rectum were all associated with increased risk of SSIs ($p < .001$).
Conclusions: The incidence of SSIs increases with the severity of the injury, perforating injuries to the small bowel, colon, stomach, duodenum or rectum, BMI, and the race of the patient. Providers should be aware of the increased risk these patients possess for developing wound infections and may consider leaving surgical wounds open to heal by secondary intention.

Engelsgjerd, Samuel — PODIUM — Molecular & Cellular Research

Xanthohumol Increases DR5 Expression / Enhances Growth Suppression with TRAIL in Neuroblastoma Cell Lines

Authors: Gamblin TC, Kunnimalaiyaan M
Project Mentor: T. Clark Gamblin, MD

INTRODUCTION: High-risk neuroblastoma (NB) is a lethal childhood cancer. Published data report the anti-proliferative effect of Xanthohumol (XN) in various cancer types suggesting XN could be a useful small molecule compound against cancer. The TNF-Related Apoptosis Inducing Ligand (TRAIL) is an endogenous ligand expressed in immune cells. TRAIL mediates apoptosis by binding death receptor 5 (DR5); cancer cells are resistant to this, possibly via decreased DR5 expression.
METHODS: The effect of XN in human NB cell lines (NGP, SH-SY-5Y, SK-N-AS) and synergistic analysis of XN/TRAIL were determined via MTT assay. Cell confluency assay by cell live imaging was carried out for SK-N-AS and NGP cells after XN treatment. Cell lysates were analyzed through Western blotting for pro/anti-apoptotic markers and DR5.
RESULTS: XN treatment causes a statistically significant decrease in NB cell viability with IC50 values approximately 12μM for all cell lines. Inhibition of cell proliferation via apoptosis was evidenced by increased pro-apoptotic markers (PARP, cleaved caspase-3, Bax) and decreased anti-apoptotic marker, Bcl-2. Importantly, XN treatment increased DR5 expression. Furthermore, statistically significant synergistic reduction was observed following combination treatment (46%) compared to TRAIL (5%) or XN (15%) alone in SK-N-AS cells.
CONCLUSIONS: This study shows XN treatment reduces NB cell growth via apoptosis in a dose-dependent manner, and enhanced growth reduction was observed combined with TRAIL. This is the first study to demonstrate XN alters DR5 expression as well as the synergism of XN and TRAIL in NB, providing a strong rationale for further in vitro/vivo analysis of XN with TRAIL.

Fabry, Nicholas — Clinical & Translational Research

Vasodilatory Effects of Light on Peripheral Artery Disease

Authors: Fabry N, Lohr N, Harmann L
Project Mentor: Nicole Lohr, MD, PhD

Introduction: Peripheral artery disease (PAD) is caused by an impairment of blood flow (BF) in the vessels of the distal extremity, and manifests as reduced walking distance, pain, and tissue destruction. Currently, limited medical treatment exists to manage symptoms, therefore an effective, non-surgical treatment has the potential to improve quality of life. Previous work has shown red-near infrared (R/NIR) light can increase nitric oxide in blood and muscle, which is capable of increasing BF. Therefore, we assessed the ability of R/NIR exposure to increase BF in healthy and PAD subjects.
Methods: BF measurement was performed using contrast-enhanced ultrasound. Images were taken at baseline, after 5 minutes of light exposure, and following termination of light exposure. To quantify BF image pixel intensity was plotted over time. Time-intensity data fit to the function: $y=A(1-eBt)$ where y is intensity at time t, A is plateau intensity, and ß is microvascular flux rate reflecting RBC flux rate. BF was determined as a product of A and ß.
Results: Healthy group mean BF was 830.26 Video Intensity Units (VIU) at baseline. Following light exposure, BF increased significantly ($p<0.005$) (1272.16 VIU) and continued to increase (1477.36 VIU) post light exposure. The PAD group BF was 501.29 VIU at baseline, and increased significantly ($p<0.05$) to 627.81 VIU and 914.11 VIU with light exposure and post light respectively.
Conclusions: R/NIR exposure has the ability to significantly increase BF in healthy individuals and in individuals with PAD, most likely through a nitric oxide mediated mechanism.

Farvour, Jeffrey — Poster 25 — Clinician Educator

Teaching Budgeting Principles to Medical Students

Authors: Farvour J, Hoagland T, Paschal L, Mootz K
Project Mentor: Todd Hoagland, PhD

Many medical students take on a great deal of debt to attend medical school. Medical students have a unique financial circumstance in that many rely solely on loans for income, and usually cannot work for income during the academic year. To save other students time and stress associated with crafting a budget, the Medical College of Wisconsin's (MCW) Financial Aid Office and I created a video that would teach medical students the importance of budgeting, how to construct a budget, and how to use a budget on a day-to-day basis. To assess the utility of the video, it was made accessible to MCW students and their feedback was collected with a post-viewing survey. The survey results demonstrate that the informational video created to teach medical students how to budget was moderately successful, as shown by 68% of students responding that the information in the video helped them better understand how to construct and use a budget while in medical school. Additionally, nearly all respondents (92%) agreed that the video was clear and understandable, and 80% of students responded that they would recommend this video to fellow students. Additional short-answer commentary provided by students in the survey demonstrate the desire for a handout illustrating the information presented in the video, as well as constructive feedback for improving the videos content.

Fayyaz, Sana — Poster 26 — Urban & Community Health

Understanding learning preferences of high school students to develop a sexual health curriculum

Authors: Fayyaz S, Kaljo K, Treat R, Menon S
Project Mentor: Seema Menon, MD
Community Partner: Escuela Verde

BACKGROUND: The visual (V), aural (A), read/write (R), kinesthetic (K) VARK® questionnaire is a validated tool used to assess learning preferences.
METHODS: The VARK® questionnaire was distributed at a charter high school where the authors currently present a sexual health workshop. Completed questionnaires were scored, and then compared based on sex, age, grade, ethnicity, and primary language. Statistically significant ($p \leq .050$) differences in mean scores were determined by analysis of variance and independent t-tests using IBM® SPSS® 24.0. Pearson correlations reported relational measures (r). IBM® SPSS® 24.0 generated statistical analysis. IRB exemption status from Medical College of Wisconsin was granted.
RESULTS: Sixty-two high school schools participated in this study. Female scores trended higher than male scores in all four modalities. Hispanic student mean scores trended higher than non-Hispanic students in all four modalities. Female students showed significance preference for V modality ($r=.55$, $p<.008$) compared to males ($r=.20$, $p<.326$). Significant preference for V and R modalities was seen when comparing grades 7-9 ($r=.65$, $p<.004$) to grades 10-12 ($4=.31$, $p<.071$) and Hispanic ethnicity ($r=.48$, $p<.002$) to non-Hispanic ethnicity ($r=.19$, $p<.418$).
CONCLUSION: Mindfullness to various learning styles is important when developing curriculum for a diverse student body.

Ferrigni, Erin — Global Health

First Start Cesarean Project

Authors: Ferrigni E, Ludwig L, Zhang J, Simpson P, Klatt T
Project Mentor: Timothy Klatt, MD

Introduction: The increasing volume at Froedtert Birth Center has created the need to perform more procedures. When the first scheduled cesarean of a given day is late, it delays other patients' care, impacting both patient safety and satisfaction.
Purpose: Within one year, identify and improve, via Plan-Do-Study-Act cycles, the core processes involved with the timely start of each day's first scheduled cesarean to achieve 80% on-time performance.
Intervention/Practice: An audit tool was developed with expectations for involved processes. These expectations included preoperative laboratories and orders completed prior to patient arrival; obstetrician at bedside 30 minutes prior to incision; operating room roll-in time 30 minutes prior to incision; and incision time. E-mails were sent to obstetricians, anesthesiologists, and other care team staff to capture the reasons for delay. From June 2016 through November 2017 monthly progress was shared among those involved, and then in aggregate, with no individuals identified.
Results: There mean timeliness of the incision improved from 77 minutes to 22 minutes late (p=0.001). The mean operating room roll-in time improved from 68 minutes late to 22 minutes late (p=0.003). Documented timely completion of preoperative laboratories and orders showed an average of 75% and 88%, respectively. Reasons for delay remained multifactorial.
Conclusions: Even though providers uniformly supported this effort, the majority actively resisted making changes necessary to reach goals. Even so, with the use of a timely e-mail to the entire care team, we improved patient flow. This technique may help others attempting to facilitate change in a change-adverse environment.

Flancher, Michael — Molecular & Cellular Research

The effect of ATP availability on the DNA damage response in mouse embryonic fibroblasts

Authors: Flancher M, Oleson B, Corbett J
Project Mentor: John Corbett, PhD

During cytokine exposure, beta-cells produce the free radical nitric oxide (NO), and NO has been shown to suppress DNA-damaged induced apoptosis by inhibiting the DNA damage response (DDR) in beta cells. This inhibition of DDR signaling correlates with a decrease in ATP following exposure to NO in beta-cells. The decrease in ATP and DDR signaling in response to NO is not replicated in other cell lines, such as mouse embryonic fibroblasts (MEFs), and thus may be a beta-cell specific response. After depleting MEFs of their ATP using glycolytic and oxidative phosphorylation inhibitors it is observed that this energy-deprived state was sufficient to reproduce the decrease in DDR activity seen in beta cells exposed to NO. Glucose was then added to restore ATP levels, and it was shown that the DDR response was reactivated.

Floan, Gretchen — Poster 27 — Clinical & Translational Research

Simulation Training for Percutaneous Femoral Neck Fixation

Authors: Floan G, Schwab J
Project Mentor: Joseph Schwab, MD
Community Partner: Marquette University, Opus College of Engineering

Background: Percutaneous femoral neck fixation (PFNF) is a surgical procedure taught on live patients that requires X-ray imaging guidance. This project's purpose was to develop and validate a PFNF simulator to teach this skill apart from operative costs, patient involvement, and radiation exposure.
Methods: The simulator was created positioning 2 webcams perpendicular in a 4-sided box projecting AP and lateral views. Orthopedic residents and faculty at a single institution were voluntarily recruited to perform 3 trials of femoral drilling. Number of drilling attempts (quantity) and accuracy of placement (quality) determined by tip-to-apex distance (TAD <22 mm) was measured per participant. Planned t-test statistical analysis will evaluate drilling quantity and quality between junior and senior participants.
Results: Two faculty members completed testing. Both participants showed a decrease in the number of X-ray images requested, total exercise time, and TAD values over the course of 3 drilling trials. T-test statistical analysis was not performed due to small sample size.
Conclusions: The decreasing trend in quantity and quality of femoral drilling over 3 trials can interpreted as improvement in performance, most likely attributed to better understanding and usage of the simulator rather than improved PFNF surgical skills as both participants were considered procedural experts. Additional participants and data collection is needed to determine true training value of the simulator. This project was limited by inaccuracies in image acquisition, affecting feedback and data measurement. Further development and error correction is needed before continued simulator testing can be performed.

Ford, James — Poster 28 — Health Systems Management & Policy

Assessing the Role of Vital Capacity as a Predictor of Outcomes in Trauma Patients with Rib Fractures

Authors: Ford J, Boyle K, Dodgion C, Carver T
Project Mentor: Christopher M. Dodgion MD, MBA, MSPH

INTRODUCTION: Rib fractures in trauma patients are associated with increased morbidity and mortality. Vital capacity (VC) assesses pulmonary function; however, limited data link VC to patient outcomes. Our objective was to evaluate VC as a prognostic value in trauma patients with rib fractures.
METHODS: This was a retrospective study from 1/2015 to 3/2018 of all trauma patients admitted with rib fractures who had VC assessments performed within 48 hours of admission. Data were obtained from medical records and the trauma registry at Froedtert Memorial Lutheran Hospital. The primary outcomes were disposition and pulmonary complications, defined as pneumonia, pulmonary embolism, unplanned intubation, acute respiratory distress syndrome, or transfer to the intensive care unit. Statistical analysis was performed using $\chi 2$ and binary logistic regression.
RESULTS: From a cohort of 1091 patients with rib fractures, with average age of 52.9 years, 757 (69.4%) had VC performed within 48 hours. Forty-seven (4.3%) developed a pulmonary complication, and there were 13 deaths (1.2%). Compared to patients with a VC <30%, patients with VC 30-40%, 40-50%, and >50% have significantly decreased likelihood of discharge to extended care facility (ECF) (OR 0.79, 0.44, and 0.27, respectively) or pulmonary complication (0.17, 0.16, and N/A, respectively).
CONCLUSION: Patients with fractured ribs and VC less than 30% of predicted value have significant association with pulmonary complications and discharge to ECF. VC may help stratify those at higher risk for complications following rib fractures.

Foss, Halle — Poster 29 — Global Health

Hepatitis B co-infection in patients with HIV: Review of quality of care at a safety-net HIV clinic

Authors: Foss H, Acharya K
Project Mentor: Kartikey Acharya, MD, MPH

Introduction: Approximately 5-10% of patients with HIV have co-infection with Hepatitis B virus (HBV). The progression of chronic HBV to cirrhosis and related complications is more rapid in HBV/HIV co-infected persons than in persons with chronic HBV or HIV monoinfection. For management of co-infection, periodic monitoring of HBV and staging of liver disease is recommended. Staging of liver disease and screening for hepatocellular carcinoma (HCC) is especially important for certain high-risk groups defined by age, sex and ethnicity.
Methods: A retrospective chart review was completed for all patients with HBV/HIV co-infection seen at the AIDS Resource Center of Wisconsin from July 2015 to June 2016. Patients with at least one clinic evaluation during the study period and those with HIV virological suppression were included. HIV virological suppression was defined as having a mean HIV viral load of <200 copies/ml. HBV virological suppression was defined as the most recent HBV quantitative DNA being <20 IU/ml.
Results: Out of 34 patients who met inclusion criteria, monitoring for HBV using quantitative DNA was done at least once on 32 (94.1%) patients. Of these, 23 (71.9%) patients had HBV suppression. Out of 18 (52.9%) patients who underwent staging of liver disease using imaging, 7 (38.9%) had radiological evidence of cirrhosis. Out of 16 patients in whom liver imaging was not performed, 14 (87.5%) belonged to a high-risk group. All patients were screened for Hepatitis C (HCV); however, screening for Hepatitis A (HAV) was done in only 30 (88.2%) patients. Seven (20.6%) patients had HCV co-infection.
Conclusion: Monitoring for HBV control and screening for HAV and HCV was done in the majority of our study population. We did notice missed opportunities in staging of liver disease, especially in certain high-risk groups. Efforts at identifying and addressing factors that lead to these gaps in patient care could further help advance care of this patient population.

Fox, Alexander — Molecular & Cellular Research

Genetic variants affecting risk of Type 2 Diabetes exhibit pleiotropic influence on multiple diseases

Authors: Fox AJ, Corbett JA, Cox NJ
Project Mentor: John Corbett, PhD

Genome-wide association studies (GWAS) are comprehensive and efficient in analyzing the genetic components of complex diseases but have difficulty in annotating SNP associations to genes. To address this issue, PrediXcan, a new prediction model, uses multi-SNP predictors to analyze the genetically regulated expression of genes. PrediXcan was hypothesized to be an excellent modality for examining what variations in genetic functional units could impact risk of developing type 2 diabetes (T2D) and how these genes may increase susceptibility to other diseases. Genes within 1 Mb loci of recognized T2D-associated SNPs and those established in previous GWAS were analyzed by PrediXcan to determine what phenotypes were associated with these genes. Additionally, patient data from the biorepository BioVU was analyzed to discover novel genes significantly associated with T2D. It was found that many of the risk factors associated with T2D and related complications exhibited no overlap. Additionally, many of these genes were found to be associated with an array of seemingly unrelated phenotypes. While some phenotypes like obesity were expected, others such as cardiomegaly were non-obvious and surprising. Both the newly identified genes in this study and those discovered in prior GWAS were associated with the same set of disorders, providing evidence for a clustering of disease phenotypes. If susceptibility loci can contribute to multiple diseases, this may not only improve the categorization of diseases but advance personalized medicine by allowing for a more specific, individualized approach to prevent or ameliorate common T2D complications.

Gallagher, Maggie — Poster H2 — Global Health

Pre-Med Pair Up

Authors: Chou E, Lauck S, Ponkratz A, Thompson K, Gallagher M
Project Mentor: Sara Lauck, MD and Erica Chou, MD

Literature studies suggest widespread advantages to peer mentoring programs; however, data about medical-student-undergraduate mentorship is lacking. To study this gap, a formal mentorship program, Pre-Med Pair Up, was established at the Medical College of Wisconsin, where pre-medical students from the University of Wisconsin-Oshkosh and Marquette University were paired with medical student mentors. The program provided peer mentorship and resources including monthly newsletters, volunteer options, and MCAT advice intended to help pre-medical students prepare for medical school and its application process.
After 6 months, retrospective surveys were created for pre-medical students and medical students to investigate the effectiveness of PMPU. One survey was distributed to the 26 medical student mentors, of which 13 completed the survey, and a second survey was distributed to the 43 undergraduate participants, of which 11 completed the survey. Pearson correlation and linear regression analyses were used to assess the correlations between program components and student confidence and knowledge. Pre-medical student survey results showed that most students felt that their confidence in abilities as a pre-medical student improved with program involvement: 9.1% no improvement, 45.5% minimal improvement, 27.3% moderate improvement, and 18.2% great improvement. This confidence was strongly correlated between students' knowledge of volunteer opportunities and feelings of preparedness for the medical school application process and medical school curriculum. Medical students thought the program was successful in making them better mentors. Confidence in their abilities as a mentor was correlated with their feelings of success as a mentor. PMPU has shown to be effective in improving student confidence by providing medical students an outlet to serve as mentors and pre-medical students resources that enhance their understanding of medical school and the application proces

Gallagher, Sean — Poster 30 — Global Health

Tracking Resistance Levels of Bacteria to Quinolone Antibiotics

Authors: Gallagher S, Wainaina JN
Project Mentor: J. Njeri Wainaina, MD

Introduction and Objective: The discovery of antibiotics revolutionized the field of medicine. However, their widespread and unregulated use has given rise to the ever growing problem of resistance. Many institutions have since created antimicrobial stewardship programs to limit antibiotic use and curb rising resistance rates. This study aimed to evaluate the outcomes of such practices and to examine specifically if resistance rates can be decreased when less antibiotics are being used. Study Methods: Microbiology antibiogram data from 2016 and 2017 was obtained from the Wisconsin Diagnostic Laboratory. Urine samples from the Froedtert inpatient setting that were cultured and sensitized were included in analysis. Samples were determined to be either sensitive or resistant to ciprofloxacin based on minimum inhibitory concentrations values. During 2017, the antimicrobial stewardship team at Froedtert worked to reduce the hospitals overall inpatient used of quinolone antibiotics. Results: The rate of resistance to quinolone antibiotics did not statistically change between 2016 and 2017. During 2017, the antimicrobial stewardship team was able to reduce overall quinolone use by roughly 50 percent. Conclusion: Despite the success in significantly reducing the use of quinolone antibiotics, the rate of resistance was unchanged. Further research should focus on continued reduction in quinolone use and longer study intervals.

Gannon, Nicholas

Clinical & Translational Research

Smoking predicts poorer distant metastasis-free and progression free-survival in soft tissue sarcoma

Authors: Gannon NP, Bedi M, King DM

Project Mentor: Meena Bedi, MD and David M. King, MD

Background: Soft tissue sarcomas (STS) are often treated with pre-operative radiation (RT), with or without chemo-therapy, followed by wide local excision. Prognosis for these patients involves an interplay of tumor and patient characteristics. Known prognostic determinants include tumor size, grade, response to therapy, and patient character-istics such as age. While smoking is negatively correlated with outcomes in various malignancies, the impact on STS is unknown. We aimed to assess if smoking impacts overall (OS), distant metastasis-free (DMFS), and progression-free (PFS) survival in patients with STS treated with pre-operative RT.

Methods: Between 2000 and 2015, 166 patients with STS were identi ed from our prospective database. Patient vari-ables were retrospectively reviewed. Smoking was de ned as a ≥ 10 pack year history of current and former smokers. Survival was evaluated using the sher exact test for univariate (UVA) and logistic regression for multivariate (MVA) analysis.

Results: Fifty-seven (34.3%) patients had smoking histories of ≥ 10 pack years. On UVA, smoking was associated with decreased DMFS ($p = 0.0009$) and PFS ($p = 0.0036$), but not OS ($p = 0.05$). Smoking held signi cance on MVA for both DMFS and PFS. Current smokers and patients with ≥ 24-month follow-up demonstrated decreased DMFS and PFS on UVA and MVA.

Conclusions: Current smokers and patients with a signi cant smoking history demonstrated decreased DMFS and PFS in STS patients treated with pre-operative RT. Smoking may cause immunologic compromise and therefore lead to higher rates of progression and distant metastasis.

Gehring, Michael

Clinical & Translational Research

Association Between Stenosing Tenosynovitis and Dupuytren's Contracture in the Hand

Authors: Gehring M, Yang K, Bou Zein Eddine S, Hettinger P

Project Mentor: Patrick Hettinger, MD

Both stenosing tenosynovitis and Dupuytrens contracture are common conditions encountered in hand surgery. In stenosing tenosynovitis, inflammation leads to trapping of the flexor tendon as it glides through the pulley system. In Dupuytren's contracture, pathological proliferation and thickening of the superficial palmar fascia forms cords and nodules leading to soft tissue and joint contractures. The purpose of this study is to examine whether there's an association between the two processes. A retrospective chart review was performed to include all patients seen by a single surgeon between 2014-2017 with the diagnosis of trigger finger or Dupuytren's contracture. Patients with systemic inflammatory diseases such as rheumatoid arthritis were excluded. Patients' demographics, medical history, social and surgical histories are recorded. Univariate and multivariate analysis were conducted. A cohort of 238 patients was identified.192 patients were diagnosed with trigger finger. 89 patients were diagnosed with Dupuytren's contracture. Forty-three patients carried both diagnoses. Median age was 61.6 (56 : 72). Half were male (50.4%) and 66.8% reported current alcohol intake. Other factors include history of former or current tobacco use (52.9%), diabetes (23.9%), and occupations requiring manual labor (31.1%). Trigger finger, gender and age were significantly associated with the development of Dupuytren's contracture in the univariate analysis. Dupuytren's contracture and gender were significantly associated with the development of trigger finger in the univariate analysis. In the multivariate model, age and trigger finger were significantly associated with Dupuytren's contracture. Significant association between stenosing tenosynovitis and Dupuytren's contracture was identified in our patient cohort. Patients with stenosing tenosynovitis may be at an increased risk of developing Dupuytren's contracture or vice versa.

Ghassemi, Omeed — Clinician Educator

Non-Thermal Infrared (NIR) Light Inhibits Osteoblast Apoptosis

Authors: Ghassemi O, Struve J, Kolz J, Weninger M, Man J, Wang M, Weihrauch D, Ninomiya J
Project Mentor: James T. Ninomiya, MD, MS

The net bone loss associated with osteoporosis is due to an imbalance between bone formation and bone resorption. Worldwide, one in every three women and one in every five men over the age of 50 will experience an osteoporosis related fracture. The osteoblast mitochondrial apoptosis pathway is suppressed by Bcl2, an anti-apoptotic protein, which inhibits Bax, a pro-apoptotic protein. This interaction ultimately prevents the release of caspase activators; therefore, reducing the formation of damaged DNA and preventing apoptosis. We hypothesized that exposure to NIR light might increase osteoblast longevity and function through inhibition of apoptosis via alterations in the ratio of Bcl2 to Bax and effects on downstream pathways. Murine MC3T3-E1 pre-osteoblasts were grown in cell culture and exposed to NIR light at 670nm and 4J. Controls consisted of osteoblasts grown in absence of exposure to NIR light. Western blot data showed a statistically significant increase in the ratio of Bcl2 to Bax after exposure to NIR light at all examined time points when compared to control. The caspase 3 assay produced a statistically significant decrease in the amount of caspase 3 present after NIR light exposure when compared to control at 24 hours. TUNEL data revealed a statistically significant decrease in TUNEL+ cells after NIR light exposure when compared to control at both 24 and 48 hours. These findings may provide the basis for the development of non-pharmacologic means for reversing bone loss through the use of devices that provide a source of NIR light directly to bone.

Giordano, Taylor — Clinical & Translational Research

Using biomarkers as indicators of frailty to predict urgent general surgery outcomes.

Authors: Webb TP
Project Mentor: Travis Webb, MD, MHPE

INTRODUCTION: Frailty has been shown to predict poor outcomes in geriatric patients, but prior research has focused on assessment in the outpatient setting and before elective surgery. No prior study has attempted to evaluate the association between outcomes and frailty prior to emergency general surgery.
HYPOTHESIS: Measurements of increased frailty will correlate with longer hospital stay after urgent general surgery in patients 65 years of age or older at Froedtert Memorial Lutheran Hospital (FMLH).
STUDY METHODS: A prospective cohort study of 15 patients age 65+ who presented to FMLH Acute Care Surgery service and underwent cholecystectomy, appendectomy, exploratory laparotomy, or exploratory laparoscopy. Serum albumin, creatinine, hemoglobin, and white blood cell count (WBC) were collected prior to surgery as biomarkers to quantify frailty. The outcome assessed was length of hospital stay.
RESULTS: The average length of hospital stay was 5.73 (3.4 standard deviation) days. Multiple regression analysis was performed with the four laboratory values and length of hospital stay which calculated the coefficient of determination (R2) = 0.65 with a P value of 0.022.
CONCLUSIONS: A statistically significant strong correlation was found between the biomarkers albumin, creatinine, hemoglobin, and WBC, and the length of hospital stay in the geriatric population undergoing urgent general surgery. These findings suggest that our protocol can be used to identify frail patients who are at high risk for lengthy hospital stays, and can direct health care providers to better allocate resources.

Glover, Xavier — Molecular & Cellular Research

Epoxyeicosatrienoic Acid Analog Attenuates Cisplatin Nephrotoxicity

Authors: Glover XG, Khan AH, Sharma A, Falck JR, Imig JD
Project Mentor: John D. Imig, PhD

Introduction: Cisplatin is a widely used anticancer drug that is severely limited by nephrotoxic effects. As a mediator of renal damage, cisplatin nephrotoxicity is utilized as an animal model for acute kidney disease. Previous studies have demonstrated that metabolites of the arachidonate cascade epoxyeicosatrienoic acids (EETs) have renal protective properties via anti-inflammatory, anti-oxidative, and anti-apoptotic activity. Hypothesis & Specific Aims: We hypothesize that EET analogs will ameliorate cisplatin-induced renal injury. Consequently, this study investigates the EET analog, EET-C22, for attenuation of cisplatin-induced nephrotoxicity in male WKY rats. Study Methods: Three treatment groups (n=5-7/group) of male WKY rats were used for this study: non-cisplatin-treated rats (control); cisplatin-vehicle; and cisplatin+EET-C22 (10 mg/kg/day). Cisplatin was administered (7mg/kg i.p.) in vehicle and EET-C22 group. EET-C22 was administered via osmotic pump implantation 5 days before the cisplatin administration. Increases in blood urea nitrogen (BUN), kidney injury molecule 1(KIM-1), plasma creatinine, and urinary N-acetyl-β-(d)-glucosaminidase activity/urinary creatinine ratio were identified as markers for cisplatin-induced renal injury. Results: The cisplatin-vehicle group showed a 5-fold increase in BUN concentrations when compared to the control group. EET-C22 reduced BUN levels by nearly 50% in treated rats. KIM-1 in untreated groups was increased 70-fold. EET-C22 reduced KIM-1 levels. In comparison to control, N-acetyl-β-(d)-glucosaminidase activity to urinary creatinine ratio was 4 times greater. EET-C22-treated rats demonstrated lower ratio values. Plasma creatinine concentrations were nearly double in untreated rats compared to control. EET-C22-rats demonstrated decreased plasma creatinine values. Conclusions: We demonstrated that EET-C22 has renal protective properties and attenuated cisplatin-induced kidney injury.

Goldenberg, Adam — Molecular & Cellular Research

Effect of an MC2R Antagonist, GPS1574, on the Corticosterone Response to Stress in the Neonatal Rat

Authors: Goldenberg A, Gehrand A, Waples E, Jablonski M, Hoeynck B, Raff H
Project Mentor: Hershel Raff, PhD

Understanding the mechanism of steroidogenesis of the premature neonate is critical, as the HPA axis is essential for lung maturation and response to stressors such as hypoxia. The neonatal rat pup is a useful model for premature human neonates and has been used to study the development of the HPA axis. The stress response in the neonatal rat shifts from ACTH-independent to ACTH-dependent between postnatal days 2 (PD2) and 8 (PD8). This may be due to the presence of an undetectable (bioactive, non-immunoreactive) ligand to the MC2R. Another possibility is that the PD2 stress response is not mediated by MC2R at all. To further explore this phenomenon, we evaluate the corticosterone response to hypoxia or ACTH in neonatal rats after treatment with GPS1574, a newly described MC2R antagonist which we have previously shown to be effective in vitro. Pups at ages PD2, PD8, and PD15 were pretreated with either GPS1574 (32 mg/kg) or Vehicle for GPS1574 and then subject to ACTH-injection or hypoxia. Pretreatment with GPS1574 decreased baseline corticosterone in PD2 pups, but increased baseline corticosterone in PD8 and PD15 pups. GPS1574 did not attenuate the corticosterone response to hypoxia in PD2 pups, and augmented the corticosterone response in PD8 and PD15 pups. GPS1574 augmented the corticosterone response to ACTH in PD2 and PD15 pups, but had no significant impact on the response in PD8 pups. Baseline adrenal Mrap and Star mRNA increased from PD2 to PD15, whereas Mrap2 mRNA expression was low and did not change with age. The data suggests that GPS1574 is not a pure MC2R antagonist, but rather acts as a bias agonist/antagonist. Its ability to attenuate or augment the adrenal response may depend on the ambient plasma ACTH concentration and/or developmental changes in early transduction steroidogenic pathway genes.

Golob, Laura — Quality Improvement and Patient Safety

Improving Discharge Accuracy by Patient

Authors: Lamb G, Golob L
Project Mentor: Geoffrey Lamb, MD

Background: A well-coordinated and efficient discharge process has numerous benefits such as streamlined workflow for hospital staff, decreased readmissions rates, and increased patient satisfaction with the hospital and providers. However, many patients report feeling unprepared at the time of discharge. As of June 2016, 9NT, one of three Froedtert Memorial Lutheran Hospital's (FMLH) general medical units, correctly predicted discharges for only 20-30% of the patients potentially leaving on any given day. A better understanding of this complicated discharge process could improve the predictive ability for individual patients' discharge dates.
Methods: This study included data collected on 105 patients discharged from June 4th to June 19th of 2016 on FMLH's 9NT. Information was collected from the electronic medical record (EMR) and included items such as diagnosis, expected discharge date, and date of prediction. This information was compared to discharge data electronically recorded within the commercial case management tracking system called OnTrac.
Results: After understanding the discharge process, the health care team determined root causes for the low prediction rate included the inability to consistently enter information into the EMR and update patient's charts throughout the day. This in turn was attributable to lack of standardized nursing documentation and the time consuming process of updating discharge information based on its location in the EMR. The team identified a potential intervention to increase the number of correct predictions. This intervention would incorporate the estimated discharge date into the Adult Patient Care flowsheet thus incorporating it into the nurse's existing workflow.

Good, Samuel — Urban & Community Health

Improving provider recognition and treatment of inadequate physical activity in the aging population

Authors: Good SD, Davis A, Sherman K, Whittle J
Project Mentor: Jeff Whittle, MD, MPH

Introduction: Most Americans do not achieve recommended levels of physical activity (PA); most doctors do not discuss PA. Studies in a few settings suggest that if intake staff routinely measure physical activity by asking the 2 item PA Vital Sign (PAVS) patients more often report discussing PA. We hypothesized that routine use of the PAVS by intake staff would increase patient recall of PA discussion during primary care provider (PCP) visits.
Methods: Six volunteer LPNs working in a Milwaukee VA primary care clinic included the PAVS in their check-in routine during the study period, while other LPNs in that clinic did not. Each Tuesday through Friday, we called a sample of patients who had seen a PCP in that clinic on the preceding day. We asked consenting patients if they had discussed PA with their PCP and/or intake LPN and whether they had received a recommendation to increase their PA.
Results: We reached 451 out of 900 patients (50%) who we attempted to contact. Participants in the PAVS system implemented by intake staff were more likely to recall being asked about PA during the PCP visit. 75.3% of PAVS participants reported being asked about PA during the PCP visit compared to 24.7% of non-PAVS participants ($p=0.0012$, Fisher's exact test).
Conclusion: Administration of the PAVS by intake staff significantly increased patient report that they had discussed PA during the clinic visit. Future work should assess the impact of PAVS administration on physician documentation of physical activity discussion and actual changes in patients' level of PA. Given increasing recognition of inadequate levels of PA and its health consequences, researchers should also seek to identify barriers and facilitators to implementation and use of the PAVS and other approaches to increasing patient PA.

Gooley, Brian — PODIUM — Clinician Educator

Perceptions of First Year Clinical Students on Their Internal medicine Hospitalist Rotation

Authors: Gooley B, Jha P, Bhandari S
Project Mentor: Sanjay Bhandari, MD and Pinky Jha, MD

Background: There is limited data about the number of patients first year clinical medical students should care for, to optimize their education. Students who are overwhelmed by caring for too many patients have a higher level of stress, while students who take on less work miss out on important educational opportunities. Both of these situations lead to less than optimal education. We therefore sought to quantify the number of patients medical students are comfortable caring for, while working with a hospitalist on an internal medicine rotation.
Methods: We used a Qualtrics survey system to ask third year medical students how many patients they believed they should take care for at any given time on internal medicine. Only students who had rotated a month with a hospitalist were asked to participate in the survey. Survey questions were multiple choice but allowed for comment submission. 49 of 53 (92.5%) total eligible students responded.
Results: 3.6 was the average number of patients responders thought they should be assigned, with the mode being 3. 0% of responders thought that one patient was the maximum number they should care for, 6% thought two patients, 48% thought three patients, 36% thought four, and 10% thought five.
Conclusions: Third year medical students on a hospitalist internal medicine service think that they should ideally follow 3-4 patients on average. Several comments have indicated variability due to previous clinical experience or the complexity of the patients being cared for. This may change through the course of their rotation.

Gordon, Jamison — Poster 31 — Clinician Educator

Propranolol for Fibromyalgia

Authors: Gordon J, Benjamin I, Okifuji A, Donaldson G, Hare B, Khor L, Light A, Light K, Nakamura Y, Tadler S, Mitsunaga R, Kida Y, White A.
Project Mentor: Ivor J. Benjamin, MD, FAHA, FACC
Community Partner: University of Utah Pain Management Center

Fibromyalgia Syndrome (FMS) is a prevalent chronic pain disorder affecting up to 5% of the population. Previous studies suggest FMS sufferers have hyperactive sympathetic activity with a hypo-reactive response to stress. This seemingly paradoxical response may result from chronic hyper-stimulation of the beta adrenergic receptors leading to receptor desensitization and down-regulation. Preliminary work suggests that the use of low dose propranolol administration may reduce post-exercise pain and fatigue. This was a randomized double blind pilot study with the aim of collecting feasibility data for the use of low dose propranolol in helping to treat fibromyalgia symptoms. The hope was to determine the best dose for use in a future clinical trial. In order to assess the severity of relevant symptoms and health related quality of life, each participant completed a set of self report questionnaires. Participants underwent regular blood pressure monitoring in addition to ECG and respiratory assessment to determine respiratory sinus arrhythmia (RSA). 10 participants completed the study. Those who took 10 mg propranolol BID demonstrated little change in blood pressure while decreasing their pain and fatigue scores. They increased their RSA by nearly 10% suggesting that a small dose of propranolol may help regulate vagal tone. Those who took placebo BID decreased RSA by 9% whereas those who took 20 mg BID were essentially unchanged. Overall, all participants tolerated the medications well. The small sample size makes it difficult to delineate conclusive results. However, 10 mg BID appears to yield the best results while minimizing side effects.

Gray, Jennifer — Poster 32 — Global Health

An Educational Intervention for Medical Students to Improve Firearm Storage

Authors: Kwong J, Gray J, Melzer-Lange M, Rein L, Liu Y
Project Mentor: Marlene Melzer-Lange MD

Limiting children's access to firearms remains an important factor in decreasing firearm injury in pediatric populations. While studies have shown that physicians believe firearm injury prevention (FIP) to be an important subject, few have conversations with patients regarding FIP due to lack of training and knowledge regarding the subject. To address this gap, a study was developed to determine if an educational intervention improved third-year medical students' (M3) knowledge and self-efficacy in FIP counseling. In this study, M3s received either the FIP intervention or a control lecture during a monthly lecture series. All students completed baseline surveys regarding beliefs, self-efficacy, and knowledge of FIP counseling. Those in the intervention group also completed a post-intervention survey. Surveys were analyzed with a paired t-test and showed the intervention improved short-term knowledge and self-efficacy in FIP counseling. These results can inform an approach to develop injury prevention counseling skills early in physician training.

Grewal, Rupinder — Global Health

Mental Health Indicators in Asia Pacific Economic Cooperation (APEC)

Authors: Grewal R, Idso J, Prough M, Sundaram C, Klein S, Nida J, Jumbam D, Garringe K and Kron M
Project Mentor: Michael Kron, MD, MS

The World Economic Forum (2011) concluded that the economic impact of mental illness is the single most important contributor among non-communicable diseases to loss of productivity. The Asia Pacific Economic Cooperation (APEC) organization responded to that information with efforts to address mental health as an integral component of economic development. The World Health Organization granted APEC access to a subset of the 2014 Mental Health Atlas database containing health indicators from all 21 APEC economies. APEC specific data was extracted and compared to data representing the six WHO regions of the world. Mental health workforces in APEC include a higher number of psychiatrist providers compared to WHO regions. Suicide rates reported in three APEC economies are among the highest in the world. Therefore, APEC has implemented a mental health strategic plan which will share best practice models to reduce the economic impact of mental illness within its member economies.

Grosshuesch, Craig — Clinical & Translational Research

Brain injury to heart procurement interval and relationship to pediatric cardiac transplantation outcomes

Authors: Grosshuesch C, Johnson WK, DeVogel N, Yin Z, Wang T, Kindel SJ, Woods RK
Project Mentor: Ronald K. Woods, MD, PhD

Objective: Severe brain injury and brain death are associated with pathophysiological changes unfavorable to the heart. Time of inciting event of brain death in cardiac donors along with the unfavorable milieu exhibited in donor organs presents a challenge in determining an optimal management strategy. Limited single-center studies evaluating the interval from brain death to cardiac procurement have produced conflicting results. We sought to analyze the relationship between the time interval of primary central nervous system event to cardiac procurement with major outcomes after pediatric cardiac transplantation using a large national registry.
Methods: We retrospectively evaluated a pediatric cohort from the UNOS registry from 2005-2014. Two separate cohorts were defined: one including only recipients who received donor hearts from patients with a primary CNS event, (BD), and another including donors with any cause of death (ALL). The entire time period from donor hospital admission to donor aortic clamp was used to define brain interval (BI) and was further categorized into groups for each cohort. The primary outcomes of interest were recipient and graft survival time. Logistical regression modeling was used for multivariable analysis.
Results: The ALL cohort included 2,671 transplant cases and the BD cohort included 2,565 cases. BI was not related to recipient survival time for either cohort ($p = 0.322$ and $p = 0.531$ respectively); nor to graft survival time ($p = 0.485$, $p = 0.563$). However, in the BD cohort a longer brain interval was associated with a decreased proportion of hearts accepted for transplant : 57.1% for a BI > 6 days versus 63.6% and 62.8% accepted for shorter intervals ($p<0.0001$).
Conclusion: Based on UNOS data, there was no relationship between BI and pediatric cardiac transplantation outcomes. Extended donor management intervals may reduce the number of hearts deemed acceptable for transplantation.

Guignard, Vanica — Poster H11 — Urban & Community Health

Community Conversations on Cancer Disparities in Milwaukee

Authors: Guignard V, Young S, Matthews L, Jensik K, Stolley M
Project Mentor: Melinda Stolley, PhD
Community Partner: Greater Milwaukee Foundation

Introduction: Breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer death among US women. While treatment advances have led to improved survival rates, significant disparities between African-Americans and Caucasians exist.
Methods: We conducted a qualitative study using focus groups with African-American women (39 participants) in Milwaukee. Two groups (20 participants) included women with no previous breast cancer diagnosis and two groups (19 participants) included breast cancer survivors. Questions addressed: what makes a healthy community, sources for cancer screening information; resources available and used during cancer treatment and survivorship, and what can be done to address cancer disparities in Milwaukee.
Results: Primary themes for the groups with no previous diagnosis included fear of screening, men taking responsibility for their health and the importance of neighborhoods that are clean and crime-free, with engaged parents to promote health. Primary themes for the survivor groups included the benefits of cancer support groups, difficulty dealing with chemotherapy side effects, and the importance of educating and engaging youth about cancer. Principal themes that overlapped between both populations included lack of trust in physicians and healthcare institutions, advocating for one's own health, and spirituality.
Conclusion: Eliminating breast cancer disparities requires active engagement from multiple organizations and stakeholders. Improvements can be made through positive community building, support groups and resources for breast cancer patients, diversifying healthcare, and increasing patient advocacy.

Hall, Sam — Poster 33 — Urban & Community Health

Alcohol Use and Peer Support in Veterans

Authors: Hall S, Orfali S, Flower Z, Franco Z
Project Mentor: Zeno Franco, PhD
Community Partner: Dryhootch

Veterans are at an increased risk for developing Alcohol Use Disorder (AUD) and other co-morbid psychiatric disorders, yet they often under-utilize professional mental health services. Peer support programs offer an alternative therapeutic option for both those seeking help for psychiatric conditions and those with subclinical mental health problems. The purpose of this study was to examine alcohol use in veterans enrolled in a peer support program, determine the effect of peer support on alcohol use and PTSD symptoms, and assess the interaction between AUD risk and PTSD symptoms over time. Veterans were enrolled in a twelve-week peer support program at Dryhootch in Milwaukee, WI. Participants were paired with a mentor to address issues including employment, housing, social and family support, addiction, and mental health. Measures of AUD risk (AUDIT) and PTSD symptoms (PCL-5) were both collected before and after twelve weeks in the program. Additionally, participants reported their total drinks consumed each week throughout the program. Results showed that veterans in this study were at an increased risk for AUD and consumed more alcohol compared to averages in civilian populations. The risk for developing AUD was associated with more PSTD symptoms. While PTSD symptoms were significantly lower after twelve weeks in the peer support program, AUDIT scores and the average number of weekly drinks were not significantly different. However, there was an interaction between AUD risk and PTSD symptoms such that veterans with higher AUD risk showed less improvement in PTSD symptoms. This study showed that although alcohol use was not significantly reduced as a result of the peer support program, heavy alcohol use influenced success in the program as demonstrated by less reduction in PTSD symptoms in those with higher AUD risk. Further community work should address improving AUD risk in order to achieve better mental health outcomes for those with heavy alcohol use.

Heffernan, Robert — Quality Improvement and Patient Safety

Comparing the Accuracy of Mass Casualty Triage Systems in a Pediatric Population

Authors: Heffernan R, Lerner EB, McKee C, Browne L, Colella MR, Liu JM, Schwartz R
Project Mentor: E. Brooke Lerner, PhD

Introduction. It was previously difficult to compare the accuracy of different mass casualty triage systems to one another. This pilot study is one of the first attempts to operationalize an expert panel's criterion standard definitions of triage categories in a pediatric population, in order to compare accuracy between different systems.
Objective. To compare the accuracy of four different mass casualty triage systems (SALT, JumpSTART, Triage Sieve, and CareFlight) when used for children.
Methods. We observed the emergency department triage of patients less than 18 years-old presenting to a pediatric specialty hospital. A single, certified EMS provider observed each patient's initial triage in the emergency department (ED) and recorded all findings that were necessary to categorize the patient using each of the four mass casualty triage systems being studied. Each patient was then assigned a criterion standard triage category based on the treatments received and final disposition. Descriptive statistics were used to compare accuracy, over-, and under-triage rates for each of the triage systems.
Results. 115 subjects were enrolled. Of those, 51% were male and 57% were transported by ambulance. When compared to the criterion standard definitions, SALT was found to be the most accurate (59%; 95% CI 50-68) compared to JumpSTART (57%; 48-66), CareFlight (56%; 47-65), and TriageSieve (56%; 46-65). SALT had the lowest under-triage rate (33%; 24-42) compared to JumpSTART (39%; 30-48), CareFlight (39%; 30-48) and TriageSieve (39%; 30-48). For each triage system, the most common error was designating a patient as "minimal" that, according to the criterion standard, should have been triaged as "delayed."
Conclusion. We found that the four most popular mass casualty triage systems preformed similarly in an ED-based pediatric population. Better differentiating between patients categorized as "minimal" and "delayed" may improve the accuracy of mass casualty triage systems.

Helmen, Zachary — Health Systems Management & Policy

Predictors of postoperative urinary tract infection after bariatric surgery

Authors: Helmen Z, Helm M, Helm J, Nielsen A, Kindel TL, Higgins R, Gould JC
Project Mentor: Jon C. Gould, MD

Background: In bariatric surgery patients, urinary tract infections are common amongst postoperative infections. In this study, we sought to determine if preoperative patient factors and perioperative processes contribute to an increased risk of UTI.
Methods: A retrospective analysis was performed of patients who underwent bariatric surgery at a single institution between March 2012 and May 2016. Standard protocol was antibiotic prophylaxis with cefazolin. Patients with a penicillin allergy received clindamycin. Urinary catheters were placed selectively. A univariate and multivariate analyses were performed to determine risk factors for patients who developed a UTI within 30 days postoperatively.
Results: 694 patients (82.7% female) underwent bariatric surgery in the study interval. UTIs were more common in females (4.9% vs. 1.7%, p=0.12). On univariate analysis age, operative time, length of stay, urinary catheter placement, clindamycin prophylaxis, and revisional surgery were significantly correlated with UTI. A multivariate logistic regression model revealed the risk of UTI increased 5.38-fold [95% confidence interval (CI): 2.41-12.05] with clindamycin use, 6.37-fold [95% CI: 2.22-18.18] with revision surgery, and 1.25-fold [95% CI: 1.05-1.49] for every 5 years gained in age.
Conclusions: Older age, clindamycin prophylaxis, and revisional procedures are significantly associated with an increased rate of UTI following bariatric surgery. Several identified variables are modifiable risk factors and targets for a quality improvement initiative to decrease the rate of UTI in bariatric surgery patients.

Henning, Rachel — Quality Improvement and Patient Safety

Alvimopan Use Following Gastrointestinal Surgery is Associated with Decreased Length of Stay

Authors: Henning R, Ridolfi T, Peterson C, Ludwig K
Project Mentor: Timothy Ridolfi, MD

Post-operative ileus is a significant economic burden. Alvimopan, a μ-opioid antagonist, is shown to reduce length of stay (LOS) and reduce time to bowel function return in GI surgical patients. Many institutions use it in enhanced recovery after surgery (ERAS) protocols, which include pain regimens like acetaminophen (APAP), ketamine, gabapentin (GBP) or ketorolac. Small studies on alvimopan usage and effectiveness exist, but not at national level. Primary goal of this study: examine relationship between alvimopan usage nationwide with LOS and cost, with secondary goal: examine relationship between IV and oral APAP, ketamine, oral GBP and ketorolac with LOS and cost.
Methods: The University HealthSystem Consortium database was queried for hospitals doing large and small bowel surgeries diagnosis related groups 329-334 Jan-Dec 2015. LOS, direct cost (DCI) and mortality outcomes were indices of the observed/expected. Multiple linear regression model predicted outcomes using % usage of alvimopan, IV and oral APAP, ketamine, oral GBP and ketorolac. Backward model selection process identified statistically significant covariates to add to the model. Alpha level of 0.05 was used.
Results: Median usage percentages from 128 hospitals, 46,220 cases: alvimopan 1.6% (0-62.6%), oral APAP 41.6% (0-95.1%), IV APAP 30.8% (0-93.8%), ketamine 6.7% (0-91.5%), GBP 9.4% (0-72.5%) and ketorolac 36.5% (0-92.3%). Increasing alvimopan usage associated with decreasing LOS index (p=0.017) and no significant change in DCI. Increasing GBP usage associated with increase in LOS index (p=0.0008), increase in DCI (p=0.002) and decrease in mortality index (p=0.0472).
Conclusion: Increased alvimopan usage is associated with decreasing LOS index following GI surgery with no change in cost. Alvimopan should be used in ERAS protocols in GI surgical patients to reduce LOS without increasing cost. GBP correlating to increase LOS index, increase in DCI and decrease in mortality index requires further study.

Hirsch, Thomas — Molecular & Cellular Research

Inhibiting bacterial H2S production as a potential combination antibiotic therapy

Authors: Hirsch T, Wynia-Smith S, Kristich C, Willoughby R, Smith B
Project Mentor: Brian Smith, PhD

Current antibiotics are inadequate for the treatment of many infections. In collaboration with Dr. Rodney Willoughby, we documented the case of a child with a Streptococcus anginosus group (SAG) associated brain abscess that improved only after treatment with hyperbaric oxygen therapy, the standard treatment for environmental hydrogen sulfide (H2S) poisoning. H2S production is documented for bacteria within the SAG as well as the Citrobacter and Salmonella genera and may contribute to the formation and maintenance of abscesses despite antibiotic administration. Small molecule inhibitors of the enzymes involved in bacterial H2S production have the potential to compliment antibiotic therapy in the treatment of abscesses caused by SAG, Citrobacter, and Salmonella. Cystathionine gamma lyase (CSE) and cystathionine beta synthase (CBS) enzymes produce H2S in humans and bacteria using cysteine and homocysteine as substrates. Propargylglycine, 3,3,3-trifluoro-alanine, (aminooxy)acetic Acid (AOAA), aminoexthoxyvinyl glycine, and Î²-cyano-alanine are known small molecule inhibitors of human CSE and CBS with varying efficacy. Our aim is to find the most potent inhibitor of human CSE, with the ultimate goal of finding inhibitors that are specific to the bacterial H2S-producing enzymes. Human CSE was expressed and purified recombinantly from E.coli. H2S production was measured using an enzyme activity assay in the presence of lead acetate. Rates were determined from the increase in absorbance at 390nm corresponding to the formation of lead sulfide. Propargylglycine-based inhibitors had the most potent effect due to suspected alpha orbital donation mechanism.

Hodapp, Joseph — PODIUM — Bioethics

Measuring satisfaction with pediatric pain management

Authors: Hodapp J, Ali S, Drendel A
Project Mentor: Amy Drendel, DO

In 2008, the Pediatric Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (PedIMMPACT) published a consensus statement of 26 pediatric pain experts from academia, clinical practice, government, and the pharmaceutical industry that recognized the dearth of research surrounding the topic of pediatric satisfaction with pain management. As a society and a system, we strive to include children in the decision-making process as soon as they are developmentally able, a concept that is the fundamental basis behind seeking assent and more active roles within healthcare decisions for children. As children develop and learn, it is the responsibility of adults to provide them with increasing opportunities for self-evaluation and more independent management of their healthcare, encouraging the growth of a new generation of self-determining adults. As clinicians and researchers, it is our prerogative to support the maturation of children by building effective methods to communicate their satisfaction with pain treatment and healthcare. We will review what is known about the topic of pediatric satisfaction with pain management, identify current gaps in knowledge, and provide direction for future research into this critical area of research.

Hurtte, Edward — Clinical & Translational Research

Widened Frontal QRS-T angle and Fragmented QRS for Patients with Chronic Kidney disease and Heart Failure

Authors: Hurtte E, Marong B ,Karagodin I, and Strande J
Project Mentor: Jennifer Strande, MD, PhD

Introduction: Fragmented QRS (fQRS) and a widened frontal QRS-T angle from surface electrocardiograms (ECG) are associated with myocardial fibrosis and sudden cardiac death. Concurrent chronic kidney disease (CKD) is common in patients with heart failure with preserved ejection fraction (HFpEF) and is associated with increased mortality. Therefore, we hypothesize that patients with CKD and pre-HFpEF will have a higher incidence of fQRS and widened QRS-T angles compared to those without CKD.
Methods: A retrospective cohort from Froedtert Hospital was divided into three groups: pre-HFpEF with CKD (group 1, n= 24), pre-HFpEF without CKD (group 2, n=16), and without pre-HFpEF or CKD (group 3, n=30). ECG's were then screened for fragmented QRS morphology: an additional R wave, notching of R or S, or the presence of >1 R' in two contiguous leads. Frontal QRS-T angle was calculated from the ECG. An ANOVA was used to indicate significance.
Results: Group 1 had the widest QRS-T angle, followed by Group 2, and lastly by our control Group 3 (106 vs. 84 vs. 73). When comparing group 1 to group 2, QRS-T angle did not differ significantly (p=.15). Fragmented QRS morphology did not statistically differ between groups.
Conclusion: Our data showed that CKD and HFpEF had the widest QRST angle. Although the QRST-angle of HFpEF and CKD was greater than HFpEF alone, these two groups did not differ significantly. Additional analysis with a larger sample size is warranted to determine its utility as a potential prognostic tool for cardiologic intervention.

Idika, Adaku — PODIUM — Global Health

Barriers to diabetic retinopathy treatment in Nigeria: U.S. methods that may improve access and treatment

Authors: Idika A, Stahulak A
Project Mentor: Andrea Stahulak, MD

Diabetic retinopathy is the leading cause of blindness in industrialized nations in those aged 15-64 years old. Nearly 100 million people globally are affected, and over 30% have vision-threatening diabetic retinopathy. Pertinent risk factors include at least a 10-year duration of diabetes mellitus, poor glycemic control, and hypertension. The prevalence of diabetes in sub-Saharan Africa is projected to be greater than 40 million by 2035. With a population of about 190 million people, Nigeria, the most populous nation in Africa, is in dire need for adequate screening programs and treatment protocols. Several cross-sectional studies in Nigeria have illustrated how the lack of wide-spread preventative screening measures can have economic implications, as many affected are between 40-59 years of age. In one study by Kyari et. al, 1 out of 35 working age adults in this age range are diabetic and in need of early interventions to prevent blindness. An 18-month pilot study of teleophthalmology was completed in the Latino community of Milwaukee, Wisconsin, where at least 40% of the population are living below poverty and lack the resources to obtain adequate and necessary health care. Four out of the 400 people screened for diabetic retinopathy were critical cases requiring immediate eye-saving interventions. If the success of this pilot study can be duplicated in Nigerian communities across the country, we may be able to limit the burden of vision-threatening diabetic retinopathy.

Idso, John — Poster H7 — Health Systems Management & Policy

Quality of Diabetes Care: Comparisons between Rzeszow, Podkarpacie, Poland and Waukesha, Wisconsin, US

Authors: Idso J, Telega G, Dabrowski M, Meurer J, Kidambi S
Project Mentor: John Meurer, MD, MBA

Introduction: Poland spent 6.4% of its GDP on healthcare in 2013, while the United States (US) spent 16.9%, despite similar life expectancies. Type 2 Diabetes Mellitus (DM) was estimated to have cost the US $176 billion in 2012. This study compares the quality of DM care between Waukesha in Wisconsin, US and Rzeszow in Podkarpacie region of Poland.
Methods: DM quality data for the Polish cohort was abstracted from the charts of 79 DM patients attending a regional diabetes clinic in Rzeszow, Podkarpacie from 2013-2014. Podkarpacie DM cost data was attained from the Polish National Health Fund. Seventy-nine DM patients, matched for age, BMI, and sex, from a diabetes clinic in Waukesha, WI were chosen as comparators. DM quality data was obtained through the electronic medical record. Cost data for each Waukesha patient was obtained from decision support staff.
Results: The mean (SD) for glycosylated hemoglobin (HbA1C, %) in the Polish and US cohorts were 7.4 (1.4) and 8 (2.1) respectively ($p=0.03$). The rate of statin usage in the Polish and US cohorts were 90% and 86% ($p<0.001$) respectively. The rate (# not tested) of nephropathy in the Polish and US cohorts were 16% (13) and 37% (1) ($p<0.001$) respectively. The direct medical cost per Polish patient with DM was $781. The direct medical cost per Waukesha patient with DM was $10,121.
Discussion: Based on our results, Polish cohort has a slightly better HbA1C. The rate of statin usage was slightly, though significantly, higher in the Polish cohort. The rate of nephropathy was significantly higher in the US cohort. The cost of care at Podkarpacie was ~10-fold lower compared to Waukesha.
While both countries operate under different political and economic conditions, each could benefit from a deeper understanding of the other's quality practices and cost structures.

Iglar, Paul — Quality Improvement and Patient Safety

Association of Depression and Communication Patterns in Geriatric Visits

Authors: Iglar P, Asan, O
Project Mentor: Onur Asan, PhD

Objective: The objective of this study is to examine communication (eye gaze) patterns and verbal communication systematically in doctor-elderly patient interactions and to investigate doctor-elderly patient interactions and communications in a depressed and non-depressed elderly population.
Methods: A secondary analysis of 43 videotaped elderly primary care sessions from the National Institute of Aging. Videos were coded using the Noldus Observer XT for both verbal and non-verbal interactions. T-tests were performed to observe differences between the depressed and non-depressed groups.
Results: In non-verbal communication, there were no significant differences detected between the depressed and non-depressed populations. In verbal communication, non-depressed patients spent a significantly longer time ($p=0.043$) discussing treatment options compared to the depressed patients.
Conclusions: Verbal communication patterns differ between a depressed and non-depressed elderly patient population.
Next Steps: This study offers practical applications that could be used in Health Information Technology design.

Isaacson, Erin — Clinical & Translational Research

Mitral Valve Surgery in Infants and Children: Surgical Approach, Outcomes and Predictors in 143 Pediatric

Authors: Isaacson E, Lucjak C, Johnson WK, Yin Z, Wang T, Woods RK, Tweddell JS, Mitchell ME
Project Mentor: Michael E. Mitchell, MD

Objective: The surgical treatment of mitral disease in the pediatric population continues to be challenging. Managing diversity in patient anatomy, growth, and avoiding the need for long term anticoagulation or re-operation often requires tradeoffs between imperfect solutions. We sought to assess our approach to mitral valve surgery in infants and children, and to identify predictors associated with mortality, re-operation and recurrent mitral disease.
Methods: The medical records, echocardiograms, and operative reports of all patients who underwent surgical intervention for mitral valve repair or replacement from January 2000 through April 2016 were reviewed.
Results:143 patients undergoing mitral valve surgery were included for analysis. 64 were infants (<1 year old) and 79 were children(1 to 18 years old). 74 were male and 69 were female. Of 143 primary mitral valve operations,133 were valve repairs and 10 were valve replacements (5 infants; 5 children). Degree of preoperative mitral regurgitation and mitral stenosis was similar between the groups. Median length of stay was longer for infants (15 vs 5 days, p=<0.001), and operative mortality was higher in infants (10.9% vs. 0%, p=0.003). Mean follow-up was 4.1 years. Freedom from death or transplant, and freedom from reoperation on the mitral valve was worse in infants. (p <0.001; and p= 0.028).
Conclusions: Infants undergoing mitral valve surgery have more pre-operative risk factors and more complicated operative and post-operative courses compared to children, despite similar degrees of mitral stenosis and regurgitation. There is room for improvement in surgical strategies for mitral valve disease in the pediatric population.

Janczy, Jerry — Clinical & Translational Research

Correlation of pharyngeal critical pressure with airway anatomy in OSA: a systematic review

Authors: Janczy J, Woodson BT, Garcia GJM
Project Mentor: Guilherme Garcia, PhD

Introduction: Obstructive sleep apnea (OSA) is a disease characterized by multiple episodes of upper airway collapse during sleep that cause oxygen desaturation and waking and is associated with multiple comorbidities. Airway collapse in OSA is influenced by multiple factors, which makes choosing the most effective surgical therapy difficult to predict.
Objective: The objective of this literature review is to summarize the current understanding on the biomechanics of upper airway collapsibility. More specifically, this paper summarizes previous studies that correlated the pharyngeal critical pressure (Pcrit), with the Apnea Hypopnea Index (AHI) and upper airway anatomy.
PRISMA methodology: A search was performed on PubMed for English language scientific papers that correlated anatomic variables (airway length, airway cross-sectional area, tissue compliance, tongue dimensions, BMI, posture, and lung volume). A total of around 150 papers were identified and read.
Results: Pcrit has a significant correlation with AHI and various anatomic measurements, including airway length and BMI. Contrary to expectations, tissue compliance and airway cross-sectional area have low correlation with Pcrit.
Conclusions: Pcrit is a useful marker of OSA severity because of significant correlations with AHI. The primary variables determining Pcrit were found to be airway length, airway cross-sectional area, tissue compliance, and lung volume. Tongue anatomy, obesity, and posture were identified as secondary factors that affected primary determinants. A correlation between critical pressure and these parameters has been firmly demonstrated.

Jelacic, Nicholas

Global Health

The Soldier's Heart

Authors: Mooney J, Weber M, Jelacic N, McBride M
Project Mentor: Michael McBride, MD

Post Traumatic Stress Disorder (PTSD) in military veterans is a health epidemic in the United States. It is estimated that up to 20% of Operation Iraqi Freedom (OIF) veterans and 15% of Vietnam Veterans have PTSD in a given year. Furthermore, it is estimated that the actual prevalence of PTSD is significantly higher, with up to 30% of Vietnam Veterans suffering from PTSD in their lifetime1. Lack of understanding about PTSD symptoms, difficulty in finding connections to available community resources, and avoidance of discussing these sensitive topics in healthcare settings all contribute to veterans not accessing the care that they need.

To address this issue, The Soldier's Heart website was created. The mission of The Soldier's Heart project is to provide a comprehensive website that allows veterans, families, providers, and communities to understand Post-Traumatic Stress through each other's perspectives, learn of treatments (both evidence based and alternative), and develop more effective communication between those affected and those who treat them. The Soldier's Heart will utilize short videos presented by fellow veterans, doctors, caregivers, and families, to communicate personal stories and struggles as well as provide understanding into the complex topic that is PTSD.

In this way, the Soldier's Heart will work to bridge healthcare gaps for veterans with the goal of providing a more comprehensive understanding of PTSD while simultaneously connecting patients to resources in their community.

Jeong, Sun Young

Clinical & Translational Research

Nomogram to predict survival for patients with resectable and borderline pancreatic ductal adenocarcinoma

Authors: Jeong S, Ahn KW, Aldakkak M, Christians K, George B, Ritch PS, Ericsson BA, Evans D, Katz M, Tsai S
Project Mentor: Susan Tsai, MD

Background: We developed and internally validated a prognostic nomogram that predicts survival among patients who received neoadjuvant therapy prior to surgery.

Method: Clinical data and survival outcomes from patients with resectable or borderline resectable pancreatic ductal adenocarcinoma (PDAC) who completed neoadjuvant therapy and surgery at a single institution were collected. Concordance index (c-index) and calibration plots were used to assess predictive accuracy. Survival at 1-, 2-, and 3-years from the date of restaging after neoadjuvant therapy and prior to surgery were used to develop the nomogram. External validation analysis was performed from a separate cohort of 278 patients from the MD Anderson Medical Center.

Results: The nomogram was developed from a cohort of 168 patients with localized PDAC. A parsimonious nomogram including clinical stage, preoperative CA19-9, and age predicted 1-, 2-, and 3- year survival with c-indices of 0.64, 0.64, and 0.65, respectively. The c-indices for 1-, 2-, and 3- years using the AJCC staging system were 0.58, 0.55, and 0.55, respectively. Clinical stage (HR:2.32; 95%CI:1.49-3.62) and preoperative CA19-9 levels (HR:1.66; 95%CI:1.08-2.58) were the strongest prognostic factors. External validation produced c-index of 0.48.

Conclusion: Prognostic nomogram utilizing clinical stage, preoperative CA19-9, and age provide more accurate survival prediction than the AJCC stage. This nomogram can be used to identify patients at high risk for early disease recurrence, prior to surgery.

Jeschke, PhD, Jonathan Poster 34 Molecular & Cellular Research

TH17-associated ileal hyperplasia requires IL-17A and IFNg to generate self-tolerance and prevent colitis

Authors: Mayne CG, Zieglebauer J, DeCiantis CL, Singh S, Kumar SN, Suchi M, Drobyski WR, Salzman NH, Williams CB

Project Mentor: Calvin B. Williams MD, PhD

Homeostasis in the ileum involves ongoing immune responses. To study how homeostatic processes of the ileum impact CD4+T cell responses, we used TCR transgenic tools to breed "Bigenic" mice that spontaneously produced CD4+T cells reactive to a model antigen expressed in the ileum. Bigenic mice were grossly similar to control littermates at weaning. By day of life (DOL) 50, the Bigenic cohort showed reduced weight, increased effector memory CD4+T cell frequencies among circulating cells and TH17-associated ileal hyperplasia. An extended natural history study to DOL 150 revealed that only half of Bigenic mice exhibit a chronic wasting disease. In addition to growth abnormalities, this wasting disease was marked by a loss of ileal crypt hyperplasia, colitis and mucosal infiltration by both TH17 and TH1 cells expressing non-transgenic clonotypes. By contrast, Bigenic mice with normal growth by DOL 150 maintained the TH17-associated ileal crypt hyperplasia phenotype and accumulated more ileal-reactive Treg cells than both DOL 50 Bigenic mice and DOL 150 Bigenic mice with wasting disease. Ileal crypt hyperplasia and ileal-reactive Treg cell accumulation were abrogated in Bigenic mice that received an infusion of nTreg cells at weaning. Both IL-17A and IFNg were required for both ileal-reactive Treg accumulation and preventing the activation of adoptively transferred ileal-reactive naive CD4+Tconv cells. IFNg:deficient Bigenic mice also exhibited an IL-23R-dependent, acutely progressive wasting disease that was >95% penetrant by DOL 50. Thus, our studies identify an IL-17A and IFNg-dependent homeostatic inflammatory process that mobilizes ileal-reactive Treg cells, can be prevented by nTreg cell infusion and is disrupted by IL-23.

Jin, Yuri Urban & Community Health

Latent Tuberculosis Infection (LTBI) Targeted Testing and Treatment in Milwaukee Community Clinics

Authors: Lacey M, Jin Y, Hansen S, Lundh R, Hunter P

Project Mentor: Rebecca Lundh MD

Decades of public health efforts have made active tuberculosis (TB) rare in the United States. However, the steady decline in TB incidence has stalled in the past few years. Reactivation of latent TB infection (LTBI) in at risk groups continues to be a source of TB transmission within the US. Thus, better methods of detecting and treating LTBI are necessary to eliminate TB. LTBI is not contagious or symptomatic, which leads to a problem of deciding who to test. The presence of risk factors can determine the need to test - an approach termed targeted testing. Once LTBI is identified, adhering to and completing antibiotic treatment prevents progression of LTBI to active TB in about 90% of cases. Unfortunately, few clinics have effective methods in place to facilitate targeted testing and/or completion of treatment.

Johnson, Ben — Global Health

Exposure to Neighborhood Green-space, Noise and Sleep: Evidence from the Survey of the Health of Wisconsin

Authors: Johnson BS, Malecki KM, Peppard PE, Beyer KM
Project Mentor: Kirsten Beyer, PhD, MPH, MS

Introduction : Sleep duration and quality has health implications. Little research analyzes neighborhood influence on sleep. Despite known associations between neighborhood green-space with sleep influencing factors (e.g. physical activity, depression), only one study examines green-space and sleep's relationship, finding green-space protective for short sleep. Further, little investigation of neighborhood sound and sleep have been done. Methods : The study analyzes data from the Survey of the Health of Wisconsin (n=2,712), a representative Wisconsin adult sample. Sleep outcomes include weekday and weekend sleep duration, sleep quality, and daytime tiredness. Primary predictors are the proportion tree canopy, levels of outdoor sound, and economic hardship index. Survey regression examines associations, controlling individual-level covariates. Results : Significant relationships between weekday sleep duration and green-space, and between weekend/day sleep duration and neighborhood sound exists. Conclusions : Neighborhood tree canopy and total and human-made noise levels may influence sleep duration, being potential targets for neighborhood interventions.

Johnson, Alexander — Molecular & Cellular Research

Genetic Deletion of Sterol Carrier Protein X Selectively Enhances Amygdalar Endocannabinoid Signaling

Authors: Johnson A, Hillard, C
Project Mentor: Cecilia Hillard PhD

The endocannabinoid system consists of a group of endogenous cannabinoid receptors found in the peripheral and central nervous system of mammals. This system has been shown to mediate stress and the behavioral changes associated with it. CB1 receptors (CB1R) are expressed at high density throughout the brain, and are specifically found in areas associated with stress responses, such as the amygdala, hippocampus and prefrontal cortex (PFC). Increasing evidence has shown that Sterol Carrier Protein (SCP) mediates endocannabinoid metabolism and CB1 receptor expression. Previous studies from the Hillard laboratory demonstrated that genetic deletion of the entire SCP gene results in reduced anxiety, likely as a result of increased CB1R expression. Since the SCP gene has two different protein products (SCP-X and SCP-2), we used specific SCP-X knock out mice (SCP-X-/-) to try to distinguish between the roles of SCP-2 and SCP-X in CB1 receptor expression. Inhibition of SCP-2 and/or SCP-X function could provide a therapeutic approach for the treatment of anxiety or PTSD through the increase of CB1 receptor in the amygdala.

Kacvinsky, Lauren — Poster 35 — Urban & Community Health

Follow up among violently injured patients after an emergency department visit

Authors: Kacvinsky L, Visotcky A, Melzer-Lange M
Project Mentor: Marlene Melzer-Lange, MD

Background: Youth violence victims are often evaluated in emergency departments. ED physicians can advise patients of medical and psychosocial follow up and provide community resources that could reduce rates of re-injury. Project Ujima helps address the needs of youth violence victims by providing resources to help them recover physically and emotionally.
Objectives:
1. To determine whether violently injured patients who present to the ED are advised to follow up with a health care provider and if so, what specialty they are advised to follow up with.
2. To determine how often patients in this population follow up as advised.
3. To compare follow up among youth involved with Project Ujima with those not involved in the program.
Methods: Chart review of patients <21 years old evaluated at CHW Level 1 Trauma Center/ED from 11/1/14-11/1/15 and diagnosed with gunshot wound (GSW), stabbing, or assault.
Results: 303 patients met inclusion criteria. 52% were recommended to follow up with their PMD or a specialist, 5% were recommended to follow up as needed, and 43% were not given follow up recommendations. Patients who were admitted ($p=0.010$) and patients with GSWs ($p=0.051$) were more likely to be advised to follow up. Ninety-six patients were advised to follow up with specialists; this was more likely to be completed among patients who were admitted ($p<0.001$) and those with GSWs ($p=0.026$). Patients were most frequently referred to their PMDs or surgical specialties for follow up. There was a trend approaching significance of involvement in Project Ujima with completed follow up ($p=0.07$).
Conclusion: Multiple specialists, most frequently PMDs and surgical specialists, come into contact with violently injured patients. Patient involvement with Project Ujima may improve completed follow up for specialty care.

Kamassah, Mawusi — Clinical & Translational Research

Modifiable Factors Contributing to Blood Pressure Differences in Monozygotic Twins

Authors: Kamassah M, Coly G, Donohue M, Kidambi S
Project Mentor: Srividya Kidambi, MD

INTRODUCTION: Primary hypertension(HTN) involves genetic and environmental factors. Discordance in blood pressure(BP) levels among a significant proportion of monozygotic twins best illustrate environmental effects. However, these environmental influences have not been clearly defined.
HYPOTHESIS: Distinct differences in higher dietary sodium, socioeconomic status(SES), and exercise will be identified among monozygotic twins with discordant BP levels.
STUDY METHODS: Monozygotic twins between 30 and 60 years were recruited from the Milwaukee and Michigan area. BPs were measured in triplicate after 5 minutes of rest at one minute intervals and averaged. Standardized and validated questionnaires were used to gather SES, exercise, and dietary sodium data.
RESULTS: Of the 43 pairs (58% women, 26% hypertensive), 23 pairs (54%) were discordant(10mmhg difference in systolic or diastolic BP or diagnosis of HTN) . Discordant pairs (46 ± 10 years, $p=0.05$) had a greater body mass index (30.8 ± 8.4 kg/m2, $p<0.05$), waist-to-hip ratio (0.94 ± 0.13, $p<0.05$) and waist circumference (103 ± 16 cm, $p<0.05$) than concordant twins. The co-twins with higher average BP (134/85 mmHg vs 119/76 mmHg, $P<0.05$) tended towards higher waist circumference (106 ± 17 cm vs 100 ± 17 cm, $p=0.26$) and higher dietary sodium consumption (3971 ± 1698 mg vs 3412 ± 1455 mg, $p=0.29$).
CONCLUSIONS: Blood pressure differences between monozygotic co-twins likely result from environmental factors. Discordant twins were 4 years older than concordant twins. Dietary sodium and waist circumference differences were statistically insignificant. Some differences in SES and exercise emerged. Increasing the sample size can further elucidate these differences.

Kelm, Sara — Poster H5 — Global Health

The impact of medical trainee culture shock on host communities in short-term global health electives

Authors: Kelm S, Kuzminski J, St. Clair N
Project Mentor: Nicole St. Clair, MD

Introduction: Medical trainee interest in global health and international electives continues to rise, leading to an emphasis on developing ethical, sustainable, and mutually beneficial partnerships. Although the benefits for trainees have been explored, the impact on host sites, particularly as it pertains to trainee culture shock, is not well known. We performed a literature search on the impact of visiting trainees on hosts during short-term global health electives to better inform a larger study on emotional responses of trainees during global electives.
Methods: A literature search was performed to gather pertinent research from the following databases: PubMed, Medline, Clinical Key, and Cochrane Reviews. The search term "global health" was cross-referenced with "global health experience," "medical elective," and "international health experience." This yielded 212 articles. From this list, 4 articles were identified as relating to the host perceptions of trainees. In addition, a Google Scholar search utilizing identical terms produced an online article that was awaiting print publication.
Results: Negative impacts of visiting trainees on host sites included decreased host efficiency, lack of trainee understanding of the local health system, and short length of stay. Positive impacts of visiting trainees included host satisfaction with the ability to nurture culturally sensitive professionals with an understanding of the global perspective of health care, opportunities to exchange ideas, and strengthened reputation. None of the articles focused specifically on the impact of trainee culture shock on hosts.
Conclusions: There is a paucity of literature pertaining to host perceptions of the impact of visiting trainees. A greater understanding of both positive and negative effects would allow for improvements in trainee preparation prior to departure which could not only improve the host experience, but also the satisfaction and effectiveness of the trainee.

Kennedy, Donald — Poster H12 — Urban & Community Health

A Mental Health Movie Night Improved by Adolescents for Adolescents

Authors: Kennedy D, Russeth K
Project Mentor: Kathy Russeth, MD
Community Partner: Prevent Suicide Greater Milwaukee Outreach

The increase in suicide rates across the United States has regularly been reported on in recent years. In Wisconsin, suicide remains the second leading cause of death among adolescents, and it is still a topic that is difficult for members of this age group to discuss. Together with Prevent Suicide Greater Milwaukee Outreach, a mental health workshop consisting of video clips and discussion points had been shown to local youth groups to decrease stigma and help participants feel more comfortable when discussing mental health issues. The purpose of this quality improvement study was to obtain feedback from a member of the target audience as well as a public health worker who works with adolescents in order to make the existing workshop more effective. The first phase of this project involved a series of interviews in which the existing workshop presentation was reviewed and each slide was discussed. The second phase involved adjusting the presentation based on the results of these interviews. The presentation was generally well received, but areas for improvement were identified, especially in regard to making the target audience more comfortable in discussing mental health. This led to breaking up the existing workshop and developing it into a curriculum consisting of eight unique presentations. The new curriculum is designed to allow more clarity through smaller, focused presentations rather than one long presentation. It is also designed to improve audience participation as multiple presentations with the same group and group leader will allow more time for questions and positively affect participants' comfort in discussing mental health issues.

Kenny, Eleanor — Poster 36 — Urban & Community Health

Effective Training Curriculum for Public School Vision Screening

Authors: Kenny E, Costakos D
Project Mentor: Deborah Costakos, MD
Community Partner: Prevent Blindness Wisconsin

Of the 3,000 children who failed their vision screening in the 2014-2015 school year in Milwaukee Public Schools, only 9% received further follow-up vision care [Prevent Blindness Wisconsin data, internal review, 2014]. Currently there is no reliable system of referral and follow-up with parents, health care providers or schools after school screenings take place. It is estimated that up to 70% of learning results from visual input. Thus, receiving prompt and adequate vision care is vital to the healthy development of a child. Obtaining proper vision screening and receiving subsequent follow up care is a complex problem with multiple barriers that need to be addressed in order to successfully provide adequate care. This project focuses on training individuals of multiple education levels and diverse backgrounds on proper vision screening and care for children of school age. The groups of individuals trained include social workers, school nurses, school parents, primary care physicians, HMO advocates, and community health navigators in the Milwaukee area. The effectiveness of this training curriculum was assessed using a set of IRB approved pre and post test questions. Of the 62 participants, 80% received >90% on the post test questionnaire. 100% of the participants received >80% on the post test questionnaire. 100% of participants improved or achieved the same score from pre to post test. This curriculum is an important piece to the solution of a complex problem with multiple facets.

Kiehl, Chelsea — Poster 37 — Global Health

Connecting Veteran Families

Authors: Kiehl, C, Zeno F, Hooyer K, McBride M, Berte K, Ruffalo L, Flower M, Classon P
Project Mentor: Zeno Franco, PhD

Since the start of Operation Enduring Freedom in Afghanistan and Operation Iraqi Freedom over 2 million children were affected by parental deployment. Military families need community based organizations (CBOs) providing resources during deployment and reintegration. The goal of this study was to examine the resources available to Wisconsin veteran families, understand how they are utilizing CBOs, identify barriers that reduce resource use, and create a dialogue between this information and data gathered in a study through the Veteran Health Coalition. Our survey involving veteran families analyzed information on family characteristics, relationship dynamics and caretaker well-being. The survey link was given to all 90 County Veteran Service Officers in the state of WI, who then distributed it to families. 33 families completed surveys, with the majority of respondents coming from Walworth and Waukesha counties. Over 75% of respondents reported not receiving resources from CBOs for themselves and 90% denied receiving resources for their children. The biggest barriers include time, lack of knowledge about community resources, and the perception that families do not need resources. To determine familial need and to address caretaker burnout we assessed for well-being. Respondents showed burn out through somatic symptoms rather than psychiatric symptoms. Via our sampling of WI veteran families we were able to appreciate trends that show they are not receiving resources because they do not know how to obtain them in the community. Organizations within the community are trying to address concerns of veteran families by providing counseling, peer support, and education assistance.

Klimara, Miles

Clinical & Translational Research

Detection of pepsin in oral secretions of infants with and without laryngomalacia

Authors: Klimara M, Samuels T, Johnston N, Chun R, McCormick M

Project Mentor: Nikki Johnston, PhD

Background: Laryngomalacia is the most common cause of newborn stridor and has been associated with laryngopharyngeal reflux. Pepsin is a gastric enzyme posited as a contributor and biomarker of reflux-related disease. Although pepsin in supraglottic lavage specimens has been associated with severe laryngomalacia in prior pilot studies, its presence in the oral secretions of patients with less severe disease is unknown.

Objective: To investigate the presence of pepsin in oral secretions of patients with and without laryngomalacia

Methods: Children less than 2 years old with or without a history of laryngomalacia presenting to pediatric otolaryngologists at Children's Hospital of Wisconsin were offered enrollment. Oral secretion samples were obtained from all subjects. Enzyme linked immunosorbent assay was used to determine the concentration of pepsin in samples and Western blot was performed on a representative subset of specimens to verify ELISA accuracy.

Results: 16 patients with laryngomalacia and 16 patients without laryngomalacia were enrolled. Pepsin was detected in specimens from 13 (81.3%) patients with LM and 2 (12.5%%) of patients without laryngomalacia.

Conclusion: Pepsin was detected more frequently in oral secretions of patients with laryngomalacia than in patients without laryngomalacia. Analysis of the levels of pepsin in patients with laryngomalacia with respect to clinical markers of disease severity will elucidate pepsin's potential as a biomarker and potential contributor to underlying laryngeal pathology.

Knous, Kort

Clinical & Translational Research

Diagnostic Sensitivity and Specificity of Dutcher Bodies in Orbital Biopsies

Authors: Olteanu H, Knous K

Project Mentor: Horatiu Olteanu, MD, PhD

The orbit is a possible site for the presentation of lymphoma. MALT lymphoma is the most common subtype, and often demonstrates plasmacytic differentiation with light chain restriction and presence of Dutcher bodies (cytoplasmic inclusion of immunoglobulins). Dutcher body incidence and their diagnostic utility in orbital lesions has not been studied extensively in the literature. A study from 1989 (Medeiros & Harris, AJSP, 1989, 13(6):459) has described that the presence of either cytologic atypia or Dutcher bodies is a reliable criterion of malignant lymphoma in the orbit and conjunctiva. However, in the course of work, we have frequently encountered biopsies that show plasma cells with Dutcher bodies in cases that did not involve lymphomas. The elucidation of the frequency, sensitivity and specificity of these findings in the differential diagnosis of orbital MALT lymphoma is of potential diagnostic utility.

Koeller, Christa — Poster 14 — Quality Improvement and Patient Safety

The Cultural Norms of Communication in a Pediatric Trauma Team, an Ethnography

Authors: Koeller C, Anhalt B, Ferguson C
Project Mentor: Cassie Craun Ferguson, MD

Background: As a Level 1 Trauma Center, The Children's Hospital of Wisconsin (CHW) in Milwaukee, WI receives patients that are in the most critical condition and need the most expertise and specialized care. To provide the highest level of care, an ad hoc team of healthcare professionals (ex. Physicians, nurses, pharmacists, etc.) forms when a trauma page is received. This study seeks to determine the different aspects that affect the culture of the trauma room and measures that can be taken to maximize successful communication.
Objective: The aim of this research was to define the set of norms of communication used in the Children's Hospital of Wisconsin trauma room and to identify obstacles that hinder successful communication.
Design: Qualitative interview study.
Setting: Single site academic medical center.
Interview Subjects: Members of each discipline involved in trauma interactions.
Measurements: Semi-structures interviews followed by qualitative thematic analysis using Pareto charts.
Results: We interviewed 16 trauma team members from various disciplines involved during trauma interactions. The three major factors that we found to affect the culture of the trauma team to be are: 1) patient status, 2) team leader, and 3) giving feedback and/or speaking up. We also determined the three most important attributes of a good team leaders are: 1) verbalizing priorities and expectations, 2) establishing and maintaining leadership throughout the trauma interaction, and 3) being direct and assertive.
Conclusion: This conceptual model identifies the factors affecting how trauma team members communicate during trauma interactions and aspects that affect this communication and the overall culture of the trauma room. It also provides insight as to characteristics that make a good team leader and possible areas for improvements and interventions.

Koo, Christopher — Health Systems Management & Policy

Cannabinoid Receptor 2 Knockouts and Effects on Visuo-auditory Reward Learning

Authors: Koo CBC, Hillard CJ, Olsen CM
Project Mentor: Cecilia Hillard, PhD

Introduction: In this study, assessed Cannabinoid Receptor 2 knock out (CB2RKO) mice in a reward learning task. We predict that CB2RKO mice will be able to acquire the learned behavior, but will show decreased preference for the reward compared to wild types.
Study Methods: Two cohorts of mice, one wildtype and one CB2RKO (n=7 & 6 respectively) performed four phases of an OSS learning task. Only one of two aperture was randomly designated to elicit a visuo-auditory reward. Phase FR1 requires a single nose poke for reward, FR2 requires two, and PR requires an increasing number (algorithmic) of nose pokes. Phase progression occurs if 1) each phase's designated minimum number of days and 2) satisfied criteria over a moving three day period.
Criteria included correct nose poke ratio ≥2:1, minimum number of reinforcers per day, and last three days' reinforcer numbers within ±20% of the last three days' mean. Data was analyzed in a 2 (genotype) x 3 (ratio) ANOVA, where ratio was a repeated measure.
Results: During PR, a Mann-Whitney U analysis of mean number of active nose pokes was significant ($p=0.035$). There was borderline significance for mean number of reinforcers elicited ($p=0.051$).
There was no significant effect of genotype on number of active nose pokes, inactive nose pokes, reinforcers elicited, or percent active nose pokes ($p=0.116$, $p=0.799$, $p=0.264$, $p=0.121$, respectively). No effect of genotype found in inactive nose pokes or percent active nose pokes ($p=0.945$, $p=0.073$, respectively).
During the PR phase, CB2RKO mice showed less correct nose pokes despite no significant difference in accuracy, perhaps indicating less desire for reward. This is strengthened by the analysis of reinforcers earned during the PR phase ($p=0.051$) with CB2RKO obtaining less reinforcers.

Kortes, Samuel — Poster 38 — Clinical & Translational Research

Analysis of Shoulder Biomechanics of Wheelchair Athletes with Paraplegia during Cross-training Exercises

Authors: Miller C, Garlanger K, Kortes S, Riebe J, Schnorenberg A, Brook Slavens B, Lee K
Project Mentor: Kenneth Lee, MD
Community Partner: University of Wisconsin Milwaukee, Mobility Laboratory

Objective: To evaluate shoulder joint kinematics during cross-training exercises in athletes of varying experience.
Design: Observational study
Setting: Motion Analysis Laboratory
Participants: Three wheelchair athletes, average age of 37.1 ± 4.6 years, with spinal cord injury levels of T8, L2, and T10, whom were novice, intermediate, and experienced with regards to cross-training respectively.
Interventions: Motion capture was performed during multiple trials of three cross-training tasks: battle rope, sled pull, and overhead press. Our custom model was applied to determine shoulder joint angles.
Main Outcome Measures: Range of motion and peak joint angles
Results: During battle ropes, with increasing experience there was a trend towards adduction (-8.9ï,°, -8.6ï,°, and 5.9ï,°), increased axial rotation range of motion (ROM; 16.5ï,°, 19.9ï,°, and 27.0ï,°) and increased peak flexion (71.2ï,°, 93.7ï,°, and 99.9ï,°). During sled pull, there was a trend towards increased abduction (-33.1ï,°, -42.4ï,°, and -54.9ï,°). Additionally, multiple parameters demonstrated differences among the athletes including sagittal plane ROM (56.8ï,°, 79.5ï,°, and 41.4ï,°) and peak internal rotation (49.7ï,°, 42.0ï,°, and 70.4ï,°). During overhead press, with increasing experience there was a trend towards increased peak elevation angle (95.6ï,°, 153.0ï,°, and 171,4ï,°) and decreased internal rotation (85.4ï,°, 80.2ï,°, 57.3ï,°).
Conclusions: Shoulder joint kinematics during cross-training exercises differ amongst the wheelchair athletes with varying experience levels. These findings may help guide prescription of sports activity and proper technique to reduce or prevent injury during cross-training exercises in wheelchair athletes. Further research is underway to characterize the kinematics of other upper extremity joints and determine the effect of spinal cord injury level.

Krawchuk, Lindsey — Poster 39 — Clinical & Translational Research

Outcome Analysis of Atrial Fibrillation Management in the Emergency Department

Authors: Krawchuk L, Conti M, Mielnicki D, Rubenstein J, Lohr N, Gitter M
Project Mentor: Nicole Lohr, MD, PhD

Introduction: Atrial fibrillation (Afib) is a common cardiac dysrhythmia frequently leading to inpatient hospitalization. Estimates show 75% of annual spending for Afib occurs in inpatient setting, with the Emergency Department (ED) accounting for 60% of admissions. Limited studies suggest significant reductions in hospitalizations occur when appropriate practice guidelines are applied in the ED. The objective of this study is to assess the outcomes of patients admitted without a standardized ED protocol for admissions.
Methods: This study retrospectively analyzed 430 patients (18+yr, not pregnant) who presented to Froedtert Hospital Emergency Department (FHED) with a primary diagnosis of Afib from January 2015 and March 2016. Patients were separated based on ED visit outcome: discharged, admitted to observation status, or admitted to inpatient status. Data was compared to other AAMC Teaching Hospitals (AAMCTH) around the country.
Results: The results of this study showed FHED had a higher percentage of patients admitted to inpatient status as well as higher mean Direct Observed Charges (DOC) then other AAMCTH's.
Next Steps: The next phase will analyze how the management of Afib in the ED changed after implantation of an ED Afib protocol. We will be analyzing the percent protocol compliance as well as gathering the same follow-up metrics to compare to the retrospective study.

Kuefler, Katherine — Poster H9 — Quality Improvement and Patient Safety

Termination of resuscitation checklist: duration and outcomes of resuscitation

Authors: Kuefler K, Lybeck A, Grawey T, Colella MR
Project Mentor: M. Riccardo Colella, DO, MPH
Community Partner: Milwaukee County Office of Emergency Management

Background: Checklists are often used in various fields to aid in error prevention, manage complex processes, and produce reliable outcomes. On April 1, 2016 a termination of resuscitation (TOR) checklist was implemented for use during out-of-hospital cardiac arrests (OHCA) by Milwaukee County Emergency Medical Services (EMS) online medical control (OLMC) physicians concurrently staffing an emergency department.
Objective: To evaluate if use of a TOR checklist by OLMC impacted return of spontaneous circulation (ROSC) for medical or traumatic OHCA. To compare effect of checklist use on duration of resuscitations performed by EMS providers and duration of the OLMC.
Methods: Medical and traumatic OHCA data from 4/1/15-9/30/15 (452 medical, 44 trauma) and 4/1/16-9/30/16 (482 medical, 71 trauma) were extracted from the Milwaukee County EMS database. Patient outcomes were measured by occurrence of ROSC during resuscitation and by presence of ROSC at hospital arrival. Analysis was done using t-tests.
Results: In medical OHCA, incidence of ROSC during resuscitation increased from 41% (185/452) to 46% (220/482) with implementation of the TOR checklist and ROSC at hospital arrival increased from 35% (160/452) to 40% (191/482). There was also a significant ($p<0.001$) increase in mean duration of resuscitations (26 to 30 minutes) and OLMC (13 to 15 minutes) after the checklist was implemented in medical OHCA cases.
Conclusion: In medical OHCA the use of a TOR checklist by OLMC significantly increased the duration of both resuscitations and OLMC time. The rates of ROSC during resuscitation and at hospital arrival increased after the checklist was implemented for medical OHCA. These results also inform resource utilization in an academic emergency department. In traumatic OHCA there were no significant changes in duration of resuscitation or OLMC and there was a decrease in ROSC. Further study with a larger sample size for traumatic OHCA and neurological outcomes is needed.

Kutty, PhD, Raman — Clinical & Translational Research

DUSP5 as a Regulator of T cell Differentiation and as a Novel Therapeutic Target

Authors: Kutty RG, Ramchandran R
Project Mentor: Ramani Ramchandran, PhD

The mitogen-activated protein kinase (MAPK) pathway regulates many key cellular processes such as differentiation, apoptosis, and survival. The final proteins in this pathway, extracellular regulated kinase (ERK1/2), are regulated by dual specificity phosphatase 5 (DUSP5). DUSP5 is a nuclear, inducible phosphatase with high affinity and fidelity for ERK1/2. DUSP5 is highly expressed in CD8+ T cells, though little is known about its function therein. Finally, DUSP5 is induced in stress conditions; we therefore interrogated the role of DUSP5 in CD8+ T cells by challenging our DUSP5 KO mouse model with acute viral infection. We examined the CD8+ T cell response by monitoring the balance of effector and memory T cells. Specifically, Dusp5-/- mice have decreased proportions of short-lived effector cells (SLECs) and increased proportions of memory precursor effector cells (MPECs) in response to infection. Further, we show that this phenotype is T cell intrinsic wherein a bone marrow chimera model restricting loss of DUSP5 to the CD8+ T cell compartment showed a similar phenotype. Dusp5-/- T cells also display increased proliferation, increased apoptosis, and altered metabolic profiles, suggesting that DUSP5 is a pro-survival protein in T cells. Our work offers a putative mechanism of DUSP5 in the context of acute infection, however these results may suggest similar effects in other stress states and may offer insights into other diseases where DUSP5 has been implicated. Together, these discoveries make DUSP5 an attractive pharmacologic target for the treatment of human diseases.

Kwansa, Nana Yaa — Poster 40 — Quality Improvement and Patient Safety

Protection of Rat Liver Mitochondrial Bioenergetics and Calcium Handling by Cooling

Authors: Kwansa NY, Stowe DF, Heisner JS, Ali M
Project Mentor: David F. Stowe, MD, PhD

The scarcity of donor organs has placed greater urgency on developing innovative techniques to optimize liver transplant function and quality. Ischemia-reperfusion (IR) injury associated with liver transplant procedures strongly influences transplant outcomes. At the subcellular level, mitochondria can take up and store large amounts of Ca2+ to regulate cytosolic Ca2+. However, during IR injury, an overload of Ca2+ beyond the buffering capacity of mitochondria adversely affects whole organ function. Mitochondrial Ca2+ overloading, among other factors, causes opening of the mitochondrial permeability transition pore (mPTP) which triggers a cascade of events leading to cell death by apoptosis. Using rats as an animal model, this research aims to demonstrate the role of temperature during liver ischemia and to study its effect on liver mitochondrial bioenergetics and calcium handling.
Rat liver tissue was subjected to immediate mitochondrial isolation (control group), storage for 120 min at 4°C, and storage for 120 min at 27°C. Mitochondria were then isolated from each tissue sample using differential centrifugation and viability assessed by the respiratory control index (RCI) test, which measures the efficiency of stimulated mitochondrial O2 consumption. Next, CaCl2 pulses were added at set intervals to suspensions containing mitochondria, respiration buffer, succinate or glutamate + malate, and fluorescent dye. Sudden increases in extra-matrix Ca2+ observed on spectrophotometry indicated a sustained opening of the mPTP due to mitochondrial Ca2+ efflux. Quantification of total added CaCl2 denoted the Ca2+ retention capacity (CRC). Results demonstrate a significant difference in CRCs between each study group. Notably, mitochondria isolated from liver tissue stored for 120 min at 4°C had enhanced CRCs compared to the control ($p = 0.01$ for succinate, $p = 0.02$ for glutamate + malate). However, tissue stored for 120 min at 27°C showed significant decline in CRCs overall.

Kwong, Jacky — Health Systems Management & Policy

An Educational Intervention for Medical Students to Improve Firearm Injury Prevention Counseling

Authors: Kwong J, Gray J, Rein L, Liu Y, Melzer-Lange M
Project Mentor: Marlene Melzer-Lange

Limiting children's access to firearms is a fundamental challenge to pediatric injury prevention. Current initiatives examine extensive training modules for residents but rarely investigate the benefits of providing similar training to medical students. We aim to determine if a 20-minute educational intervention promotes FIP counseling in third-year medical students.
This was a prospective study performed during the 2016-17 academic year. Groups of 12-15 different third-year medical students were selected to receive either a 20-minute intervention or control during a monthly pediatric lecture series rotation. The intervention consisted of two clinical vignettes, context, and suggestions for clinical integration. The control session was a case-based lecture about pediatric emergencies. All students completed baseline electronic assessments and another after 6 months. Those in the intervention group also completed post-intervention assessments. Assessments evaluate students' beliefs, self-efficacy, and knowledge of FIP counseling.
We surveyed a total of 130 students. 65 students completed the entire series of assessments (22 and 43 students respectively).
There were no significant differences between the control and intervention at baseline. Immediately after the intervention, students felt more self-efficacious, had improved knowledge of FIP risk factors, and had beliefs more consistent with FIP. After 6 months, students still felt ready to counsel patients and retained knowledge of FIP risk factors. However, students were no longer confident in providing advice and resources to patients and their beliefs did not significantly favor FIP counseling.
A 20-minute educational intervention moderately improved FIP counseling in third-year medical students. Students were adept at retaining FIP knowledge and modestly self-efficacious at providing counseling. But without further training, the beneficial effects of a one-time intervention will likely wane with time.

Lambert, Isabella

Clinical & Translational Research

Risk factors linked to central catheter-associated thrombosis in the neonatal intensive care unit.

Authors: Lambert I, Tarima S, Uhing M, Cohen S

Project Mentor: Susan Cohen, MD

Objective: Our study identified risk factors for the development of clinically identifiable catheter-associated thrombosis (CAT).

Study Design: We performed a retrospective cohort study of neonates in whom a central catheter was present. 1475 catheters were identified in 766 patients during a 36-month study period. The odds of thrombi formation in catheterized neonates was modeled using logistic regression.

Result: The incidence of CAT was 1.17 per 100 neonates. Cholestasis and history of surgery before or during line placement increased risk for thrombus. Catheter specific factors did not increase risk. Subgroup analysis of peripherally inserted central catheters (PICC) demonstrated larger caliber and femoral vein placed PICCs were more likely to have CAT.

Conclusion: We conclude that clinically identifiable CAT is rare in the neonatal population. Furthermore, catheter specific characteristics are predictive for CAT in PICC but not predictive for all central lines.

Landis, Jesa

Global Health

Rehabilitation of Victims from the 2015 Nepal Earthquake

Authors: Landis J, Mackinney T

Project Mentor: Theodore Mackinney, MD

Background: In April 2015 an earthquake struck Nepal causing nearly 9,000 fatalities, and 23,000 injuries. Objectives: To summarize the extent of rehabilitation services offered in Nepal following the earthquake, and to qualitatively describe the care of earthquake victims. Methods: healthcare professionals were interviewed from 06/2015-07/2015. Results: 10 interviews were conducted with physicians, surgeons, therapists, and administrators from five hospitals near Kathmandu. Excepting one hospital, all facilities had only basic physical therapy equipment. As described in other earthquakes, common patient injuries included open tibia or fibula fractures. The impact on providers was consistent; all physical therapists interviewed reported working with dramatically increased patient loads,and struggled to manage. A significant barrier to continued care was transportation cost and misconceptions regarding therapy. Family support was vital to recovery. Compared to international standard earthquake rehabilitation practices, most facilities surveyed were found inadequate. Conclusions: Without resources, most Nepali facilities provide minimal levels of physical therapy.

Lange, Joel — Poster 41 — Health Systems Management & Policy

Effect of drug pricing on cost-effectiveness of maintenance bevacizumab for metastatic colorectal cancer.

Authors: Sherman S, Lange J, Dahdaleh F, Rajeev R, Gamblin TC, Polite B, Turaga K
Project Mentor: T. Clark Gamblin, MD, MBA

Unregulated drug prices raise cancer therapy costs. Following induction chemotherapy, patients with metastatic colorectal cancer receive maintenance capecitabine and bevacizumab based on improved progression-free survival in the CAIRO3 trial.
Post-induction chemotherapy outcomes were modeled using Markov chains to account for patients developing treatment complications or cancer progression. Transition probabilities between patient states were determined from CAIRO3 data. Payor perspective Medicare data determined each state's costs. Treatment utility was counted as life-years gained, and adjusted using CAIRO3 Quality of Life data. The primary endpoint was the incremental cost-effectiveness ratio of Cap-B maintenance compared to observation alone. Markov-model-estimated survival and complication outcomes closely matched those reported in CAIRO3. Per-patient incremental costs per 3-week maintenance chemotherapy cycle were $6,601. After 29 model-iterations corresponding to 60-months of follow-up, mean per-patient costs were $105,239 for maintenance and $21.10 for observation. Mean quality-adjusted life-years (QALYs) accrued were 1.34 for maintenance and 1.20 for observation. The incremental cost-effectiveness ratio favored maintenance treatment, at incremental cost of $725,601 per QALY. The unadjusted ICER was $438,394 per life-year. Sensitivity analyses revealed that the ICER varied with changes in drug costs. To reduce ICER to below $100,000/life-year would require costs for bevacizumab and capecitabine to fall to $1,070 per 3-week chemotherapy cycle from $6,173 currently. Current drug pricing makes anti-neoplastic therapy extremely expensive to payors and society at large. In this study, drug pricing would need to be reduced by 83% to make maintenance therapy cost-effective, a finding with implications for policy decisions and payment negotiations.

Lee, Daniel — Clinical & Translational Research

The Henle fiber layer in albinism

Authors: Lee DJ, Woertz EN, Wilk MA, Linderman RE, Summers CG, Brooks BP, Brilliant MH, Antony BJ, Lujan BJ, Carroll J
Project Mentor: Joseph Carroll, PhD

Purpose: Directional optical coherence tomography (D-OCT) allows visualization of the Henle fiber layer (HFL) in vivo. Here we used D-OCT to characterize the HFL and outer nuclear layer (ONL) in albinism and examine the relationship between true foveal ONL and peak cone density.
Methods: Horizontal D-OCT B-scans were acquired, registered and averaged for 12 subjects with oculocutaneous albinism and 26 control subjects. Averaged images were manually segmented by two observers to extract HFL and ONL thickness. Adaptive optics scanning light ophthalmoscope (AOSLO) was used to acquire images of the foveal cone mosaic in 10 subjects with albinism, from which peak cone density was assessed.
Results: Across the foveal region, HFL topography was different between subjects with albinism and normal controls. In particular, foveal HFL thickness was thicker in albinism than in normal controls ($p<0.0001$), while foveal ONL thickness was thinner in albinism than in normal controls ($p<0.0001$). Total ONL+HFL thickness was not significantly different between albinism and controls ($p=0.356$). Foveal ONL thickness was positively correlated with peak cone density in subjects with albinism ($r=0.7576$, $p=0.0149$).
Conclusions: Foveal HFL and ONL topography are significantly altered in albinism relative to normal controls. Our data suggest that increased foveal cone packing drives the formation of Henle fibers, more so than lateral displacement of inner retinal neurons (which is reduced in albinism). The ability to quantify foveal ONL and HFL may help further stratify grading schemes used to assess foveal hypoplasia.

Lee, Ryan — Clinical & Translational Research

Quantitative analysis of neurometabolites in adolescents with persistent post-concussive symptoms

Authors: Lee RM, EspaÃ±a LY, Prost RW, Nencka AS, Koch KM, Meier TB
Project Mentor: Timothy B. Meier, PhD

Introduction: There is great interest in developing physiological markers of persistent concussion symptoms (PCS) that can occur following mild traumatic brain injury (mTBI). Magnetic resonance spectroscopy (MRS) can measure changes in brain metabolism in a non-invasive way and is directly translatable to clinical application. Previous studies have shown that mTBI is associated with decreases in N-acetylaspartate (NAA), though the majority of previous studies have focused on adults. We hypothesized that adolescents with PCS would have decreased NAA in frontal white matter (FWM) and the anterior cingulate cortex (ACC).
Study methods: Twenty-two symptomatic, adolescent (14-18 years old) mTBI patients (PCS+) were recruited from a concussion clinic and assessed at least 4-weeks post-injury. Twenty-one adolescents without PCS served as controls (PCS-). MRS was performed in the ACC and right FWM using a PRESS sequence on a GE MR750 3T scanner. Spectra are analyzed using LCModel to calculate metabolite levels. Two-tailed independent samples t-tests were used to compare groups using alpha=0.05.
Results/Conclusion: PCS+ showed a significant decrease in total NAA (NAA plus N-acetylaspartylglutamic acid; p=0.012) and a non-significant decrease in NAA (p=0.057) in the FWM when compared to PCS:. No differences between groups were seen in the ACC (p's>0.3). Our results suggest a relationship between PCS in adolescents and decreased total NAA in the white matter. This study will help understand pathophysiology of PCS in adolescents.

Lin, Emily — Clinical & Translational Research

Computational Fluid Dynamics Study Of Airflow Limitation Associated With Subglottic Stenosis

Authors: Lin E, Bock JM, Zdanski C, Kimbell J, Garcia GJ
Project Mentor: Guilherme Garcia, PhD

Introduction: Subglottic stenosis (SGS) is one of the most common airway disorders in pediatric patients. Currently, treatment decisions rely primarily on the Cotton-Myer scale, which classifies SGS severity based on percentage reduction in airspace cross-sectional area (CSA). However, the precise relationship between CSA reduction and airflow reduction is unknown.
Specific Aims: This study aims to derive an equation relating airflow and CSA at the subglottis, thus providing a system to classify SGS severity based on airflow limitation. We hypothesize that airway resistance can be described by the Bernoulli Obstruction Theory, which predicts a direct proportionality between airflow and cross-sectional area (Qˆ2CSA) in cases of severe constriction.
Study methods: Computed tomography scans of 6 healthy subjects (ranging from ages 5 month-old to 40-year-old) were used to create three-dimensional models of the respiratory tract from nostrils to carina. Using virtual modeling, cylindrical segments of varying degrees of obstruction were inserted in the subglottis. Computational fluid dynamics simulations were run and airway resistance was computed.
Results: The simulations revealed that a universal relationship exists between percentage airflow reduction (Q_SGS/Q_HEALTHY) and percentage CSA reduction (A_SGS/A_HEALTHY). In agreement with the Bernoulli Obstruction Theory, the most severe constrictions in all patients were fitted by Q_SGS/Q_HEALTHY =k A_SGS/A_HEALTHY , where k=2.25 ±0.15 (r2=0.93).
Conclusions: Our results demonstrate a clear relationship between percentage reduction in airspace CSA and percentage reduction in airflow, irrespective of age and inter-individual anatomic variability. This mathematical relationship can be used to estimate the degree of airflow reduction that corresponds to a percent reduction in CSA in SGS patients.

Liu, Chrissy — Clinical & Translational Research

Gallbladder Carcinoma: An Analysis of the National Cancer Data Base to Examine Hispanic Influence

Authors: Liu C, Berger N, Rein L, Tarima S, Clarke C, Mogal H, Christians K, Tsai S, Gamblin TC
Project Mentor: T. Clark Gamblin, MD, MS, MBA

Background: Gallbladder cancer (GBC) is a lethal disease with high incidence among Hispanics. Overall survival (OS) among races/ethnicities has not been described using the most recent National Cancer Database. This study hypothesized that prognosis is worse for Hispanics compared to similar non-Hispanic populations.
Methods: Patients with GBC were identified from the National Cancer Database and categorized as White, Black, Hispanic, and Other. Descriptive statistics, OS, and Cox regression were examined.
Results: The study identified 12,952 patients. Median age was 71 years and 68.8% were female. The study characterized 69.8% White, 13.9% Black, 11.0% Hispanic, and 5.4% other patients. 5-year OS curves differed, with survival highest in Hispanic patients (27% vs. 23% Other, 18% White, and 17% Black, $p<0.001$). Hispanics presented at younger ages (67 vs 72 years, $p<0.001$), were more likely to be uninsured (17.3% vs 3.9% $p<0.001$), had lower income ($p<0.001$), and education levels ($p<0.001$) compared to Whites. Following multivariable modelling, treatment at an academic facility (HR 0.90, 95% CI 0.84-0.97) and year of diagnosis (HR 0.90, 95% CI 0.88-0.92) related to survival. Hispanic ethnicity did not show significance ($p=0.207$).
Discussion: Hispanic ethnicity exhibits the highest OS for GBC, but after adjusting for covariates, this influence is not significant.

Liu, Kristen — Poster 42 — Clinical & Translational Research

Literature Review of Seven Parameters of Patients with Adolescent Scoliosis Pre and Post Surgery

Authors: Liu K, Liu XC
Project Mentor: Xue-Cheng Liu, MD, PhD

Although the etiology of scoliosis has been researched, gait, motion, posture, balance, pelvic, and muscle changes in adolescent idiopathic scoliosis (AIS) have not been as well-researched or reviewed. A literature research on PubMed with articles newer than 1995 resulted in numerous studies looking for patients with AIS patients before and after surgery. The results showed some consensus as well as discrepancies in the literature. The consensus is that spinal motion is decreased in AIS with and without surgery. In addition, there are paraspinal muscle, multifidi muscle, and pelvic changes in scoliosis when compared to normal subject. Gait, balance, and posture studies provided conflicting opinions.

Lorenz, Joshua — Poster 43 — Health Systems Management & Policy

Physician & clinic staffs' perceptions of clinic navigators to address social determinants of health

Authors: Lorenz J, Burghardt A, Milam H, Nordness M, Hogsett K, Gunn V, Meurer J
Project Mentor: John Meurer, MD, MBA

Social Determinants of Health are markers of well-being drawing an increasing amount of attention from across the healthcare spectrum including physicians and insurance companies. The origin of this focus, in part, may be attributed to recent studies including the Adverse Childhood Events Study which showed a child's social environment is inextricably intertwined with both their immediate and long-term health risks. The Population Health Management team at Children's Hospital of Wisconsin sought to respond to these findings by implementing a program called Clinical Navigation (CN) to increase clinicians' awareness of the social needs of their patients and provide an immediate resource for struggling families. For a program like CN to function efficiently, however, it requires enthusiasm and belief from all care team members. Prior to implementation, physicians and clinic managers were concerned CN would disrupt their busy clinic schedules. Similarly, social workers worried this program overlapped with many of their clinical duties. To effectively capture the care team' perceptions of CN both prior to and after implementation, we interviewed 25 individuals across seven clinics focusing on five key areas: Perceived value, knowledge, relationships, workflow, and experience. Using published methods of qualitative theme identification, we discovered both areas for future improvement as well as overall remarkably affirmative themes from all participants with an increasing enthusiasm for the program as time went on. We trust these findings will quell many of the same trepidations of other health systems who are considering implementing a program to address SDH.

Lucjak, Camille — Bioethics

Assent in Pediatric Oncology

Authors: Lucjak CS, Lang KR, Lee KJ
Project Mentor: Kellie Lang, JD, RN

The purpose of this study was to describe pediatric oncology providers' attitudes and perceptions regarding including pediatric patients in decision-making discussions for cancer treatment. Sixteen of 27 eligible participants completed an anonymous online survey consisting of twelve questions, yielding a response rate of 59%. Of the providers, 75% strongly agree that it is valuable to include pediatric patients in decision-making discussions. Even those who do not find value in the practice reported using multiple methods to assess for understanding and agreement in a child. Almost two-thirds (62.5%) begin including children between the ages of seven and nine. Barriers reported in the study include child's developmental level, language incongruence, parental preference, and child's age. Next steps might include exploring ways for providers to educate parents on the rationale for including children in the discussion. Additionally, finding effective strategies to identify and remove language barriers may improve communication.

Lyons, MPH, Victoria — Poster 44 — Clinician Educator

The Healthy Exercises and Recognizing Tomorrow (HEART) Workshop

Authors: Ruffalo L

Project Mentor: Leslie Ruffalo, PhD, MS

Community Partner: Washington High School Community Learning Center, Milwaukee Public School System, Marquette University

Introduction: The percentage of youth who exercise daily declines with progression from elementary school up through high school. This phenomenon can begin the trajectory of chronic health conditions youth may develop later in life. Thus, there should be emphasis in high school on the relationship between physical activity and chronic health conditions.

Hypothesis: It is expected after completion of the HEART workshop, students will better understand the relationships between physical activity and chronic health conditions and possess more confidence to exercise daily.

Specific Aims:

1. Increase knowledge among high school students on the relationship between physical activity and chronic health conditions.
2. Help students feel more confident to increase their amount of physical activity.

Methods: HEART curriculum was constructed using National Health Education Standards (NHES). Workshop evaluations were developed from Levels 1 (Reaction) and 2 (Knowledge Change) of the Kirkpatrick Model.

Results: HEART participants will complete a retrospective pre/post survey upon completion of the curriculum. Descriptive statistics will be used to measure reaction to the curriculum. Paired samples t-tests will be conducted to analyze changes in knowledge and awareness.

Conclusions: Educational curriculums should include multiple, interactive components such as case-based scenarios adolescents can identify with to best encourage more daily physical activity.

Next Steps: Final steps include implementation of the workshop and collection of questionnaires to measure students' reaction to workshop and changes in knowledge and attitudes after completion of workshop.

McAvoy, Kieran — Poster 45 — Clinical & Translational Research

Stroke Presentation Outside of tPA Window Warrants MR Imaging over CT

Authors: M Bhalla, K McAvoy, A Klein, J Ulmer, L Mark, B Fitzsimmons, N Bhalla

Project Mentor: John Ulmer, MD and Manav Bhalla, MD

Background: Computed Tomography (CT) is first line when excluding hemorrhage in stroke suspected patients who present within tPA window period. However, majority patients present outside of this window and receive additional Magnetic Resonance Imaging (MRI) within 24 hours. It is unknown whether CT predictive values are sufficient in stroke diagnosis without confirmatory MRI.

Methods: We retrospectively reviewed 501 patient records (18-89 years old) who presented to the ED and had both CT and MRI within 24 hours. Symptom onset to CT imaging time was used to categorize data into five groups: 0-3, 3-24, 24-72, >72, and unknown hours. Final CT reports were compared to MRI and clinicians discharge diagnoses. CT/MR predictive values (sensitivity, specificity, accuracy, and negative/positive predictive value (NPV/PPV) were calculated.

Results: A 41% of patients presented within 0-3 hours, and 59% presented beyond 3 hours of symptom onset. Across all groups, CT accuracy ranged 65-70%, NPV ranged 58-63% and most importantly ranged 29-53%. CT PPV at 0-3 hours was 75% which increased to >90% beyond this window. With the exception of PPV in the first 3 hours after symptom onset, "unknown" group predictive values and accuracy were similar to the other groups. MRI predictive values ranged from 93-100%.

Conclusion: Although CT PPV remains high beyond the tPA window, CT's ability to identify (sensitivity) and exclude (NPV) stroke remains poor irrespective of symptom onset duration. Patients presenting beyond the tPA window should undergo MRI initially in order to foster the efficacious use of modalities in diagnosing or excluding stroke.

McGee, Jack — Global Health

Free Dialysis in Nepal: Logistical Challenges Explored

Authors: McGee J, Pandey B, Maskey A, Frazer T, MacKinney T
Project Mentor: Theodore MacKinney, MD
Community Partner: Patan Academy of Health Sciences, Manipal College of Medical Sciences

Nepal's Ministry of Health began offering free lifetime hemodialysis (HD) in 2016. There has been a large growth in renal replacement therapy (RRT) services offered in Nepal since 2010, when the last known data on the subject was published. In 2016, 42 HD centers existed (223% increase since 2010) serving 1975 end stage renal disease patients (303% increase since 2010); 36 nephrologists were registered (200% increase since 2010), 12 were trained in transplantation, and 790 transplants had been performed to date. We estimate the incidence of end stage renal disease to be 2900 patients (100 per million population). With an annual cost of approximately US$2300 per dialysis patient, offering free dialysis could potentially cost the government US$6.7 million per year, suggesting that 2.1% of the annual health budget would be allocated to 0.01% of the population. The geographic zone surrounding the capital city, Kathmandu, contains 50% of HD centers, but only 14.5% of Nepal's population. Forty-eight percent of the population lives within zones without HD service, therefore infrastructure challenges exist in providing equitable access to RRT. The aim of this article is to summarize the current statistics of RRT in Nepal.

McKeon, Jack — Poster 46 — Health Systems Management & Policy

Integrated Behavioral Health: a Focus on Clinic Staff and Nurse Views

Authors: McKeon J, HeinrichT, Meurer, J
Project Mentor: Thomas Heinrich, MD

This study focuses on clinic managers and nurses at seven clinics involved in an ongoing Integrated Behavioral Health (IBH) initiative at MCW. By having a project focused on clinic managers and nursing staff rather than providers or patients, the project will have a unique perspective on the progress and efficacy of the collaborative care initiative that hasn't been present in many of the RCT's that have been published on collaborative care.
A qualitative, literature based survey was sent to each of the clinic managers, nurses, and medical assistants at seven MCW and Community Physicians clinics that deliver care via three models: Integrated Behavioral Health, Co-located model, and care as usual. The survey focused on one or both of the following areas:
1) Clinic staff attitudes and opinions on depression care and its role in physical health care
2) Clinic staff views on the readiness and capability of their clinic to treat depression.
The survey results give a view of the IBH and primary care depression treatment from the grassroots level, giving insight into whether the people managing the daily activities of collaborative care clinics feel that they are able to do so effectively. The survey results also give a perspective on how depression treatment is viewed by clinic staffs. With these survey results in addition to the statistical analyses of depression screening monitoring, it can possibly be noted whether or not the opinions and views of a clinic manager or nursing staff may play a role in how well a clinic manages depression and engages in cultural change.

McVey, Natalie — Poster H8 — Molecular & Cellular Research

Intralipid Induces Endocytosis in Human Coronary Artery Endothelial Cells by a CD36/Caveolin-1 pathway.

Authors: McVey NL, Richman M, Struve J, Baumgardt S, Weihrauch D
Project Mentor: Dorothee Weihrauch, DVM, PhD

Introduction: IntralipidTM (ILP) is a fatty emulsion used in parenteral nutrition. Research shows that ILP protects against myocardial ischemia/reperfusion injury (IR) in animal models through activation of an Akt pathway that delays mitochondrial permeability transition pore (mPTP) opening and induces protective processes. The mechanism of ILP passage through endothelium human coronary artery endothelial cells (HCAEC) is unknown. We hypothesize uptake of ILP occurs through endocytosis in HCAECs by formation of a CD36/caveolin-1 cell membrane complex.
Methods: 1% ILP was administered to HCAECs for 2 hours. Western blots were conducted with anti-CD36, caveolin-1, dynamin-2, src kinase-1, eNOS, and phospho-eNOS antibodies. Additional cells were exposed to ILP, and immunohistochemistry was performed to visualize uptake into cells.
Results: The association of CD36 with caveolin-1 increased after stimulation with ILP. Src kinase-1 acts to phosphorylate dynamin-2, a GTPase responsible for separating the vesicle from the plasma membrane. ILP stimulation induced phosphorylation of Src kinase-1 and increased expression of dynamin-2. Furthermore, the association and expression of lysosomal markers CD63 and FM5-95 are increased after ILP treatment. ILP treated cells showed no increase of phospho-eNOS or eNOS.
Summary/Conclusion: Our data suggest that administration of ILP to HCAECs induces an endosomal pathway by formation of CD36/caveolin association, which leads to enhanced endosome formation seen by increased lysosomal markers. Thus understanding the underlying mechanism of ILP uptake may contribute to development of improved delivery systems in parenteral nutrition.

Mejia, Cassandra — Global Health

Screening for Adverse Childhood Experiences within Pediatric Patients in Rzeszów, Poland

Authors: Mejia C, Telega G, Wilson S
Project Mentor: Grzegorz Telega, MD and Samantha Wilson, PhD

Aim: This study sought to assess (1) prevalence of adverse childhood experiences (ACEs) within a pediatric population in Rzeszów, Poland, (2) pediatrician screening practices for ACEs, and (3) physician experiences and opinions regarding ACE screening.
Background: ACEs are stressful or potentially traumatic events correlated with negative, lasting effects on health.
Materials and Methods: Caregivers (n=110) of children aged 6m-18yrs completed a modified/ translated Adverse Childhood Experiences Questionnaire, developed by the Center for Youth Wellness, San Francisco (CYW ACE-Q). CYW ACE-Q scores were compared to physician perception of patient stress and need for intervention. Physicians (n=18) provided additional opinions regarding ACE screening.
Results: CYW ACE-Q responses revealed 27% of patients endorsed four or more ACEs, reflecting increased concerns for toxic stress. In 11% of patients, screening was positive but physician perception of stress was negative; while, 7% of patients had negative screening but positive physician perception of stress. Of the patients with a positive screening, 44.5% had discordant positive physician perception of stress and only 47% were evaluated as in need of intervention. All surveyed physicians (n=18) believed that ACEs were important in primary health; only 5% reported there was enough time to screen or resources to intervene.
Conclusion: A significant prevalence of ACEs were noted within this pediatric sample in Rzeszów, Poland. Results highlight the incremental benefit of ACE screening to supplement physician perception of family stress. Lack of time to screen and limited intervention resources were noted barriers to ACE screening.

Menard, Michael

Clinical & Translational Research

Impact of Comic Concussion Discharge Instructions on Caregiver Knowledge

Authors: Menard M, Thomas D
Project Mentor: Danny Thomas, MD, MPH

It has been found that nearly 20% of caregivers fail to retain key information from the traditional text heavy concussion discharge instructions. This project investigated the effectiveness of the traditional text heavy discharge instructions versus a comic themed set of discharge instructions. Furthermore, the socioeconomic status and health literacy of caregivers was determined and analyzed with respect to the effectiveness of the two forms of discharge instructions. This study took place in the Emergency Department of the Children's Hospital of Wisconsin in Milwaukee.

Meyers, Nicholas

Molecular & Cellular Research

High-glucose conditioning results in astrocytic lactate shuttle changes during glucose deprivation

Authors: Meyers N, Staricha K, Cohen S, Rarick K, Harder D
Project Mentor: David R. Harder, PhD

Objective: Astrocytes play a critical role in maintaining brain function by providing metabolic substrates to neurons on demand. In the astrocyte, systemic glucose is either stored as glycogen or metabolized to transferable energy substrates, such as lactate, then shuttled to neurons through the Astrocyte-Neuron Lactate Shuttle (ANLS) as needed, to replenish the metabolic demands of synaptic firing. Clinically, chronic hyperglycemia is associated with exacerbating poor neurologic outcomes following ischemic brain injury, and the efficacy of post-injury lactate supplementation has been demonstrated in various animal models and preliminary clinical trials. We hypothesize that high-glucose conditioning impairs the astrocyte's ability to generate lactate for neuronal consumption during periods of acute glucose deprivation.
Methods: Primary astrocyte cultures derived from Sprague-Dawley pup hippocampi were culture-purified in normal- (NG, 5.5mM) or high-glucose (HG, 25mM) media over three passages. Real-time intracellular glucose monitoring was performed using a fluorescent glucose-biosensor. Fluorometric glutamate-stimulated lactate-efflux and apoptosis/necrosis assays were performed before and after a 3-hour glucose deprivation.
Results: We found that HG-treated astrocytes are unable to maintain intracellular glucose levels (53+/-3.5% at 3hr, $p<0.01$) as well as glutamate-stimulated lactate release (52+/-6.9 vs. 90+/-16 uM-Lactate/ng-Protein in NG-astrocytes at 3hr, $p<0.01$) during glucose deprivation, whereas levels of apoptosis/necrosis remain similar.
Conclusions: HG-conditioning induces significant ANLS-related changes in the astrocyte's response to glucose deprivation, including intracellular glucose handling, as well as a diminished capacity to maintain glutamate-stimulated lactate release. These findings suggest that HG-conditioning impairs the astrocyte's ability to provide metabolic substrates to the neuron via the ANLS during acute glucose deprivation.

Mier, Neil — Clinical & Translational Research

Laparoscopic versus Open Inguinal Hernia Repair Quality of Life Analysis

Authors: Mier N, Helm M, Helmen Z, Bosler M, Nielsen A, Kastenmeier A, Gould J, Goldblatt M
Project Mentor: Matthew Goldblatt, MD

Background: The introduction of laparoscopic repair has given surgeons an additional option to inguinal hernia repair alongside the traditional open repair. Patient quality of life (QOL) was evaluated for open and laparoscopic inguinal hernia repairs in a long-term longitudinal study. Methods: All patients were administered Short Form-12 (SF-12) surveys at standard intervals to assess patient quality of life. Physical and Mental Component Scores (PCS and MCS) were calculated pre-operatively and post-operatively up to one year after the initial surgery. Results: A total of 68 patients met inclusion criteria for laparoscopic (n=43) and open (n=25) hernia repairs. Physical Component Scores for laparoscopic and open repair demonstrated a mean increase of (3.4±6.9 and 6.9±9.7, p=0.089) respectively. Mental Component Scores for laparoscopic and open repair showed a mean decrease of (0.2±7.5 and 0.4±6.1, p=0.934) respectively. Conclusion: There were no statistically significant differences when comparing QOL results between laparoscopic and open repair.

Miller, Adam — PODIUM — Clinical & Translational Research

Transcatheter Aortic Valve Replacement (TAVR) In Older Adults Improves Symptoms but Not Physical Function

Authors: Miller AT, Stefanacci C, Grant E, Querijero M, Blaum C, Williams M, Duthie EH, Dodson JA
Project Mentor: Edmund H. Duthie, MD and John A. Dodson MD, MPH (NYU)

Introduction: Patients undergoing Transcatheter Aortic Valve Replacement (TAVR) frequently have mobility limitations from advanced age and co-morbidities. Previous studies have shown that TAVR improves symptoms of aortic stenosis, but it is unclear if this leads to increased physical activity levels. We therefore evaluated patient symptoms and physical activity in the perioperative setting two weeks pre- and post-TAVR to determine if TAVR improves physical function.
Methods: Patients with severe aortic stenosis who underwent TAVR between September 2015 and July 2016 were eligible for the study. The Kansas City Cardiomyopathy Questionnaire (KCCQ) was used to assess symptom-related quality of life. Subjects were given an activity monitor which measured mean minutes of moderate to vigorous physical activity (MVPA) per day for two weeks prior to TAVR. Activity levels were again monitored for two weeks post-TAVR, and the KCCQ was repeated. Linear regression analysis was performed to examine the correlation between KCCQ score and activity level pre- and post-TAVR.
Results: Mean age of study patients (n = 20) was 85.0 ± 3.3 years. Mean KCCQ score increased from 65.7 pre-TAVR to 78.2 post-TAVR (p = 0.02). Daily MVPA decreased from 69.7 minutes pre-TAVR to 59.4 minutes post-TAVR. Linear regression analysis demonstrated that ΔKCCQ score was weakly associated with ΔMVPA ($r^2 = 0.248$, p = 0.04) following TAVR.
Conclusions: Patients undergoing TAVR experienced a significant improvement in quality of life in the immediate postoperative setting, but daily MVPA decreased. Further study is needed to assess whether physical activity improves over a longer time course and investigate perioperative interventions to improve physical function.

Miller, Sophie — Molecular & Cellular Research

The Role of miR-21-5p and PPARα in CKD induced CRS, dyslipidemia, and NAFLD

Authors: Nasci VL, Miller S, Chuppa S, Kriegel AJ
Project Mentor: Alison J. Kriegel, PhD

Chronic Kidney disease (CKD) is linked to cardiovascular pathologies and non-alcoholic fatty liver disease (NAFLD). These pathologies have also been observed in the 5/6 nephrectomy (5/6Nx) model of CKD. Previous studies in our laboratory have shown miR-21-5p, a microRNA known to target peroxisome proliferator-activated receptor alpha (PPARα), impacts cardiac lipid handling in the 5/6Nx model. PPARα is a regulator of fatty acid up-take and metabolism and has been shown to be suppressed in CKD, cardiovascular disease, and NAFLD. In this study, we evaluated the potential for miR-21-5p to regulate serum and liver lipid content and liver PPARα levels in 5/6Nx rats and H4IIE rat hepatoma cells exposed to free-fatty acids. Rats subjected to 5/6Nx developed significantly elevated serum triglyceride and cholesterol levels and their livers exhibited increased microvesicular lipid accumulation. We found that lipid treatment (LT) increased lipid abundance within cells, increased miR-21-5p levels and increased PPARα levels. Conversely pre-miR-21-5p attenuated LT induced increase in lipid content and also resulted in a modest reduction in PPARα expression. Our studies indicate that the regulatory relationship between miR-21-5p and PPARα in the liver is complex and could be modulated by cellular lipid content or fatty acid exposure. Our in vitro studies suggest that there may be additional targets of miR-21-5p regulating liver PPARα abundance indirectly. Our study indicates that miR-21-5p may have a regulatory role in liver lipid uptake and/or processing in 5/6Nx induced dyslipidemia, but is not involved with regulation of dyslipidemia in this model.

Mills, Tyler — Quality Improvement & Patient Safety

Predictors of Complicated Airway Foreign Body Extraction

Authors: Sjogren P, Mills T, Pollak A, Muntz H, Meier J, Grimmer F
Project Mentor: Adam Currey MD
Community Partner: University of Utah School of Medicine

Methods: Retrospective case series of children identified with airway foreign body in a multi-hospital network. Patients requiring ICU admission, hospital stay greater than 24 hours, need for more than one bronchoscopy, operative time greater than one hour, or death were considered "complicated." Results: Out of 449 cases, 129 (28.7%) were considered complicated. Unwitnessed obstruction ($p = 0.008$) as well as radiographic findings of hyperlucency ($p < 0.001$) or infiltrates ($p = 0.001$) predicted a complicated case. There was no significant association found between surgeon type or facility as related to a complicated case. Conclusions: Unwitnessed aspiration events and abnormalities on chest radiograph may be associated with a more complicated course in children with an airway foreign body. Surgeon and hospital volume did not significantly correlate with higher rates of complications.

Mocarski, Mason — Clinical & Translational Research

Electromyographic Assessment of the Shoulder Musculature during Passive Rehabilitation Exercises

Authors: Mocarski M, Cross J, Ketchum N, Craighead E, Krimmer M, Vetter C
Project Mentor: Carole Vetter, MD

The rate of re-injury following a rotator cuff repair (RCR) is considerably high, with reported rates ranging from 24 to 94%. One potential reason for this high occurrence is that the muscles of the newly repaired rotator cuff may be experiencing an excessive amount of stress before they can fully heal. We hypothesized that certain common exercises prescribed to patients post RCR that are thought to be passive are stimulating the shoulder musculature to a moderate degree of activation, resulting in an increased likelihood of re-injury to the repaired rotator cuff. To investigate this idea, we assessed the activation of the shoulder musculature of 14 non-injured patients, 8 females (24.9 ± 4.5 years) and 6 males (27.8 ± 3.1 years), during passive exercises commonly prescribed after RCR using electromyography. Fine wire and surface electrodes were used to measure the maximum voluntary contraction (MVC) of each rotator cuff muscle, which was then compared to the muscle activity measured during several rehabilitation exercises. The resulting %MVC was used to stratify each exercise into one of eight risk categories, ranging from definitely safe (1) to dangerous (8). Our study found that the subscapularis muscle activity was a six or greater in every exercise, deeming them unsafe with respect to that muscle. Other exercises that demonstrated elevated activity in one or more shoulder muscles were those that utilized arm flexion as well as pulley exercises. Low level exercise (levels 1 and 2) using a continuous passive motion (CPM) machine demonstrated the lowest EMG activity.

Nance, Rhett — Poster 47 — Quality Improvement and Patient Safety

Evaluation of the implementation of the Anatomage Table into First-Year Medical Anatomy Curriculum

Authors: Peterson J, Nance R, Frenkel, Hoagland T, Mulligan M, Baynes K, Coates N
Project Mentor: Todd Hoagland, PhD; Keith Baynes, MD; Margaret H. Mulligan, PhD, MS

The role of technology is playing larger role medicine today. Robotic surgery, new pharmacologic treatments, and accurate imaging techniques are some examples of how physicians are practicing medicine in more precise and effective ways than ever before. MCW, along with other schools throughout the country, continues to invest great resources to provide students with a quality education. Among these resources is the Anatomage Table, which is a fully segmented real human 3D anatomy system that provides users with the opportunity to manipulate images and explore the human body beyond what any cadaver could provide. The goal of this study was to evaluate what type of resources students at MCW use to study anatomy, including the use of the Anatomage Table. Students were asked to report study resources and their experiences using the Anatomage Table. Additionally, a Mental Rotations Test (MRT), which evaluates an individual's ability to manipulate objects in space, was given to each student before and after the completion of the anatomy course. Performance on this test was compared to evaluate any improvement in each student's visual spatial abilities.

Based on our results, we found that a large majority of MCW students utilized 3D anatomical resources in their studies. In fact, 35% (n=60) of respondents reported the use of 3D Anatomy Apps. When asked about the value of the Anatomage Table, 84% (n=60) reported that this resource greatly enhanced their understanding of anatomy and related topics. In addition, we found that the Anatomage Table had a positive impact on the students' MRT performance. Of the students the students who showed no improvement on the MRT, a greater percentage did not use Anatomage Table as compared to the students who showed improvement on the MRT.

The Anatomage Table is a fantastic educational resource for students learning human anatomy. We believe this resource can still be better utilized by students at MCW.

Navarrete, Emily Poster 48 Global Health

Improving Abnormal Pap Follow-up for Underserved Women in Milwaukee

Authors: Amos A, Broekhuizen F, Navarrete E
Project Mentor: Emily Navarrete, BS
Community Partner: Progressive Community Health Center - OB/GYN Department

The purpose of our project was to improve patient follow-up rates following abnormal Pap test results within the Progressive Community Health Centers. Many barriers prevent patient follow-up within the community health center environment. Our goal was to monitor these high-risk patients and try to ensure that they received timely follow-up within the clinic after receiving abnormal Pap test results. In order to do this, we kept an Excel spreadsheet of all of the abnormal test results Progressive Community Health Centers received from the ACL Laboratories testing center. After logging patients with abnormal results into the excel spreadsheet, we then attempted to call patients via telephone or certified mail in order to schedule the appropriate follow-up appointment. Between January 2015 and September 2017, 277 women receiving care with Progressive Community Health Centers received abnormal Pap testing results. Of these 277 women, 131 women (47.3%) were in need of immediate follow-up. Of the 131 women in need of immediate follow-up, 95 (72.5%) went to their scheduled follow-up appointment. Further work is needed to increase this rate to Progressive Community Health Centers' goal of at least a 90% follow-up rate. This further improvement may be achieved through further investigation into barriers to care, better recording of up-to-date patient contact information, and patient education to improve understanding of the importance of timely follow-up following an abnormal Pap testing result.

Navarro, Christopher Molecular & Cellular Research

Blocking mitochondrial calcium uniporter reveals evidence for Ca2+/H+ exchanger

Authors: Navarro C, Boswell M, Davani A, Heisner J, Camara A, Stowe D
Project Mentor: David F Stowe, MD, PhD

Mitochondrial Ca2+ overload is important in many pathologies, particularly cardiac ischemia reperfusion injury. Proteins in the inner mitochondrial membrane (IMM) facilitate Ca2+ movement. Mitochondrial Ca2+ uptake is mostly via the mitochondrial Ca2+ uniporter (mCU), whereas Ca2+ efflux is via a mitochondrial Ca2+/H+ exchanger (mCHE). By understanding Ca2+ dynamics, new drugs can be investigated to prevent Ca2+-mediated oxidative stress in reperfusion states. This study aims to examine the kinetics of Ca2+ flux through the mCHE by altering the pH gradient across the IMM and by blocking Ca2+ influx in Ca2+ overloaded mitochondria.
Isolated Guinea pig cardiac mitochondria were divided into suspensions of pHs: 6.9, 7.15 and 7.6. The mitochondria were then loaded with a bolus of 40 µM CaCl2. Shortly thereafter, Ru360 (a blocker of mCU) was administered to block Ca2+ entry into the mitochondria. Extra-matrix Ca2+ was then measured with a Ca2+-sensitive buffer dye. Mitochondrial membrane potential (Δm) and intra-matrix pH was also measured using appropriate buffer dyes.
Blocking the mCU after the Ca2+ bolus at pH 6.9 caused an increase in the rate of Ca2+ efflux. Also, blocking the mCU in all pHs caused a decrease in the rate of matrix acidification. Blocking the mCU preserved ΔΨm in all pHs. Blocking the mCU prevented Ca2+ entry into the mitochondria which slowed the mCHE as evidenced by the decreased acidification (fewer matrix Ca2+ ions to allow proton entry). It is known that mitochondrial Ca2+ is in constant cycling of influx and efflux. By blocking this cycling with the mCU blocker, the mCHE continued to extrude Ca2+ in exchange for protons which shortly thereafter began to slow due to lack of matrix Ca2+ as its substrate. In conclusion, these data support that the mCHE plays a role in the exchange H+ and Ca2+ during Ca2+ overload.

Nelson, Luke — Poster 49 — Quality Improvement and Patient Safety

Determining the utilization of the low risk ankle rules based on physical exam documentation.

Authors: Nelson L, Ferguson C
Project Mentor: Cassie Ferguson, MD

Background: Pediatric ankle injuries are a common presentation to emergency departments (ED). Currently ankle x-rays (XR) are ordered at a rate of 85-100%. The low risk ankle rules (LRAR) were developed to safely screen which pediatric patients would need an XR based off physical exam findings.
Objectives: Separate the population into those that are low risk or not low risk based on physical exam documentation to better understand who is receiving an ankle XR and the utilization of the LRAR.
Methods: A retrospective chart review was conducted on children ages 3-16 years old who visited a large, urban pediatric emergency department with an ankle injury between June and December 2017. ICD-10 diagnostic codes for the chief complaints of ankle injury and ankle pain were used to identify the ankle injuries. Based on the physical exam documentation, the injury would be classified as: low risk, not low risk, low risk plus foot findings documented, or indeterminate.
Results: 216 patients were included. 94 (43.5%) were low risk and 62 (66.0%) had an ankle XR. 107 (50.0%) were not low risk and 93 (87.0%) had an ankle XR. 19 (8.7%) were low risk plus foot findings documented and 18 (94.7%) had an ankle x-ray. 15 (6.9%) were indeterminate and 5 (33.3%) had an ankle x-ray.
Conclusion: The implementation of clinical decision rules, based on LRAR, into the electronic health record (EHR) would result in fewer ankle XRs in those that are low risk.

Nguyen, Stephanie — Clinical & Translational Research

An Evaluation of Short-term Nutritional Supplementation of Patients Undergoing Elective Joint Surgery.

Authors: Nguyen S, Ebert T
Project Mentor: Thomas Ebert, MD, PhD

INTRODUCTION Nutritional supplements containing immune components have shown improved outcomes in frail patients undergoing surgery for cancer management, however it is unclear if there is a similar benefit in patients undergoing major joint replacement surgeries. We hypothesize that nutritional support before and after such surgeries enhances patient energy, motivation to rehabilitate, and healing following surgery.
METHODS We conducted a controlled interventional trial with nutritional supplementation for patients undergoing elective total hip replacements. Intervention patients consumed three nutritional drinks for five days before surgery. After surgery, patients resumed this regimen while in-hospital. Control patients received no supplementation. For two days after surgery, all patients answered a Quality of Recovery (QoR) survey and were scored on a participation scale by physical therapists. Also, on the day of surgery and for three days after, C-reactive protein (CRP) and white blood cell (WBC) values were collected.
RESULTS There were sixteen patients in the intervention group and seventeen in the control. Compared to the control group, intervention patients showed no significant improvement in QoR and physical therapy participation scores, as well as no significant reduction in CRP and WBC values after surgery.
CONCLUSIONS Nutritional supplementation did not significantly alter recovery after total hip replacement surgery. While our study did not demonstrate a benefit in these patients, it still serves as an important piece of the investigation of populations that could possibly benefit from perioperative nutritional supplementation.

Nielsen, Alexander — Clinical & Translational Research

Bleeding and Blood Transfusion is a Risk Factor for VTE

Authors: Nielsen AW, Helm MC, Bosler ME, Helmen ZM, Gould JC
Project Mentor: Jon Gould, MD

Background: Morbidly obese patients are at an increased risk for venous thromboembolism (VTE) after bariatric surgery. We sought to evaluate the relationship between perioperative bleeding and postoperative VTE in bariatric surgery patients. Methods: Univariate and multivariate regressions were used to determine perioperative factors predictive of post-operative VTE within 30-days in patients who experience a bleeding complication necessitating transfusion. Results: Multivariate analysis revealed that the rate of VTE was significantly higher after blood transfusion (Odds Ratio [OR]=4.9; $p<0.0001$). Conclusions: Bariatric surgery patients who receive a postoperative blood transfusion are at an increased risk for VTE. In those who bleed, consideration should be given to reinitiating chemoprophylaxis when safe and extending treatment after discharge.

Notardonato, Lucia — Poster 50 — Urban & Community Health

Developing Pipeline Programs to Diversify Health Care Professions & Improve Health Care in the Milwaukee

Authors: Notardonato L, Siller A, Kendrick R, Letellier S, Meurer L
Project Mentor: Linda Meurer, MD, MPH
Community Partner: Milwaukee Area Health Education Center, James Madison High School

Minorities make up 30% of the U.S. population, yet only account for 8.7% of physicians and 6.2% of registered nurses. This underrepresentation of minority physicians has led to cultural disparities in health care and poorer patient satisfaction. Pipeline programs can increase the number of minorities that pursue careers in health care. In collaboration with the Milwaukee Area Health Education Center Youth Health Service Corps (AHEC-YHSC), the Medical College of Wisconsin (MCW) has formed a pipeline program partnership with James Madison high school (JMAC), in the hopes of nurturing students' early interest in health care careers. In the 2016-17 academic year, ten JMAC students enrolled in the YHSC program. MCW students provided monthly training sessions on health career topics such as suturing, cranial nerves and blood typing, and hosted site visits to MCW's simulation center and anatomy lab. Evaluations indicated that the program had a positive influence on participants' interest in health careers and confidence in their ability to attend college. Medical students learned to plan and implement a service learning program, but were faced with scheduling and communication challenges. Next steps include a longitudinal study of education and career outcomes among former YHSC students.

Organ, Nicholas

Clinical & Translational Research

Rheological adaptation of aortic stenosis in the presence of chronic renal disease

Authors: Organ N, Choi B
Project Mentor: Byung-il Choi, MD

Background: Acquired aortic stenosis (AS) is attributed to aging, gradual deterioration, and dystrophic calcifications. Chronic kidney disease (CKD) causes metabolic derangements and metastatic calcifications. This study will correlate poor renal function with both structural and hemodynamic parameters of AS.
Methods: This retrospective analysis of 313 patients with AS correlated estimated glomerular filtration rate (eGFR) with echocardiographic valvular anatomic and hemodynamic data. A simple linear regression and Pearson's correlation coefficient were obtained for eGFR and eight cardiac variables.
Results: No significant linear relationship existed when eGFR was paired with valve area (R= -0.0779, p=0.176), maximum transvalvular velocity (R=0.0654, p=0.253), mean transvalvular pressure gradient (R=0.0432, p=0.45), or estimated pulmonary artery systolic pressure (R= -0.0929, p=0.194). A statistically significant but weak positive linear correlation existed between eGFR and LV ejection fraction (R=0.207, p<0.001). A statistically significant but weak negative correlation existed between eGFR and LV mass indexed for body size (R= -0.168, p<0.01). A statistically significant but weak negative correlation existed between eGFR and LV outflow tract diameter (R= -0.215, p<0.001).
Conclusions: Aortic valve area had no correlation with eGFR, due to clustered AVA data. As eGFR decreased, LV ejection fraction declined, despite compensatory LV hypertrophy demonstrated by increased LV mass index and interventricular septal thickness, suggesting inadequate compensation with volume overload. LV outflow tract diameter increased suggesting subaortic dilatation with increasing pressure gradient. Thus, CKD may cause rheological adaptation in patients with AS.

Palomares, Jose

Clinical & Translational Research

A Combined Perfusion and Diffusion MRI Metric to Distinguish Pediatric Brain Tumor Grade

Authors: Schmainda KM, Prah MA, Palomares JA, Maheshwari M, Lew S, Kelly T
Project Mentor: Kathleen M Schmainda, PhD

Background and Purpose: This study aims to evaluate the effectiveness of perfusion (pMRI) and diffusion MRI (DWI) for distinguishing low-grade (LG) and high-grade (HG) pediatric brain tumors using relative cerebral blood volume (rCBV) and apparent diffusion coefficient (ADC). Materials and Methods: This study involved 38 pediatric patients with newly diagnosed tumors classified according to WHO tumor grades I, II (LG) & III, IV (HG). Pilocytic astrocytomas and optic pathway gliomas were grouped separately (PA+OPG). The rCBV and ADC mean values were calculated. Statistical analysis included the Whitney t-test using an alpha=0.05 as the level of significance. Results: This study demonstrates that the sRCBV to ADC ratio has greater statistical power distinguishing HG, LG, PA+OPG and NT masses than ADC or rCBV alone. Conclusion: The use of the sRCBV to ADC ratio as a novel imaging biomarker to distinguish among these pediatric brain tumors would be beneficial for reducing invasive interventions.

Park, Jiyoon — Clinical & Translational Research

Use of I2b2 Cohort Discovery Tool to Identify Potentially Unrecognized Primary Hyperparathyroidism (pHPT)

Authors: Park J, Yen TW, Doffek K, Coan KE, Wang TS
Project Mentor: Tracy S. Wang, MD, MPH

Background: The majority of patients with hypercalcemia may not be appropriately referred for further evaluation/treatment of potential primary hyperparathyroidism (pHPT), as nonspecific presenting symptoms are heterogeneous to normal aging or other diseases. The purpose of this study was to determine the prevalence of potentially undiagnosed pHPT.
Methods: This is a retrospective review of de-identified patient data from Freodtert Hospital collected within the i2b2 Cohort Discovery Tool. The cohort was defined as any patient with at least one serum calcium >10.2mg/dL (normal, 8.6-10.2) and PTH>30pg/mL (normal, 16-72) in the study period (1/1/15 to 9/30/15). A PTH>30 is considered elevated in the setting of hypercalcemia. The presence of an ICD-9 diagnosis of HPT, symptoms of pHPT, and referral to Endocrinology or Surgery were compared in patients with PTH 30-70 and those >70.
Results: Of the 941 patients, 446 (47%) had PTH 30-70 and 495 (53%) had PTH>70. Patients with a PTH>70 were more likely to have a diagnosis of HPT (393, 80%) than patients with PTH 30-70 (160, 36%; p=<0.0001). There was no difference in reported symptoms between the two groups (p=0.521). However, those with a PTH>70 were more likely to be referred for additional evaluation (262, 53%) than patients with PTH 30-70 (200, 45%; p=0.005).
Conclusion: Patients with elevated serum calcium and PTH 30-70 appear to be less frequently referred for evaluation/treatment of potential pHPT than patients with PTH>70pg/mL. Despite the limitations of this de-identified database, this suggests that pHPT may be underdiagnosed and undertreated within the health care system.

Patel, Gina — Poster 51 — Global Health

Acquired Factor X Deficiency in Light Chain (AL) Amyloidosis is Rare and Associated with Advanced Disease

Authors: Patel G, Hari P, Szabo A, Rein L, Baumann Kreuziger L, Chhabra S, Dhakal B, D'Souza A
Project Mentor: Anita D'Souza, MD, MS

Systemic light chain (AL) amyloidosis can lead to an acquired coagulopathy secondary to acquired factor X (aFX) deficiency. However, it is not very clear who develops aFX deficiency in AL amyloidosis. We therefore undertook this single center study to better characterize AL amyloidosis-associated aFX deficiency. Out of 121 AL patients who had FX testing at the time of their first evaluation at our institution, including 17 patients on warfarin at the time of testing, 10 out of 104 patients (8.3%) with systemic AL amyloidosis were found to have FX levels below 50%. Acquired FX deficiency was associated with advanced stage of AL amyloidosis and elevated cardiac biomarkers. Lower FX activity, advanced stage, and cardiac involvement by disease were associated with higher hazard of death on univariate analysis. On multivariate analysis, stage of AL amyloidosis was the only significant predictor of survival. Median survival time of patients with FX deficiency was 9.3 months compared to 118.4 months in those without. We conclude that while aFX deficiency is rare in systemic AL amyloidosis, it is a marker of advanced disease.

Patel, Paraj — Clinician Educator

Mitochondrial dynamics and electrophysiology in ALS iPSC-derived motor neurons.

Authors: Ebert A, Seminary E, Patel P
Project Mentor: Allison Ebert, PhD

Motor neurons from Amyotrophic Lateral Sclerosis (ALS) patient induced pluripotent stem cell (iPSC) lines were developed to better understand the roles of C9orf72 and SOD1 mutations. ALS is an adult-onset neuromuscular disorder with devastating consequences. Understanding these mutations and how they manifest in lower motor neurons is essential for discovering novel therapies. Previous literature has proposed that mitochondrial malfunction mediates motor neuron loss in ALS. However, it is unclear whether mitochondrial defects are consistent across different ALS mutations. Therefore, we tested mitochondrial transport and metabolism, Ca2+ homeostasis, and basal neuronal spontaneous firing in C9orf72 and SOD1 ALS iPSC derived motor neurons. Live cells assays were used to measure mitochondrial velocity in C9orf72, SOD1, and control wildtype neurites. Live cell metabolic assays were used to determine oxygen consumption rate and respiratory capacity between patient and control motor neurons. Basal neuronal spontaneous firing was measured using microelectrode array plates which determined spontaneous activity in 3 minute intervals. Our results showed clear deficits in the ALS iPSC-derived motor neurons compared to controls; however, C9orf72 and SOD1 motor neurons exhibited different phenotypes compared to each other. For example, C9orf72 motor neurons exhibited a statistically significant hypoexcitability compared to control motor neurons at earlier time points, but electrical activity increased with further maturation. However, there were no alterations in mitochondrial function. In contrast, SOD1 motor neurons had a statistically significant decrease in mitochondrial velocity compared to C9orf72 and control motor neurons with no effect on electrical activity. Our results highlight differences in pathophysiology between the C9orf72 and SOD1 mutations, which indicates that much more research is needed to understand the downstream consequences of ALS-linked mutations.

Percy, Shayla — Urban & Community Health

A Group-exercise Curriculum for Adults at Agape Community Center

Authors: Percy S
Project Mentor: Rebecca Bernstein, MD
Community Partner: Agape Community Center

Background: Despite overwhelming evidence indicating that a sedentary lifestyle increases the risk of developing many different diseases, only 21% of adults in the United States meet the current recommendations for physical activity.1 As a result, many exercise interventions have been developed in an effort to increase physical activity levels. Methods: This intervention utilized a pre-posttest design to determine the effectiveness of a group exercise and education class in increasing the physical activity of members of the Agape Community Center in Milwaukee, Wisconsin. Results: The pre-posttest data was unable to be analyzed due to low participation in the program, however via observations of the program and participant feedback it was determined that several modifications to the curriculum's content, difficulty, and scheduling should be made in future implementations. Conclusion: Although significant attrition led to inconclusive results, this intervention may serve as a starting point to further develop an effective exercise intervention.

Perez, Enio — Poster 52

Authors: Perez E
Project Mentor:

Peterson, Jeffrey — Poster 47 — Quality Improvement and Patient Safety

Evaluation of the use of the Anatomage Table and other technologies in Medical School Anatomy Curriculum

Authors: Hoagland T, Baynes K, Peterson J, Nance R, Frenkel M, Coates N
Project Mentor: Todd Hoagland, PhD

The role of technology is playing a larger and larger role in the field of medicine today. Robotic surgery, minimally-invasive procedural techniques, and extremely accurate imaging techniques are just a few examples of how physicians are practicing medicine in more precise and effective ways than ever before. Additionally, technology is providing medical students with the possibility of an educational experience previously unimaginable. The Medical College of Wisconsin continues to invest great resources to provide students with the technology necessary to experience education in this miraculous way. Among these resources is the Anatomage Table, which is 3D anatomy system that provides users with the opportunity to manipulate images and explore the human body. The goal of this study was to evaluate what type of resources students at the Medical College of Wisconsin use to study anatomy, including the use of the Anatomage Table. Students were asked to report what resources they used during the course and their experiences using the Anatomage Table. Additionally, a Mental Rotations Test, which evaluates an individual's ability to manipulate objects in space, was given to each student before and after the completion of the anatomy course. Performance on this test was compared to evaluate improvement in students' visual spatial abilities.
Based on our results, we found that a large majority of MCW students utilized 3D anatomical resources in their studies. In fact, 35% (n=60) of respondents reported the use of 3D Anatomy Application. When asked about the value of the Anatomage Table, 84.615% (n=60) reported that this resource greatly enhanced their understanding of anatomy and related topics.
The Anatomage Table is a fantastic educational resource which we believe can still be better utilized by students at MCW. By doing so the anatomy education experience at MCW will be better than ever before and will better prepare students to become the physicians of the future.

Phillips, Emily — Molecular & Cellular Research

Role of the Histone Methyltransferase Dot1L in Cohesin Mutated AML

Authors: Phillips E, Fisher J, Stelloh C, Rao S
Project Mentor: Sid Rao, MD, PhD

Acute myeloid leukemia (AML) is a hematopoietic malignancy that remains difficult to treat. Understanding leukemogenesis is critical to developing new AML therapies. Cohesin is a critical protein complex with a role in cell division. AML with cohesin haploinsufficiency expresses elevated levels of HoxA9, a transcription factor essential for self-renewal. Histone methyltransferase, Dot1L, is responsible for laying down the histone methylation mark (H3K79) that drives expression of Hoxa9. We hypothesized that Dot1L inhibitors will decrease self-renewal in cohesin haploinsufficient bone marrow cells. Bone marrow was obtained from mice and transfected with Rad21 shRNA to mimic cohesin haploinsufficiency and establish dysregulated self-renewal. Dot1L was depleted via shRNAs or inhibited via Dot1L inhibitors. Results indicate that although H3K79 is significantly reduced upon Dot1L inhibition, cohesin haploinsufficient bone marrow cells maintain dysregulated self-renewal one week post Dot1L inhibition. Future studies will focus on whether DOT1L inhibitors have an effect on self-renewal after one week.

Ponkratz, Alexandria — Poster H2 — Clinician Educator

Retrospective Analysis of a Peer Mentorship Program

Authors: Ponkratz A, Thompson K, Gallagher M, Lauck S, Chou E, Treat R
Project Mentor: Sara Lauck, MD and Erica Chou, MD
Community Partner: Marquette University, University of Wisconsin-Oshkosh

Literature studies suggest widespread advantages to peer mentoring programs; however, data about medical student-undergraduate mentorship is limited. To study this gap, a mentorship program, Pre-Med Pair Up (PMPU), was established at the Medical College of Wisconsin. Pre-medical students from the University of Wisconsin-Oshkosh and Marquette University were paired with medical student mentors. The program provided peer mentorship and resources including monthly newsletters, checklists, volunteer resource guides, and interview advice intended to help pre-medical students prepare for medical school and its application process.

After 6 months, retrospective surveys were created to investigate the effectiveness of PMPU. One survey was distributed to the 26 medical student mentors and a second survey was distributed to the 43 undergraduate participants. Pearson correlation and linear regression analyses were used to assess the correlations between program components and student confidence and knowledge. Pre-medical student survey results showed that most students felt that their confidence in abilities as pre-medical students improved with program involvement: 9.1% no improvement, 45.5% minimal improvement, 27.3% moderate improvement, and 18.2% great improvement. This confidence was strongly correlated between students' knowledge of volunteer opportunities ($r = 0.887$, $p < 0.001$) and feelings of preparedness for the medical school application process ($r= 0.854$, $p = 0.001$) and medical school curriculum ($r = 0.871$, $p < 0.001$). Medical students thought the program was successful in making them better mentors. Confidence in their abilities as mentors was correlated with their feelings of success as a mentor ($r = 1.0$, $p < 0.001$).

PMPU has shown to be effective in improving student confidence by providing medical students an outlet to serve as mentors and pre-medical students resources that enhance their understanding of medical school and the application process.

Powell, Jackie — Poster H6 — Global Health

Adolescent Health Risks and Behaviors Survey - A School Based Survey in Central Nepal

Authors: Thapa B, Powell J, Yi J, McGee J, Landis J, Rein L, Kim S, Shrestha S, Karmacharya B
Project Mentor: Bipin Thapa, MD, MS, FACP
Community Partner: Dhulikhel Hospital: Department of Community Programs

A comprehensive study of adolescent behavioral health in central Nepal has not yet been performed. This survey assessed trends in demographics, nutrition, hygiene and related infrastructure, causes of injury, violence, mental health, substance use, and female hygiene. A 40-question survey was adapted from the CDC's Youth Risk Behavior Surveillance System and translated to Nepali. Approximately 1200 surveys were administered anonymously to students in 8 different schools in central Nepal. The data has identified nutrition, infrastructure, mental health, and female hygiene as areas for improvement. The number of adolescents who reported going hungry some, most, or all of the time (30.5%, 25.8%, 13.9%) reveals a need for better food access. Students reported positive hand-washing behaviors but some schools may lack infrastructure to encourage good hygiene, as 44.5% of students reported that there was no place to wash their hands with soap and water at school. Mental health data showed that 6.5% of students were dissatisfied with who they are, 6.5% experienced frequent loneliness in the past year, and 11.8% have considered or attempted suicide. A significantly greater percentage of students who reported suicidal ideation also reported engaging in behaviors related to physical violence and substance use. Outcomes such as happiness with themselves, insomnia due to anxiety, and loneliness also differed significantly depending on whether students reported suicidal ideation or attempt. 40.1% of female students reported missing school at least once in the last three months due to menstruation. This data will be used to design community interventions within the population surveyed.

Price, James — Health Systems Management & Policy

Hybrid Process Mapping the Developmental Care System in Milwaukee County

Authors: Price J
Project Mentor: John Meurer, MD, MBA
Community Partner: United Way of Greater Milwaukee & Waukesha County

Developmental screening tools are best practice for the identification of developmental delays, yet only 33% of Milwaukee County children received a screening in 2015. Early intervention, made possible through screening, saves $13 in future treatment costs per dollar spent. Screening frequency will likely increase by improving the accessibility and efficiency of the Milwaukee County developmental care system. Service providers were interviewed to construct a hybrid process map of the system in order to ascertain recommendations for system improvement. The novel hybrid process mapping technique combines elements of many mapping techniques to capture the system's complexity. Analysis of the map revealed the needs to establish and strengthen feedback communication loops and to decrease barriers for information consent. The map can also be employed to increase service provider and public literacy of the system. The hybrid process mapping technique can be applied to other developmental care systems throughout the country.

Ramahi, Khalid Jamal — Molecular & Cellular Research

Daily Physical Activity Impacts Vascular Endothelial Health

Authors: Ramahi KJ, Sudhi T, Widlansky ME

Project Mentor: Michael E. Widlansky, MD, MPH

Introduction: Previous studies have shown that interventions designed to achieve a goal of 10,000 steps/day did not improve endothelial function in sedentary adults. The impact that the duration of such quantitative levels physical activity has on vascular endothelial function is unclear.
Hypothesis: We hypothesized that chronically high levels of physical activity quantified as daily step count would be significantly associated with vascular endothelial function.
Study Methods: 63 healthy sedentary subjects from a study involving a 12-week intervention to increase physical activity and 32 healthy subjects were followed. Daily step count for each subject was the average over a 7-day measurement period. Endothelial function was measured by flow-mediated dilation of the brachial artery. Simple and multivariable linear regressions were performed to determine predictors of FMD%.
Results: Simple linear regression revealed that step count significantly predicted FMD% (P=0.03) for the entire cohort. With multivariable adjustment, the association between step count and FMD% was still significant (P=0.02). For healthy subjects, FMD% was more strongly associated with average step count (P=0.004). After multivariable adjustment (P=0.003), step count remained a significant independent predictor of FMD%. However, average step count in the sedentary group was not significantly associated with FMD% (P=0.34).
Conclusions: Our study reveals that long-term persistent physical activity is an important predictor of vascular endothelial function. An acute increase in physical activity levels among previously sedentary adults does not correlate with vascular function measurements. Further work is needed to determine the ideal duration of physical activity needed to improve endothelial function in sedentary groups.

Rao, Amrita — Poster 53 — Global Health

Increasing Mammography Uptake through Academic-Community Partnerships in Ethnic Minority Communities

Authors: Rao A, Tavares E, DeNomie M, Kamaraju S

Project Mentor: Sailaja Kamaraju, MD

Community Partner: Muslim Community & Health Center, Sikh Religious Society Of Wisconsin - Brookfield Gurudwara, Wisconsin Shirdi Sai

Background: Women of ethnic/racial backgrounds are shown to have a higher death rate from breast cancer. Community Based Academic Partnerships (CBAPs) are an effective method of collaborating with communities to promote cancer awareness and screening efforts. Data shows that newly immigrated women have lower utilization of screening practices than other group of women.
Aims: 1) Provide education and identify barriers to breast health and 2) Evaluate effectiveness of breast education workshops
Methods: Monthly breast health education workshops were conducted at community sites over 2 years. Demographic surveys were completed, and a questionnaire was used to identify barriers to breast health care. Mobile mammography unit provided free screening mammograms. Interviews were conducted with individuals representing 3 communities that participated in the workshops. Interview questions focused on whether community leaders felt the workshops were effective, had fulfilled a purpose to the community, and what could be done to improve further workshops.
Results: 493 women attended a workshop. 374 participants completed all of the surveys. 188 women ≥ 40 years old reported no prior mammogram in the past 2-5 years. 60% of these women were insured. After attending the breast health workshop, mammogram uptake was 100% among insured women, and 80% in uninsured women. Finances, language and access disparities were cited as barriers. Utilization of a group's native language was a major strength. Recruitment was a significant challenge. Impact on attendees centered on exposure and improved knowledge base. The 4 main barriers were education, sensitivity of topic, fear, and confidentiality.
Conclusion: Our culturally tailored workshops increased knowledge and uptake of screening mammography based on quantitative data from the workshop surveys. Small group interviews affirmed these findings and proved to be an important tool for further delving into the barriers to breast health.

Regala, Peter — Global Health

Social inequalities in health in the Balkan countries: a systematic review

Authors: Polasek O, Bosjnak Z, Regala P
Project Mentor: Zeljko Bosnjak, PhD and Ozren Polasek, MD, PhD

SPECIFIC AIMS: The aim of this systematic review was to determine the extent of research on social inequalities in health in the wider-sense Balkan countries, including Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Montenegro, Romania, Serbia, and Slovenia.
STUDY METHODS: A systematic literature review was based on Pubmed, SCOPUS, and Web of Science searches, identifying all studies that had social inequalities in health as the primary study outcomes. A total of 38 pieces of information were extracted from all of the identified studies. We had also developed a novel methodological approach of synthesis of the different data reporting schemes, by using beta coefficients from linear regression across strata, which is independent of the number and nature of classes used for social status estimation.
RESULTS: The initial database search yielded 15,363 articles, which were reduced to a total of 71 studies that provided 82 data points (there were a few studies that had provided multiple samples). Most studies originated from Croatia (n=16), followed by Romania (13) and Slovenia (13). Total summative sample size exceeds 170,000 subjects, with most commonly investigated social strata in relation to obesity, hypertension, maternal health or vaccination.
CONCLUSIONS: The negative effects of social deprivation are widely reported and their health-related outcomes are reflected in higher morbidity and mortality rates of the less affluent. Some countries in the region managed to mobilize their researcher capacities towards better understanding of social inequalities and their effect on the health. This study provided a framework for the regional research priorities, needed for the delivery of the effective interventions, aiming towards the reduction of their negative effects.
NEXT STEPS: Further develop the database and perform a data synthesis through meta-analysis; publish the results in an international peer-review journal.

Reis, Michael — Poster 54 — Bioethics

Debating Assisted Reproductive Technologies with Audience Feedback

Authors: Reis M, Spellecy R
Project Mentor: Ryan Spellecy, PhD

Introduction: Assisted reproductive technologies (ART) is a growing field of medicine. With each new advancement in biomedical technology, there are ethical and legal implications that need to be considered.
Background: With ARTs, the most common ethical and legal concerns focus on the welfare of the children, rights of parents and their reproductive freedom, and the role of potential surrogates. The purpose of the debate was to expose members of the MCW community to the most common ethical and legal arguments in a formal debate.
Methods: Three students were took part in this debate, two as debaters and one as a moderator. One side was arguing that ART's were ethical and legal. The other side was arguing that there were too many questions still about how to use ART's ethically or legally. The debate opened with the audience completing a questionnaire assessing their understanding of ART's, personal feeling about ART's, and their opinions regarding its regulation. Each questionnaire was graded on a 1-5 Likert scale. After the debate ended, another questionnaire was sent into the audience which assess how their personal feelings changes.
Results: For "better understanding", the difference in pre to post debate was +0.3. For the "change in personal feelings" question, the difference was -1. For the ethics question, the change was +0.4. For the legality question the difference was +0.1. For the "regulations" question the difference was +0.6. For the "personal choice" question, the difference was +0.3.
Conclusions: Assisted reproductive technologies is a rapidly growing field in medicine. The data shows that perception of ART's among those who participated is overall positive, and that rational debate can increase understanding. Personal feelings it seems cannot be changed in the setting of one debate, and that questions still remain about their legality. There was a consensus that more regulations are still needed.

Richter, Dustin — Molecular & Cellular Research

Comparison of Growth in Children Undergoing Three Different ACL Reconstructions

Authors: Richter D, Lyon R, Liu XC, Van Valin S, Tarima S
Project Mentor: Xue-Cheng Liu, MD, PhD

Background: Three surgical techniques used in pediatric anterior cruciate ligament (ACL) reconstruction include transphyseal (TP), all-epiphyseal physeal-sparing (PS), and a second physeal-sparing technique featuring "over-the-top" graft (OT). Despite studies investigating physeal damage and growth disturbance in pediatric patients, there remains debate which procedure should be used. The aims of this study were to use sequential, post-surgical radiographs to measure tunnel migration due to growth around the knee in pediatric patients, and to asses if rate of migration differed between surgical techniques.
Methods: Retrospectively, anterior-posterior (AP) and lateral x-ray films from 31 skeletally immature patients were grouped based on procedure type: TP, PS, or OT. Along with measuring tunnel angle, length, width, and femoral condylar geometry, a two-dimensional grid was created to assess changes in tunnel location over time.
Results: Although 53 total variables were measured in this study, the overwhelming majority showed no significant differences in rate of migration or mean value across surgery types. In comparing rate of tunnel location migration, only one variable, the vertical coordinate for the femoral tunnel/drill hole aperture, exhibited a significant difference in both PS and OT groups compared to the TP group (p-value=0.0497). In comparing mean variable values, both PS and OT groups demonstrated significantly decreased tunnel width (p-value=0.0001) and medial condyle radius (p-value=0.0499) as compared to the TP group.
Conclusions: While this study measured tunnel migration, the rates of migration were uniform between ACL reconstruction techniques. Ultimately, this implies post-operative growth was consistent among all groups. We conclude this is indicative of minimal interference of all three procedures, each allowing successful and relatively unaffected growth around the knee following ACL reconstruction in skeletally immature patients.

Ritchay, Alex — Clinical & Translational Research

The Effect of Proton Pump Inhibitors on Endothelial Function

Authors: Ritchay A, Widlansky M
Project Mentor: Michael Widlansky, MD, MPH

Introduction: Recent studies have suggested proton pump inhibitor (PPI) use may lead to an increased prevalence of adverse cardiovascular (CV) events through the development of endothelial dysfunction. With conflicting data from cohort and randomized trials as to whether PPIs increase CV risk, this study looked to determine whether PPIs were associated with endothelial dysfunction in vivo.
Hypothesis: We hypothesize that patients taking PPIs will exhibit decreased endothelial function as characterized by a decreased flow mediated dilation percent (FMD%).
Methods: This cross-sectional analysis used data from the MCW vascular bank. Subject demographic data, anthropomorphic data, medication information, FMD% and flow velocity data were extracted from the database. Flow mediated dilation study data for subjects on PPIs and subjects not on PPIs were compared using unpaired t-tests.
Results: The average FMD% of the 49 subjects on PPIs (5.34 0.39%) was similar to the 403 subjects not on PPIs (5.64 0.14%, P=0.46). Average hyperemic flow velocity for subjects on PPIs (1.03 0.034 cm/s) was also similar to subjects not on PPIs (1.02 0.012 cm/s, P=0.73). Data was stratified based on sex and diabetic state and there were no statistically significant differences.
Conclusions: Both FMD% and flow velocity data were similar for subjects on PPIs or not on PPIs. This suggests there is no link between PPIs use and endothelial dysfunction. The in vitro mechanisms by which PPIs may cause endothelial dysfunction are not manifested in this in vivo analysis.

Robichaud, Brian — Clinical & Translational Research

Bioprosthetic pulmonary valve endocarditis: incidence, risk factors, and clinical outcomes

Authors: Robichaud B, Hill G, Cohen S, Woods R, Earing M, Frommelt P, Ginde S
Project Mentor: Salil Ginde, MD, MPH

Background: Pulmonary valve replacement (PVR) is a common operation in patients with congenital heart disease (CHD). As survival with CHD improves, infective endocarditis (IE) is a growing complication after PVR. The aim of this study was to assess the incidence, risk factors, and clinical outcomes of IE after surgical PVR in patients with CHD at our institution.
Methods: Retrospective analysis of all cases of surgical PVR performed at Children's Hospital of Wisconsin between 1975 and 2016 was performed. All cases of IE after PVR were identified and clinical and imaging data were obtained by review of medical records.
Results: Out of 924 surgical PVRs, there were 19 (2%) cases of IE. The median age at diagnosis of IE was 21 years (range=1.2 to 34 years) and the median time from PVR to diagnosis of IE was 9.4 years. The overall freedom from IE after PVR was 99.1%, 96.9%, and 93.4%, at 5, 10, and 15 years, respectively. There was no significant difference in freedom from IE based on valve type, including bovine jugular vein grafts. Patients with IE were more likely to have had a history of multiple PVRs, while length of follow-up after PVR, age at time of PVR, and gender were not significant risk factors. Eleven (58%) cases of IE required surgical intervention, while 8 (42%) were successfully treated with intravenous antibiotics alone. There were no deaths and no recurrences of IE after treatment.
Conclusion: The overall risk for IE after PVR is low. There was no association between age or type of pulmonary valve and risk of IE. The majority of cases require surgical intervention, but in general the outcomes of IE after PVR are good with low mortality and risk of recurrence.

Roenius, Matthew — Poster 55 — Global Health

Transforming medical education in Iraq: Evaluating curriculum reform at Al-Kindy College of Medicine

Authors: Roenius M, Kron M
Project Mentor: Michael Kron, MD, MSc, FACP

Objective: Political unrest and socioeconomic turmoil has led to the flight of physicians and medical educators out of Iraq, causing the quality of medical education to deteriorate. In an attempt to stifle further regression, Al-Kindy College of Medicine (AKCOM) in Baghdad, Iraq sought to reform their medical school curriculum and adopt a more integrated, student-centered approach to medical education. The aim of this study is to evaluate the methods implemented within Al-Kindy's updated curriculum and explore the potential impact that it may have on the future of Iraqi healthcare.
Methods: Information gathered from an Al-Kindy student-led, cross-sectional, quantitative study of 294 fellow AKCOM medical students - as well as from the presentation provided by Al-Kindy physicians at the American Society of Tropical Medicine and Hygiene 2017 annual meeting - was analyzed to provide insight into the feasibility and effectiveness of AKCOM's curriculum reform.
Results: Medical students at AKCOM identified the need of a student-centered, integrated curriculum in order to enhance the skills and competency necessary to develop into physicians capable of providing impactful medical care in Iraq.
Conclusions: The implementation of a reformed, integrated medical curriculum is a sustainable venture that will provide medical students at AKCOM greater access to medical knowledge and resources. However, the infancy of the school's new curriculum limits the ability to adequately assess medical students' competency levels when compared to students engaged with the prior curriculum, ultimately hindering foresight into its potential impact on the greater Iraqi healthcare landscape.

Rubens, Merrill — Clinical & Translational Research

The Effect of Customized Low-Sodium Diet on Blood Pressure and Vascular Function

Authors: Rubens M, Moosreiner A, Obi B, Cowley Jr A, Kotchen T, Widlansky M, Beyer A, Mattson D, Liang M, Kidambi S

Project Mentor: Srividya Kidambi, MD

Introduction: Research studies have shown modest lowering of blood pressure (BP) with low-sodium diets. However, compliance remains a challenge with both subjects in clinical studies, with numbers as low as 50%, and patients in clinics.
Hypothesis: A customized low-sodium diet will lower BP and improve vascular compliance.
Methods: Adult subjects with baseline BP ≥ 130/80mmHg or history of hypertension were placed on a 2-week low-sodium diet. Meals were customized according to each subject's food log. Two 24-hour and 3 spot urine sodium measurements were taken to ensure compliance. BP and flow-mediated dilation measurements were taken before and after the diet period to assess vascular function.
Results: Thirty-two subjects were recruited (18 African-American, 13 Caucasian, 1 Hispanic). Before the diet, SBP and DBP were 148 ± 13mmHg and 89 ± 9mmHg respectively. During the diet, subjects consumed an average of 955 mg of sodium/day (72% reduction from baseline). SBP and DBP decreased after the diet, -12.3 ± 10mmHg (-8.1%) and -8.0 ± 9.4mmHg (-8.7%). Urine sodium measurements were 200 ± 85 mmol/24hr pre-diet and 62 ± 66 mmol/24hr after completion, with over 90% of subjects showing a decrease. In vivo vascular compliance increased 2.2 ± 2.8% in those who demonstrated adherence to the diet.
Conclusion: A customized low-sodium diet can improve vascular compliance and lower blood pressure while on the diet.

Russell, Ashley — Molecular & Cellular Research

Identifying Serum Cytokines in Peripheral Artery Disease

Authors: Lohr NL, Russell AK, Lindemer B

Project Mentor: Nicole Lohr, MD PhD

Peripheral artery disease (PAD) is a disorder where blood flow is reduced due to obstruction, thrombosis, or aneurysm formation in peripheral blood vessels. Endothelial dysfunction as a mechanism for PAD should be considered, as the risk factors for PAD stimulate a pro-inflammatory environment which leads to decreased nitric oxide (NO) production. The NO generated by red/near infrared (R/NIR) light energy is sufficient to reduce endothelial dysfunction induced by inflammatory cytokines found in PAD patients. Thus, our study aims to show that NO reduces markers of endothelial dysfunction (ICAM-1 and VCAM-1). Western analysis of serum from healthy subjects and those with PAD revealed an NIR treatment on the order of 12J showed large decreases in ICAM-1 compared to samples without light treatment. Serum from PAD patients and those with PAD-associated risk factors can significantly increase markers for endothelial dysfunction. Exposure to R/NIR can attenuate up-regulation of these important endothelial adhesion molecules.

Sadek, Ahmed — Clinical & Translational Research

Comparing the Costs of Metastatic Neuroendocrine Tumor Treatments

Authors: Sadek A, Dybul S, Rilling W, Hohenwalter E, Lea W, George B, Smith E, White S
Project Mentor: Sarah White, MD, MS

Introduction: Treatment options for metastatic neuroendocrine tumors (mNETs) can be broken down into procedural (liver-directed therapy (LDT) and surgical resection) and systemic (chemotherapy and hormonal) therapies. While all are effective, there is little literature on their long-term costs. This study aims to understand typical multi-modality treatment regimens and their relative associated costs.
Methods: This is a single-center retrospective study evaluating adult patients treated for mNETs. LDT dates and types were collected. The hospital billing system was queried for standard costs of LDTs, hormonal, and IV therapies. Oral drug costs were obtained from the hospital pharmacy order acquisition system.
Results: 161 hepatic mNET patients were identified. Octreotide (n=133) and Lanreotide (n=13) were the most common hormonal agents used. Etoposide (n=28), carboplatin (n=19), and cisplatin (n=11) were the most common IV chemotherapy agents. Capecitabine (n=36), temozolomide (n=46), everolimus (n=35), and sunitinib (n=24) were the most common oral chemotherapy agents. 71 patients received systemic therapy only. 91 patients underwent a total of 264 LDTs (2.9±2.1 LDTs per patient), including: transarterial chemoembolization (cTACE) (n=148), transarterial radioembolization (TARE) (n=84), and drug-eluting-bead chemoembolization (DEB-TACE) (n=15).
Octreotide was the most common therapy and was used as a baseline for cost comparison. Each LDT procedure was 0.8x ± 0.5 the cost of 6 months of octreotide. Six months of IV or oral chemotherapy were 1.63x ± 0.11 and 1.48x ± 1.95 the cost of 6 months of octreotide, respectively.
Conclusion: Although a single session of LDT may incur higher costs, prolonged systemic regimens surpass LDT costs.

Saindon, Michael — Poster 56 — Health Systems Management & Policy

Pediatric Violence Intervention in the Emergency Department: Feasibility Literature Review

Authors: Saindon M, Levas M
Project Mentor: Michael Levas, MD

Injury is the leading cause of morbidity and mortality amongst pediatric patients in the United States and acutely injured children are likely to initially present to the emergency department. This scenario presents a unique opportunity for health care providers working in the emergency department providers to screen patients and attempt to intervene. Notably, violently injured youth show a predisposition to adverse psychosocial outcomes. In response, the Children's Hospital of Wisconsin has instituted Project UJIMA, a violence intervention program for high risk children who have been exposed to pediatric violence. Initial studies have demonstrated improvements in school and emotional functioning as well as patient anxiety following Project UJIMA intervention for these patients. With the context of pediatric violence intervention in mind, a literature review was performed to further analyze the feasibility and efficacy of emergency department screening and intervention for both violence intervention and other high-risk behaviors such as alcohol and substance abuse.

Sandy, Scott — Molecular & Cellular Research

CRISPR/Cas9 ex vivo gene editing of rat primary hepatocytes as a therapeutic model for genetic disease

Authors: Sandy SJ, Rasmussen S, Niebuhr J, Grzybowski M, Geurts A
Project Mentor: Aron Geurts, PhD

This project aimed to knock out multiple genes that are highly expressed in hepatocytes, including Fah and Cyp2e1. Multiple targeted CRISPR/Cas9 plasmids were constructed and tested using polymerase chain reaction. The PCR results confirmed banding patterns consistent with CRISPR/Cas9 plasmids targeting the Fah gene, as well as Cyp2e1. Transfection of cells was performed via electroporation using the Lonza Nucleofector system. After transfection of these CRISPR plasmids into Rat C6 cells, Cel-1 assay results showed non-homologous end joining (NHEJ) activity for the Cyp2e1 CRISPR, but not Fah CRISPR, suggesting that only the Cyp2e1 CRISPR was active. Surgeries were performed on wild type Sprague Dawley rats to isolate primary hepatocytes. Transfection of GFP plasmid and CRISPR plasmid into primary hepatocytes showed minimal positive GFP fluorescence under microscopy, indicating that the nucleofector system was successful for transfecting plasmid DNA into primary hepatocytes, but requires further optimization to reach maximal efficiency.

Schroeder, Luke — Poster 57 — Global Health

Variations in comprehensibility between the Spanish and English-language asthma action plans

Authors: Schroeder L, Zhang J, Yan K, Steinberg J
Project Mentor: Joshua Steinberg, MD

INTRODUCTION: An EMR-generated individualized Spanish-language Asthma Action Plan (Sp-AAP) had been developed for use throughout the Children's Hospital of Wisconsin (CHW) system. However, the Sp-AAP had not undergone quality assessment review. This study compared the distribution, comprehensibility and user valuation of both the Sp-AAP and English-language AAP (E-AAP).

METHODS: 53 caretakers (35 English, 18 Spanish speaking) of children < 12 years old with a previous provider-confirmed diagnosis of persistent asthma completed an anonymous survey in their preferred language at the CHW Asthma & Allergy clinic. Survey questions interrogated utilization, comprehension and valuation of the AAP as a tool for asthma management. Pattern of Sp-AAP distribution was also assessed. Comprehension was objectively measured with five questions about typical asthma management scenarios requiring reference to a mock demonstration AAP.
RESULTS: Objective AAP comprehension, as measured by the percentage of correct answers to asthma management scenarios, differed between English and Spanish language respondents (E: 60.0%, S: 32.5%, p = 0.009). One question addressing exercise premedication differed between groups (p=0.002); however, there were no significant differences for the other questions. There was no difference in caretaker valuation of the Sp-AAP (9.2) vs the E-AAP (8.9) (p=0.50). Of the English survey respondents, 8.6% had a caretaker who would prefer Spanish; however, only 8.8% of respondents were asked by a provider if there was a Spanish-speaking caretaker.
CONCLUSION: Comprehensibility of the AAP irrespective of language was lower than expected. Differences in comprehensibility between Sp-AAP and E-AAP may exist. Users of the Sp-AAP and E-AAP both highly value the AAP as an asthma management tool.

Schurman, Alexander — Clinical & Translational Research

Scoping review of possible cognitive interventions to delay the progression of cognitive impairment

Authors: Schurman A, Foldy S

Project Mentor: Seth L. Foldy, MD, MPH

Dementia directly affects 2.4 to 5.5 million Americans and is often preceded by Mild Cognitive Impairment (MCI). Screening for MCI has is debatable due to limited evidence on interventions to reverse progressive impairment. This scoping review seeks to describe the state of evidence since 2010 on the relationship between cognitive activities and MCI. SCOPUS, PUBMED, OVID-PSYCHINFO and COCHRANE databases were queried for articles since 2010 on MCI, early-dementia, and early cognitive impairment paired with the term cognitive followed by interventions, stimulation, training, rehabilitation, engagement, activities or games. 4634 titles were identified, following review 13 randomized control trials (RCTs), 39 longitudinal studies and 6 meta-analysis were included. The most commonly studied RCT trials were combination cognitive and physical interventions, followed by cognitive training, framing and a mindfulness-based intervention. From the longitudinal studies cognitive activity was most evaluated, followed by education, personality, occupation, socioeconomic status, social activity and combined cognitive and physically active lifestyles. The meta-analysis added computer-based interventions, music therapy and psychological treatments. Overall these studies predominantly measured impact affecting a cognitive domain and global cognition but sparsely evaluated functional independence or quality of life. Much could be discussed but broadly, the evidence to reduce the risk of progressive cognitive impairment relies greatly on lifestyle factors however promising, but either understudied or underpowered studies, exist for the implementation of interventions in the acute setting. Continued research is needed with sufficient sample sizes and adequate follow-up; additionally, quality of life and functional independence should appear as measures of interest in future studies.

Schwoch, Morgan — Global Health

Assessing Second Victim Syndrome among Emergency Medicine Physicians

Authors: Pilarski A, Schwoch M

Project Mentor: Alicia Pilarski, DO

Second Victim Syndrome (SVS) is a term used to describe the psychological suffering experienced by health care workers after enduring a significantly adverse clinical event. This syndrome can lead to burnout, anxiety and depression, which can predispose the physician to provide decreased quality of care. More research is needed to develop effective therapeutic programs to support second victims. With this goal in mind, this study aims to survey the prevalence and awareness of SVS in Emergency Medicine, as well as preferred forms of support.

Of 538 survey responses, 56% of residents and 39% of attending physicians had never heard of SVS, though 65% of residents and 48% of attending physicians had experienced this syndrome in the past year. Of those who considered themselves second victims, 57% received institutional support. Colleague/peer support was utilized most frequently (87%), followed by support from a significant other (61%) and a close friend (40%). Supervisors, administrators and managers were not utilized as often. Most respondents recovered after an adverse event. However, a small portion required unscheduled time off work, or contemplated leaving the organization or the profession altogether.

This study found that SVS continues to be an under-recognized and under-supported condition that has an impact on the mental health of the physician. Future support programs should include peer support, privacy and a way to advertise available support. Physicians with less experience are less aware of SVS and more likely to encounter an adverse event. Therefore, education and support programs should be incorporated into residency programs.

Selzler, Zachary — Quality Improvement and Patient Safety

Factors contributing to increased mortality in higher risk-stratified congenital heart surgery patients

Authors: Selzler Z, Johnson W, Woods R
Project Mentor: Ronald K. Woods, MD, PhD

Background: Outcomes of congenital heart surgery have improved significantly over the past three decades, yet mortality remains high for certain groups of patients. An intricate stratification tool, the STS:EACTS Congenital Heart Surgery Mortality Categories (STAT Mortality Categories), was developed from the analysis of over 70,000 operations entered in the Congenital Heart Surgery Databases of EACTS (33,360) and STS (43,934). The discriminatory power of this tool renders it a potential method of standardization when comparing institutional outcomes. The aim of this review is to identify risk factors in neonates treated at our institution utilizing the defined STAT categories. We hypothesized that modifiable factors exist which may differentiate survivors from non-survivors in high risk cardiac operations.
Methods: A retrospective chart review limited to patients who underwent higher risk-stratified (STAT 4 & 5) congenital heart surgery between Jan 1st 2010 : Dec 31st 2015. Demographics, diagnoses, preoperative factors, and intraoperative & postoperative variables were collected and analyzed using Mann-Whitney for continuous variables and Chi Square for group comparisons.
Results: Cohort included 242 patients. Mean age was 8.7 ± 5.6 days. 69.8% underwent STAT 4 and 30.2% underwent STAT 5 procedures. Survival was 92.6%. Weight at surgery was significantly different between survivors and non-survivors (3.35 ± 0.64 vs 3.29 ± 0.67 Kg, $p<0.001$). Cardiopulmonary bypass time was shorter in survivors (173.29 ± 64.5 vs 301.3 ± 136.7 min, $p<0.00001$). Various pre- and post-operative factors were also associated with lower rates of survival.
Conclusions: Data suggests that factors exist which may differentiate between groups. The need for revision emphasizes the importance of anatomically and physiologically sound initial repairs. Investigations are ongoing as this may assist patient management strategy regarding high-risk cardiac operations in neonates.

Seymour, Lawrence — Poster 58 — Global Health

Efficacy of distance-based EMS education in a low-income country

Authors: Seymour L, Weston B, Montejo R
Project Mentor: Benjamin Weston, MD, MPH

INTRODUCTION:
Road traffic accidents are a major cause of morbidity and mortality in low-income countries. Compounding this issue is a lack of advanced medical training in these regions and a paucity of developed emergency medical services. To help address this need, a distance-based emergency medical services educational product was developed with the goal of advancing medical training in resource-poor areas.
DESIGN:
This prospective before and after study evaluated the knowledge acquisition and technical effectiveness of an online delivered, distance based EMS lecture. Medical providers at Karl Heusner Memorial Hospital in Belize City, Belize were invited to voluntarily participate. Participants were given a pre-test consisting of 15 questions regarding ambulance and emergency vehicle safety. This was followed by a 45 minute lecture presented synchronously via Skype Professional on the same topic, followed by a post-test consisting of the same questions and a technical questionnaire.
RESULTS:
Nine participants completed the pre-test and immediate post-test. Significant improvement was noted between the average scores of the pretest as compared to the post test (31% vs 73%, p 0.00068).
CONCLUSIONS:
This synchronously presented distance-based EMS educational program showed significant gains in both immediate and delayed knowledge acquisition among a small sample size.

Sherr, Sela — Poster 59 — Global Health

A Survey of Target Audience Opinions on the Characteristics for a Novel Medical Intelligence Report

Authors: Sherr S, Liu JM
Project Mentor: Jason Liu, MD, MPH

Introduction/Objective: Efficient collection and interpretation of medical and public health information, or "medical intelligence", may lessen the effects of events potentially causing large numbers of injuries or deaths. A preparedness coalition began to systematically distribute medical intelligence on potential health threats. This study aimed to assess end-users on desired characteristics of a medical intelligence report.
Methods: A voluntary survey was distributed to representatives in a regional healthcare preparedness coalition. The questions assessed how respondents currently find threat information, and their opinions on the utility of a report. The coalition was surveyed 2 months before and after intelligence report distribution started. Descriptive statistics were calculated.
Results: A total of 110 responses (66 pre-report, 44 post-report) were received. Respondents indicated that current methods are limited due to information overload and needing to verify sources, which required too much time. Most subjects indicated that they considered a medical intelligence report to be "very useful" (68.2%), with none indicating it would be "not at all useful". The top three characteristics desired were to include the most pressing threats (77.3%), recommended actions (77.3%), and be specific to the geographic area (73.6%). Respondents preferred a weekly report (41.8%), followed by bi-weekly (29.1%).
Conclusion: The healthcare professionals surveyed perceive difficulties in remaining current on potential health threats. Many of the respondents would find a prioritized intelligence report to be useful. This underscores the opportunity for the regular distribution of a medical intelligence report summarizing health threats.

Siller, Alfredo — Urban & Community Health

MCW/Milwaukee AHEC-YHSC/JMAC Service Learning Pipeline Program

Authors: Siller, A, Notardonato L, Kendrick R, Letellier S, Meurer L
Project Mentor: Linda Meurer MD
Community Partner: Milwaukee Area Health Education Center (MAHEC), James Madison High School

Minorities make up 30% of the U.S. population, yet only 8.7% of physicians and 6.2% of registered nurses. This underrepresentation of minority physicians has led to cultural disparities in health care and poorer patient satisfaction. Pipeline programs can increase the number of minorities that pursue careers in health care. In collaboration with the Milwaukee Area Health Education Center Youth Health Service Corps (AHEC-YHSC), the Medical College of Wisconsin (MCW) has formed a pipeline program partnership with James Madison high school (JMAC), in the hopes of nurturing students' early interest in health care careers. In 2016-17, ten JMAC students enrolled in the YHSC program. MCW students provided monthly training sessions on health career topics and hosted visits to MCW's simulation center and anatomy lab. Evaluations indicate the program positively influenced participants' interest in health careers and confidence in ability to attend college. Next steps include follow-up of former YHSC students.

Skinner, PhD, Nathan — Molecular & Cellular Research

Assessment of Spinal Cord Injury in a Rat Model using Orthogonal Filter-Probe Diffusion Encoding Scheme

Authors: Skinner N, Kurpad S, Muftuler LT, Schmit B, Budde M
Project Mentor: Matthew Budde, PhD

Spinal cord injury (SCI) is a serious condition where early prognostication can affect long-term patient outcome. Magnetic resonance imaging (MRI) is emerging as the standard for noninvasive injury assessment for acute care, but advanced tools such as diffusion tensor imaging (DTI) have limited clinical adoption in the management of SCI in part due to technical limitations, ambiguous interpretation, and lack of specificity for axonal damage, the most important pathological feature of long-term function following SCI. As a DTI alternative, we developed a novel technique, termed filter-probe double diffusion encoding (FP-DDE), which attenuated non-interesting signals and improved specificity for axonal injury. FP-DDE was hypothesized to improve the detection and assessment of SCI severity while reducing acquisition time and post processing demands that plague DTI.
First, simulations modeling axonal damage and edema were evaluated demonstrating that FP-DDE exhibits high sensitivity and specificity in detecting axonal injury with minimal sensitivity to edema. FP-DDE was then examined in vivo in a rat model of contusion SCI showing stronger relationships with cord compression measurements, chronic hind limb locomotor function, and histopathological measures of spared white matter over measurements from DTI. Moreover, this was achieved with reduced acquisition time and automated and rapid data analysis. Lastly, the technique was optimized for human MRI implementation and successfully implemented on a clinical system.
In summary, FP-DDE utilized a novel acquisition scheme to overcome many limitations of traditional MRI techniques and provides an important framework and necessary background to improve injury detection and prognostication for patients with SCI.

Snyder, Haverly — PODIUM — Quality Improvement and Patient Safety

The hospital experience through the patients' eyes

Authors: Snyder HJ, Fletcher KE
Project Mentor: Kathlyn E. Fletcher, MD, MA

Background: Post-hospital syndrome is associated with a decrease in physical and cognitive function and can contribute to overall patient decline. We can speculate on contributors to this decline (e.g., poor sleep and nutrition), but other factors may also contribute. This study seeks to explain how patients experience hospitalization with particular attention on what makes the hospital stay difficult.
Objective: Our aims were to identify aspects of the hospitalization that were particularly stressful for patients as well as factors that may mitigate these stressors.
Design: Qualitative interview study using grounded theory methodology.
Setting: Single site academic medical center.
Patients: Hospitalized general medicine patients.
Measurements: Interviews using a semi-structured interview guide.
Results: We recruited 20 general medicine inpatients from an academic medical center. Of the participants, 12 were women and the mean age was 55yrs (range = 22-82yrs). We found three major groups of factors contributing to the hospital experience: 1) hospital environment (e.g. food quality and entertainment), 2) patient factors (e.g. indifference and expectations), and 3) hospital personnel (e.g. care team size and level of helpfulness). We also discovered a number of emotions arising from hospital experiences (e.g. level of control and feeling like an object) that, together with the major three contributing factors, led to the patients' perception of their hospital experience overall.
Conclusions: This conceptual model clarifies the factors affecting how patients experience hospitalization. It provides insight into possible contributors to post-hospital syndrome and offers a blueprint for specific quality improvement initiatives.

Somani, Sneha — Poster 60 — Global Health

How Funding Allocation Influences Programs and Goals for Small to Large Scale Global Organizations

Authors: Somani S, Deshpande R, Sanger J
Project Mentor: James Sanger, MD, FACS

Introduction
Illnesses requiring surgical intervention make up an estimated 11% of the global healthcare burden. This review compares how the budgets and resources of three organizations affect their ability to deliver global care. The Bill and Melinda Gates Foundation (BMGF) represents a large, multibillion-dollar group. Operation Smile (OS) is a multimillion-dollar global organization. The Milwaukee Medical Mission (MMM) is a local organization with a small budget working in one country.
Analysis
The massive resources of the BMGF allows them to fund other organizations and influence public health policy in various countries. From 2003 to 2015, their program expenses grew by $6 billion, while management expenses were stagnant, indicating a commitment to global health policy programs. OS initially focused on surgical care, but evolved to emphasize education and sustainability. Education began as 2.6% of their budget in 2002 and grew to 25.2% in 2016. The MMM's goals are education and service, with long-term partnerships between the Medical College of Wisconsin and the Universidad de Santander in Colombia. 100% of their budget is used for the volunteer run medical mission.
Conclusions
Large organizations are able to focus on research and development and influence global policy, making them leaders in public health. Medium-sized organizations operate globally year round, delivering direct care with a narrow focus on particular procedures. To increase effectiveness and reduce complications, OS increased emphasis on training of local specialists. Small organizations focus on direct care for a finite time frame and education through resident and physician exchange programs.

Stauder, Scott — Poster 61 — Clinician Educator

Attributes of a Medical School Curriculum that Promote the Development of Self-Directed Learning Skills

Authors: Webb T, Kugler N, Stauder S
Project Mentor: Travis Webb, MD, MHPE

Background: Self-Directed Learning (SDL) has become a critical component of medical school curricula, as medical schools are required to demonstrate evidence of medical student SDL within the curriculum. However, there is no consensus on what attributes/qualities comprise SDL, and how medical schools may better promote and provide SDL opportunities to medical students. Our project aimed to establish a consensus on the components of the medical school curriculum that promote SDL skills and behaviors in medical students.
Methods: We surveyed the Society of Teaching Scholars (STS) at the Medical College of Wisconsin. The initial phase consisted of a survey asking two open-ended questions: 1) What are the observable characteristics (behaviors) of a self-directed learner? 2) What specific components of a medical school course or clerkship do you believe promote self-directed learning? Based on the survey results, a second survey consisting of SDL characteristics and curriculum components was distributed to the STS, following the Delphi method of surveying, ranking attributes on a Likert scale of 1-7. Using attributes which received a 4+ rating from ≥50% of respondents, a final Delphi round was performed, and a consensus is currently being compiled using attributes which received a 5+ rating from >70% of respondents.
Results/Conclusion: An average of 35 STS members responded in the 1st Delphi round, and an average of 24 STS members responded in the final round. 44 SDL characteristics and 50 curriculum components were used in the Delphi surveys. Final survey results obtained 33 unique SDL characteristics and 36 curriculum components which received a 5+ rating from >70% of respondents. These attributes will be classified into groups with similar attributes, to provide a diagram outlining SDL and curriculum components that promote the development of SDL skills.

Stoeckel, Ashley — Poster H10 — Quality Improvement and Patient Safety

Improving the Timeliness of Emergency Department Evaluation of Injured Children

Authors: Stoeckel A, Drendel A, Ferguson C, Bailey K, Gourlay D
Project Mentor: Amy L. Drendel, DO, MS

Intro: Pediatric trauma centers rely on the accurate pre-hospital identification of high-risk injured patients to activate the trauma team and gather the necessary personnel and resources to care for them in the ED. We aimed to decrease the time to hospital trauma activation upgrade and ED length of stay (LOS) for injured patients brought to the ED by ambulance who did not initially meet hospital trauma team activation criteria.
Methods: A team made up of ED and surgery physicians, nurses, and administrators was formed in July 2016. Interventions included: a standardized process for documenting high-risk injured patients in the EMR (Feb 2017), creation of an ED trauma response team (Feb 2017), audit and feedback to providers (Jul 2017). Main outcome measures were: time to trauma upgrade and ED LOS. Process measures were: time to first vital signs and time to completion of the primary/secondary surveys. Data were analyzed using run and process control charts.
Results: From May to Dec. 2017, 468 patients qualified for the ED trauma response team. Overall, patients were male (57%), and white (43%) or black (42%). Injuries included blunt trauma (83%), penetrating trauma (5%), and burns (3%). Admission rate was 34%. A total of 22 injured patients required hospital trauma team activation upgrade (15 in the pre-intervention phase). The mean time to upgrade decreased from 16.6 to 5.4 minutes post-intervention. Of the 7 injured patients upgraded in the post-intervention period,71% went to the operating room and 100% required hospitalization (29% in the ICU). Mean time to first vital signs and documentation of the primary/secondary surveys have been stable. ED LOS was unchanged at 2.7 hours.
Conclusions: Through interventions designed to standardize the evaluation of trauma patients not initially meeting trauma team activation, we significantly decreased the time to upgrade for patients for whom it was required. Future interventions will be directed at decreasing the ED LOS.

Stoming, Christopher — Poster 62 — Urban & Community Health

The utilization of Farmer's Markets in low income areas from the perspective of Patients and Physicians

Authors: Stoming C, Ruffalo L, Carlson Z, McCurdy A, Bernstein R, Casey J, DeNomie M, Kilkenny M
Project Mentor: Leslie Ruffalo, PhD
Community Partner: Fondy Food Center

Several studies have quantitatively demonstrated the effectiveness of fruit and vegetable prescription programs in low income areas. While clinic based nutrition programs such as these have potential to reduce risks and mortality associated with chronic diseases, farmer's markets remain an underutilized resource. In order to create and sustain more effective programs, qualitative data on fruit and vegetable prescriptions would be of value. In a follow up study to a 2016 Fruit and Vegetable Prescription pilot program in Milwaukee, WI, we conducted informal interviews with prescription users (i.e. patients), members of the clinical care team, and farmer's market managers, in order to glean insight into the effectiveness and practicality of the program from each group's perspective. The conversations were audio recorded, transcribed verbatim, and analyzed using open coding techniques. A total of 28 themes were identified in 21 interviews. It was found that the most central themes to Fruit and Vegetable Prescription programs include a Need for the Program, Prescription Preference, Clinic and Patient Relationship, Transferability (extending beyond the clinic program), Ease of Incorporation into Clinic Workflow, Barriers to Healthy Eating, and Desire for Continuation of the Program. This study can provide opportunities for improved implementation of fruit and vegetable prescription programs, more effective ways to engage patients, and positive health behavior changes in our community's most vulnerable populations; however, it is imperative to first understand the nuances and themes that form the foundation for these programs.

Tan, Kevin — Poster 63 — Quality Improvement and Patient Safety

Insights from pharmacists and pharmacy technicians about expedited partner therapy in Wisconsin

Authors: Tan K, Pickett M, Borchardt L, Drendel A
Project Mentor: Michelle Pickett, MD, MS

Background: Expedited partner therapy (EPT) is an effective method to combat sexually transmitted infections (STIs) and prevent re-infections. Pharmacy staff play a vital role in the success of EPT. Our study aims to identify pharmacy staff knowledge of EPT and identify potential barriers.
Methods: The study was a cross-sectional internet-based survey distributed to members of the Pharmacy Society of Wisconsin. Non-retired pharmacists and pharmacy technicians were eligible. EPT knowledge was dichotomized into 'yes' vs 'no/unknown'. Statistical analysis included chi-squared test and Students two-sided t-test; using an alpha of 0.05.
Results: Ninety-four surveys were analyzed: 74 pharmacists, 20 pharmacy technicians; response rate of 70%. Overall, 73 (78%) knew EPT is legal in Wisconsin, 86% of pharmacists vs 45% of pharmacy technicians, $p<0.01$. The mean time from graduation/training was less for participants who knew EPT is legal versus those who did not (12.8 years vs 20.2 years, $p<0.01$). Sixty-four participants worked in an outpatient setting, of which 19% knew of a formal workplace EPT policy. Of the 73 participants who knew EPT is legal, 30% incorrectly stated a name/birthdate is needed for the prescription. Thirty-two (40%) of the 81 participants who have heard of EPT thought nameless EPT prescriptions should not be legal, commonly citing patient safety concerns.
Conclusions: Our study demonstrated inconsistent knowledge of EPT amongst pharmacy staff. Knowledge of workplace EPT policies and patient safety concerns were the two commonly identified barriers to EPT. Addressing these knowledge and policy barriers will be vital to improve the utilization of EPT.

Tavares, Emmanuel — Poster 53 — Global Health

Increasing Mammography Uptake through Academic-Community Partnerships in Ethnic Minority Communities

Authors: Tavares E, Rao A, DeNomie M, Kamaraju S
Project Mentor: Sailaja Kamaraju, MD
Community Partner: Muslim Community & Health Center, Sikh Religious Society Of Wisconsin - Brookfield Gurudwara, Wisconsin Shirdi Sai

Background: Women of ethnic/racial backgrounds are shown to have a higher death rate from breast cancer. Community Based Academic Partnerships (CBAPs) are an effective method of collaborating with communities to promote cancer awareness and screening efforts. Data shows that newly immigrated women have lower utilization of screening practices than other group of women.
Aims: 1) Provide education and identify barriers to breast health and 2) Evaluate effectiveness of breast education workshops
Methods: Monthly breast health education workshops were conducted at community sites over 2 years. Demographic surveys were completed, and a questionnaire was used to identify barriers to breast health care. Mobile mammography unit provided free screening mammograms.Interviews were conducted with individuals representing 3 communities that participated in the workshops. Interview questions focused on whether community leaders felt the workshops were effective, had fulfilled a purpose to the community, and what could be done to improve further workshops.
Results: 493 women attended a workshop. 374 participants completed all of the surveys. 188 women ≥ 40 years old reported no prior mammogram in the past 2-5 years. 60% of these women were insured. After attending the breast health workshop, mammogram uptake was 100% among insured women, and 80% in uninsured women. Finances, language and access disparities were cited as barriers. Utilization of a group's native language was a major strength. Recruitment was a significant challenge. Impact on attendees centered on exposure and improved knowledge base. The 4 main barriers were education, sensitivity of topic, fear, and confidentiality.
Conclusion: Our culturally tailored workshops increased knowledge and uptake of screening mammography based on quantitative data from the workshop surveys. Small group interviews affirmed these findings and proved to be an important tool for further delving into the barriers to breast health.

Telfer, Zachary — Global Health

Using Nature to Reduce Human Infection Risks: A System for Controlling Schistosomal Intermediate Host

Authors: Telfer Z, Townsend T, McKaye K, Hargarten S
Project Mentor: Stephen Hargarten, MD, MPH

Reports on human Schistosomiasis haematobium infection in Cape Maclear Lake Malawi, Africa, have been the focus of many research groups since the initial rise in infection after 1980. Bulinus nyassanus, one of the aquatic intermediate host snails for this parasite, is a natural and preferred prey of the indigenous cichlid fish, Trematocranus Placodon. Novel underwater and under substrate snail sampling techniques in this study combined with extensive T. placodon transects have revealed new predator-prey behaviors. Controlled T. placodon feeding experiments in lake floor cages demonstrate its ability to reduce B. nyassanus numbers in addition to feeding observations in laboratory aquaria and in the lake by SCUBA divers. In addition, illegal fishing net counts reveal a spatial relationship between heavy fishing outside the fishing-prohibited national park and increased numbers of B. nyassanus. The preferred habitat for the snails from core/surface transect samples and laboratory experiments was found to be fine substrate (below 900 pm). Core samples reveal that snails burrow as deep as 1 m under the lake sediment and that the majority (90%) of the snails reside below the top 5 cm. Night samples also indicate nocturnal surfacing (>10%) of B. nyassanus. These new observations imply that 1) previous day time surface surveys of vector snail numbers were severely underestimated, and 2) control strategies for the reduction of schistosomiasis infection must be revised to include the use of the indigenous T. placodon cichlid.

Thompson, Karen — Global Health

Pre-Med Pair Up: a Medical Mentorship & Global Awareness Program

Authors: Thompson K, Ponkratz A, Gallagher M
Project Mentor: Sara Lauck, MD and Erica Chou, MD
Community Partner: University of Wisconsin Oshkosh & Marquette University

Literature suggests advantages to peer mentoring programs; however, data about medical student-undergraduate mentorship are lacking. To study this knowledge gap, a mentorship program, Pre-Med Pair Up (PMPU), was established at the Medical College of Wisconsin. PMPU pairs pre-medical students from the University of Wisconsin-Oshkosh and Marquette University with medical student mentors. To identify programs most beneficial to the pre-medical population, a survey was completed by 43 pre-medical and 26 medical students involved in the program. Students identified the following programs as most beneficial: tips for MCAT, personal statement writing, and interviewing (94% of participants requested these resources), a master calendar (91%), and volunteer opportunities (91%). These programs were integrated into the design of PMPU, as was a monthly global health e-newsletter and a dedicated webpage to provide a superior mentor-mentee experience. Through PMPU, new data about benefits of medical student-undergraduate mentorship can be identified.

Thurston, Jacob — Poster H4 — Clinical & Translational Research

Airflow simulations in the nasal cavity of cleft palate children

Authors: Thurston J, Moghaddam M, Garcia G, McCormick M
Project Mentor: Michael McCormick, MD

The purpose of this study was to characterize the airflow of the nasal passageways in children born with unilateral cleft lip and palate and compare them to children with no nasal airway abnormalities. To the authors' knowledge there have been no previous studies characterizing the nasal airflow of children born with cleft lip and palate. Study of the effects of these congenital deformities on the nasal airway would help provide guidance with the management of these children. Children with congenital cleft lip and palate were found and compared with controls of similar age and gender. Nasal airways were characterized through computational fluid dynamics simulations. CT scans taken during standard of care were used to construct a 3-dimensional model of the nasal airway with Mimics software (Materialise, Inc). This 3D model was then converted into a computational mesh using ICEM-CFD software (ANSYS, Inc). Fluid flow was simulated with Fluent software (ANSYS Inc), assuming steady-state laminar flow. The results were analyzed for differences in surface area, volume, airway resistance, and pressure changes through anatomical landmarks.

Tomczak, Brenna — Clinical & Translational Research

Use of the Wisconsin Prescription Drug Monitoring Program among emergency department providers

Authors: Tomczak B, Akert B, Kohlbeck S, Zosel A
Project Mentor: Amy Zosel, MD, MSCS

BACKGROUND: PDMPs are statewide databases intended to monitor controlled substance dispensing and enable informed prescribing practices. In spite of the high prevalence of opioid abuse and mortality, it is hypothesized the Wisconsin PDMP is underutilized. This project aimed to establish baseline provider attitudes and PDMP use in clinical practice.
METHODS: An online survey was disseminated to emergency medicine groups, including midlevel providers and physicians prescribing controlled substances in the emergency department (ED) in Southeastern Wisconsin. Descriptive statistics were performed.
RESULTS: 89 complete surveys were returned. 78% of respondents work 11 or more shifts per month in the ED. Of the 96% of respondents that had previously heard of the PDMP, 98% perceived it as moderately to extremely useful and 78% were already registered. The most common response for not registering was lack of understanding on how to register. Lack of time was cited as the main reason for not using the program. Of those registered, 100% use the PDMP to help identify prescription drug abuse. The majority of respondents use the PDMP 2-4 times per week. 30% of providers voluntarily access the PDMP for all patients before writing a controlled substance prescription. 26% of providers voluntarily consult the PDMP for all patients currently on a controlled substance.
CONCLUSIONS: Despite high registration and perceived usefulness, PDMP use varied but was low compared to provider presence in the ED. This suggests barriers to use which can be addressed through education focused on efficient use of the PDMP and its integration into practice. Education is of increased relevance with passing of mandates to consult the PDMP prior to controlled substance prescribing. Further efforts should be made to address the role of PDMP data in discussing substance abuse and treatment options with patients.

Tumilty, Hannah — Poster 64 — Quality Improvement and Patient Safety

The availability, cost, and accessibility of counseling services for medical students

Authors: Tumilty H, Ferguson C
Project Mentor: Catherine Ferguson, MD

Background: Medical school is a time of little sleep, increased demands, and an intense pressure to perform, which contributes to higher rates of depression, anxiety, burnout, and suicidal ideation among medical students compared to their peers. The consequences of poor mental health during medical school manifest as impaired academic performance, cynicism, academic dishonesty, substance abuse, and suicide. Understanding these concerns, the Liaison Committee on Medical Education (LCME) requires that "a medical school has in place an effective system of personal counseling for its medical students that includes programs to promote their well-being and to facilitate their adjustment to the physical and emotional demands of medical education." The aim of this study is to understand how the seven medical schools within the Kern Institute fulfill this LCME standard.
Methods: Information was gathered by searching each Kern Institute medical school's website for the terms "medical student wellness," "medical student counseling," and "medical student mental health."
Results: Of the seven medical schools within the Kern Institute, only three provide medical students access to mental health providers who work with medical students specifically. Only one medical school reports that its medical students have access to an unlimited number of counseling sessions, while other medical schools' programs provide up to 10 counseling sessions at no additional cost to the medical student. Six of the seven programs have a 24-hour crisis number available on their website.
Conclusions: Although every medical school within the Kern Institute is accredited by the LCME, the way in which each school meets the LCME standards varies. Further research into the rates of depression and anxiety among medical students at medical schools that offer different counseling options could shed light on the most effective way to combat mental health issues among medical students.

Uhm, Tae Kyu — Molecular & Cellular Research

Role of DUSP5 Mutants in Embryonic Vascular Development

Authors: Uhm TK, Coceja C, Ramchandran R
Project Mentor: Ramani Ramchandran, PhD.

Dual specific phosphatase 5 (DUSP5) and sucrose nonfermenting kinase (SNRK) regulate mitogen-activated protein kinases (MAPK) in cell signaling. In embryonic vascular development, both DUSP5 and SNRK are responsible for angioblast development in the lateral plate mesoderm. Four different mutants of DUSP5 were identified from previous works done by Ramchandran lab: E264Q, E264L, R214Q, and S147P. These four DUSP5 mutants were previously tested for their decreased phosphatase activities in vitro; however, they were never tested in vivo. Our study show that DUSP5 mutants exhibit some loss-of-function in vivo, showing increased expression of angioblast. Quantitative analysis of in-situ data also indicates that R214Q and S147P mutants show more loss-of-function than E264Q and E264L mutants, which suggests that E264 mutations in the primary active site of the phosphatase domain may contribute less to DUSP5 activity in vivo compared to other mutations.

Umhoefer, Katherine

Urban & Community Health

Ptpn22 Deficiency Leads to Upregulation of Pro-Inflammatory Cytokines and Increased Rate of T1D Onset

Authors: Umhoefer K, Khaja S, Ciecko A, Yi-Guang, C
Project Mentor: Yi-Guang Chen, PhD

Ptpn22 is a lymphocyte tyrosine phosphatase that is expressed in all hematopoietic cell types and has inhibitory effects on T-cell receptor (TCR) signaling. Ptpn22 mutations have been implicated in a variety of autoimmune disorders, including Type 1 Diabetes Mellitus (T1D). T1D individuals have increased frequencies of the Ptpn22 1858T SNP (620W) variant compared to healthy controls. Ptpn22 knockout (KO) mice on a NOD background develop T1D significantly faster than NOD controls. This study explores how Ptpn22 deficiency may predispose mice to developing T1D at increased rates. It was hypothesized that the Ptpn22 KO mutation in the NOD mouse will affect T1D development through the modulation of cytokine balance and macrophage activation. ELISAs were used to analyze CD4+/CD25- T cell and macrophage culture supernatant that was derived from NOD/ShiLtJ controls and Ptpn22 KO mice. Ptpn22 mutants had significantly higher production of IFN, IL-10, IL-17A, and IL-2 cytokines. TNFð›,, IL-6, and IL-4 cytokine levels were inconclusive across samples. IL-21 and IFNð›, were undetected. Indeed, it is suggested that a pro-inflammatory environment in the pancreas can lead to islet destruction. This study suggests that Ptpn22 variants that lead to upregulation of pro-inflammatory cytokines and classical activation of macrophages may prime the immune system to attack cells of the pancreas, leading to development of T1D. Future testing can explore if sensitization of macrophages by Ptpn22 KO or NOD CD4+/CD25- T cells in co-culture will modulate macrophage cytokine activity.

Unteriner, Jackson

Clinical & Translational Research

Does a CPR Feedback Form Improve Out-Of-Hospital CPR Quality?

Authors: Unteriner J, Colella MR, Weston B, Aufderheide T
Project Mentor: Tom P. Aufderheide MD, MS

Introduction: Various CPR continuous quality improvement (CQI) approaches have improved quality of CPR delivered at the scene of a cardiac arrest. Hypothesis: Use of a CPR CQI feedback form will increase chest compression fraction and reduce pre-shock and post-shock pauses in Milwaukee County EMS resuscitation attempts for out-of-hospital cardiac arrest. Methods: Retrospective analysis of CPR quality metrics in adult non-traumatic out-of-hospital cardiac arrest before and after implementation of a post-event CQI feedback form that was distributed to EMS providers associated with the event. Compression fraction, pre-shock pause, and post-shock pause were analyzed. Results: Comparing the Before (n=408) and After (n=556) groups for all cases, the average compression fraction was 79.2±13.4 vs 86.4±8.6%, p<0.001, pre-shock pause was 18.8±11.5 vs 11.8±15.0 seconds (s), p<0.001, and post-shock pause was 7.0±5.3 vs 6.6±6.4 s, p=0.686. Conclusions: This CQI feedback form appeared to positively influence quality of CPR delivered at the scene of cardiac arrest.

Vaughn, Alyssa | Poster H1 | Bioethics

Understanding Family Satisfaction after Care of Pediatric Traumatic Brain Injury

Authors: Vaughn A, Atwood M, Thompson N, Olson K
Project Mentor: Melissa Atwood, DO, MA

Objective: Traumatic brain injury (TBI) remains the most common cause of death and disability in children from the developed world2. The aim of this study was to understand family satisfaction with care of their child in the intensive care unit (ICU) after TBI with special focus on assessing parent perceptions regarding how the medical team evaluated and treated the "whole" patient as well as parent satisfaction with care and the associated decision making. The secondary aim was to compare family satisfaction whether palliative care was involved or not.
Methods: A combination retrospective and prospective approach was taken using the pediatric family satisfaction in the intensive care unit (pFS-ICU) survey which includes questions addressing satisfaction with care and decision-making. This survey was sent to relatives of patients recently treated in the ICU who were identified to meet TBI criteria through the Children's Hospital of Wisconsin trauma registry. Surveys were not sent to parents of children who were determined to have TBI due to non-accidental trauma or are deceased.
Results: A total of 28 (27%) relatives returned the questionnaire. Median scores for every question in the survey were either "excellent" or "very good". There was significant correlation between overall satisfaction with care and symptom management, coordination of care, and nursing skill. Only one patient received a palliative care consult.
Conclusions: This study found that family members are overall satisfied with care of pediatric patients with TBI in the ICU and decision-making surrounding their care. An area for improvement is family's information needs.

Wallner, Meghan | Poster 65 | Quality Improvement and Patient Safety

Improving the Referral Process for a Hospital Based Violence Intervention Program in a Pediatric ED

Authors: Wallner M, Melzer-Lange M, Gray M, Cheaton B
Project Mentor: Marlene Melzer-Lange, MD
Community Partner: Project Ujima

Our quality improvement study aimed to characterize the patient population presenting to the pediatric emergency department with interpersonal violence related injuries, delineate the process by which patients eligible for the Hospital-Based Violence Intervention Program (HBVIP) receive contact with program staff, and design, implement, and evaluate the effects of several interventions aimed at improving the referral process.
We completed a chart review of electronic health records of all patients between the ages of 7 and 18 who received an ICD-9 or ICD-10 code diagnosis consistent with injuries related to assault, stabbing, or gunshot wounds in a Level 1 Pediatric Emergency Department and Trauma Center (EDTC) between January 1st 2014 and September 30th 2017. A reviewer examined the records to evaluate for program eligibility. We then examined the HBVIP's service database to determine which of the eligible patients ultimately had contact with HBVIP staff. The first intervention took place in late November 2016 and involved an alteration in compensation structure for the HBVIP community liaisons. The next two interventions occurred in May 2017 and included initiating the utilization of the hospital's intranet call system to contact HBVIP staff and educating circulating EDTC social workers about the program. From January 1st 2014 to November 30th 2016, of the 483 violently-injured patients presenting to the EDTC who met eligibility requirements, 277 patients (57%) ultimately had contact with HBVIP staff. A process map of the HBVIP referral process was created. A P-chart demonstrated that the alteration in compensation did not result in improvement in the referral process. Based on data through September 2017, the two interventions instituted in late May 2017 have not yet demonstrated an improvement in the referral process, although further longitudinal evaluation of change is warranted.

Wang, Benjamin — Poster 66 — Clinical & Translational Research

A rare case of Urea Cycle Disorder in Adulthood

Authors: Wang B, Jha P
Project Mentor: Pinky Jha, MD

Case: A 48-year-old female with a past medical history of peptic ulcer disease presented to the emergency department with lethargy, gait disturbance, and weakness for a day. Three weeks prior to this admission, the patient had EGD that showed gastric ulcer and esophageal stricture requiring stricture dilatation procedure. Patient continued to have nausea and vomiting after the procedure. Vital signs were notable for tachycardia. On examination patient was unresponsive. Laboratory analysis showed an ammonia level of 406 umol/L, a bicarbonate of 8, and an anion gap of 31. Additional workup including imaging and toxicology were negative. Extensive workup including hepatic function test and toxicology screen was unremarkable. The genetics team was consulted who confirmed the diagnosis of urea cycle disorder. During the ICU stay, patient was treated with sodium phenylacetate, sodium benzoate, arginine replacement, and dextrose 10% 0.45% saline as per the genetics recommendations.
Discussion: Here we present an unusual case of urea cycle disorder presenting in an adult woman. Urea cycle disorders are metabolic disorders of nitrogenous waste substances due to either complete or partial deficiency of enzymes. Though many cases of urea cycle disorder present in the neonates 24-48 hours following birth, a delayed presentation may be observed in female carriers with partial activity of urea cycle enzymes because it is inherited as an X-linked trait. These patients are often only symptomatic when stress-related events trigger increased ammonia levels. Hyperammonemia should be addressed immediately in the acute setting as it can cause irreversible neurological injury or death. A diagnosis of urea cycle disorders should be suspected in patients who had a recent stressor with progressive lethargy and confusion that is refractory to hyperammonemia therapies.

Wendler, Derrick — Clinical & Translational Research

Effects of Non-Thermal Near Infrared Light on Osteoclast Maturation

Authors: Wendler D, Weihrauch D, Struve J, Ninomiya J
Project Mentor: James Ninomiya, MD, MS

Introduction: Fractures and their treatment remain a major societal challenge. Despite advances in fixation methods the morbidity associated with fractures continues to be problematic. Previously attempts have been made to evaluate means of enhancing fracture healing while decreasing the potential for non-unions. However these methodologies are limited by efficacy, associated expense of administration, or a lack of control in the extent of the effect. Therefore, other adjunctive means of enhancing bone healing are worthy of investigation. One such methodology is the use of non-thermal infrared (NIR) light, which has been shown to enhance healing in a variety of tissues. Previous animal studies in this lab demonstrated that administration of NIR light to pre-osteoblasts effectively doubles cell proliferation while delaying differentiation, culminating in an increase in mineralization. NIR influence on osteoclast activity, however, is yet to be thoroughly investigated. Our study aims to explore this influence, and the relationship between osteoblasts and osteoclasts, and their associated signaling factors.
Methods: Osteoblasts were exposed to a single dose of NIR light (670 nM) for 40 s (4 J/cm2, 100 mW). Temperature alterations in the culture dishes were less than 0.1°C during the light exposure. Experimental and control cells were harvested at 48 hours and frozen in -80°C. These samples were then used to as variables in the evaluation of multi-nucleated giant cell growth.
Results: A significant increase in osteoclast maturation was noted in those wells that were subjected to conditioned media from osteoblasts exposed to NIR light. This was in comparison to wells subjected to osteoblast-conditioned media that was shielded from light.

Westein, Riley — Poster 67 — Health Systems Management & Policy

Addressing Social Determinants of Health with Individual Needs Assessment at a Student Run Free Clinic

Authors: Westein R, Kelm S, Lundh R, Thorson B, Young S
Project Mentor: Rebecca Lundh, MD

Introduction: Social determinants of health are the conditions in which people are born, grow, live, work, and age. This may include socioeconomic status, education, physical environment, employment, social support, and access to healthcare. It is easy to overlook the importance of taking these factors into consideration in patient care which can cause providers to misidentify the root cause of patient complaints. Saturday Clinic for the Uninsured (SCU) has a social worker available on-site 1-2 times per month and can make referrals as needed, but this service is underused by patients and volunteers. SCU volunteers have limited experience with needs assessments and are unaware of resources that can address these issues. We aim to assess the issues that are prioritized by the patients at MCW's Saturday Clinic for the Uninsured, identify trends, and provide access to resources with the goal of better addressing specific needs. In the process, we will bring awareness to medical students of the patient-specific social determinants to be considered in care.
Methods: In collaboration with a social worker from Milwaukee's Free and Community Clinic Collaborative, we developed a voluntary intake form for patients to self-identify factors such as food availability, tobacco use, medical insurance, mental health services, energy assistance, housing, and education opportunities that are impacting their health. The intake form is offered to all clinic patients during their visit. If completed, clinic managers then provide resources to address specific needs identified, notify the team providing care, and offer appointments with a social worker to discuss more complicated issues.
Results: To assess effectiveness, we track resources provided and referrals to social work. By evaluating the percentage of patients identifying a certain need, we can identify issues most prominent in our community, view trends over time, and better tailor our resources to patient demands.

Wey, Alexandra — Clinical & Translational Research

Brodmann area 6 thickness and motor learning in Parkinson's disease

Authors: Wey A, Theisen F, Sojkova J, Oh J, Pozorski V, Hiner B, Ozioma O, Gallagher C
Project Mentor: Bradley Hiner, MD

Background PD patients have been found to have deficits in motor learning and cortical thinning in several areas of the brain, including the supplementary motor area (SMA). A connection between motor learning and thinning of the SMA has not yet been investigated. Methods 39 non-MCI PD and 41 normal aged controls completed an MRI and a motor sequence task (MST). BA6 (SMA + premotor cortex) thickness was derived from the T1-weighted MRI volumes using Freesurfer. BA6 thickness was compared to MST using a linear regression. Results Lower BA6 thickness in PD was related to poorer accuracy (both hemispheres; P=0.005-0.024), and plateau speed (both hemispheres; P=0.029-0.049). Conclusions This study suggests that prefrontal cortical changes such as BA6 thinning are related to impaired motor learning in PD. If borne out, cortical thickness in the BA6 region could provide a new diagnostic marker for quantification of deficits and regional cortical involvement in PD.

Williams, Brady — Clinical & Translational Research

Influence of Preoperative Opioid Use on Postoperative Outcomes After Arthroscopic Rotator Cuff Reapair

Authors: Williams BT, Redlich NJ, Mickschl DJ, Grindel SI
Project Mentor: Steven I. Grindel, MD

INTRODUCTION: Recent orthopaedic research has questioned the impact of opioid use on surgical outcomes. This study aimed to investigate this in the context of arthroscopic rotator cuff repair. It was hypothesized that preoperative opioid use would be associated with inferior outcomes and greater postoperative opioid requirements.
METHODS: A database query was performed to identify adult patients with full or partial thickness supraspinatus tears that were surgically treated by a single surgeon with arthroscopic repair between 2011 and 2015. Pre- and postoperative outcomes scores (AROM, ASES, Constant Scores, SST, and VAS) and postoperative opioid use (morphine equivalents and therapy duration) were retrospectively recorded. Prospective record review was performed for a subset of patients who did not have a minimum of 2 years of follow up data.
RESULTS: A total of 200 patients, 44 of whom received opioids preoperatively, were identified for inclusion. Patients prescribed preoperative opioids had consistently inferior pre- and postoperative outcomes scores; however, the magnitudes of improvement were not significantly different between groups. Postoperatively, patients in the preoperative opioid group received 1.91 (95% CI, 1.31-2.78) times more opioids over a postoperative course of treatment that was 2.73 (95% CI, 1.62:4.59) times longer. The preoperative opioid group, in addition to having a greater proportion of female patients, also had significantly higher rates of certain comorbidities including back pain, depression, degenerative joint disease, and chronic pain conditions.
CONCLUSIONS: All patients demonstrated significant and comparable improvements in outcomes scores following surgical repair. However, patients taking opioids preoperatively did not ultimately reach the same level of functionality and had substantially greater opioid requirements postoperatively.

Winn, Phoebe — Bioethics

Prenatal Counseling and Parental Decision-making Following a Fetal Diagnosis of Trisomy 13 or 18

Authors: Winn P, Acharya K, Peterson E, Leuthner S
Project Mentor: Steven Leuthner, MD, MA

Objective: To evaluate parental decision-making following a prenatal diagnosis of trisomy 13 (T13) or trisomy 18 (T18), prenatal counseling received, and neonatal outcomes
Study design: Single-center, retrospective cohort study of families with a prenatal diagnosis of T13 or T18 from 2000-2015.
Results: Out of 152 pregnancies, over half were terminated. 20% chose induction with palliative care, 20% chose expectant management, 2% chose full interventions, 3% were lost to follow up. Counseling was based on initial parental goals, but most women were given options besides termination. Women who chose expectant management had a live birth in 50% of the cases. Women who chose neonatal interventions had a live birth in 100% of the cases, but there were no long-term survivors.
Conclusion: The majority of women who continue their pregnancy after a fetal diagnosis of T13 or T18 desire expectant management with palliative care, not neonatal interventions. A live birth can be expected at least half of the time.

Winsor, Kristen — Clinician Educator

Atrial Natriuretic Peptide knockout exacerbates renal and cardiac damage in salt sensitive hypertension

Authors: Winsor KN, Ilatovskaya DV, Staruschenko A
Project Mentor: Alexander Staruschenko, PhD

High blood pressure is a significant health problem, and a certain proportion of hypertensives are sensitive to salt intake. Atrial natriuretic peptide promotes salt excretion and can lower BP. Based on existing literature we hypothesized improper ANP signaling could play a role in SS hypertension, and designed a study to observe the effects of ANP deficiency on renal and cardiac function using the SSNPPA-/- model. SS hypertension was induced by a switch to a high salt diet for 21 days. SSNPPA-/- rats demonstrate a significantly higher mean arterial pressure and show exacerbated kidney damage (higher glomerular injury score and increased renal arterial hypertrophy). Additionally, the SSNPPA-/- rats have reduced diuresis and sodium and chloride excretion. Furthermore, SSNPPA-/- rats show significantly increased cardiac damage compared to controls, as seen by an elevation in fibrosis and hypertrophy ventricles. Further work will be devoted to discovering an ANP-associated molecular pathway in SS hyperte

Wolff, Kathryn — Clinician Educator

Educational benefits from interprofessional teaching with nursing students.

Authors: Wolff K, Havas N, Korek S, Stoner K, Bernstein R, Wenzlaff R, Corso N, Benson L, Allen P
Project Mentor: Kimberly Stoner, MD

BACKGROUND: Interprofessional Education (IPE) has been a recent theme because of the growing disconnect between healthcare professionals. Lack of understanding of the roles and responsibilities of nurses and physicians can create conflict in the workplace and lead to patient harm. In this project, nursing students will be given the opportunity to teach medical students how to administer an influenza vaccine. This project will help bridge the gap between these future healthcare professionals.
METHODS: A second-year Medical College of WI (MCW) medical student collaborated with two fourth-year MSOE School of Nursing (MSOE/SON) nursing students to design, develop, and deliver the M1 Foundations of Clinical Medicine (FCM) course immunization session. Medical students worked in interdisciplinary small groups to administer and receive the influenza vaccine. Nursing students used their expertise to provide guidance to the medical students. An IPE debrief was held that resulted in a rich discussion.
RESULTS: The medical students found it helpful to have an experienced nursing student guide them through the immunization process, which alleviated any anxiety. Nursing students gained confidence in the leadership role and improved their techniques after educating the medical students. Both sets of students expressed a desire to continue these IPE sessions.
DISCUSSION: Medical students not only learned how to administer vaccines, but developed early relations and mutual respect for other healthcare professions with the goal of providing better patient care. This successful session has led to increased IPE sessions. This project will also be expanded to include the M2 Bench to Bedside immunization session.

Wong, Melissa — Poster 68 — Global Health

Screening for Depression in a Refugee Clinic Setting

Authors: Wong MM
Project Mentor: Beth Damitz, MD

In the clinical setting, mental health screenings are important for recognizing depression in refugee patients and then treating them. These screenings optimally occur during an initial physical exam at a designated healthcare site, like the Family Care Center in Milwaukee, WI. The Family Care Center does not have formal methods for screening their refugee patients but rather depends on questioning by individual health providers. The objective of this study was to analyze their records from a 3 and a half year period in order to calculate the depression rate of their refugee patient population. The rate of depression was 0.71%, but 39.23% of patients were not being screened. The results indicate that depression was being underreported. Implementing uniform guidelines or a formal screening tool could provide improvement, but more research can be done to understand the specific factors that hindered their screenings of refugee patients.

Woodley, Liana — Poster 69 — Clinical & Translational Research

Assessing Lifestyle Behaviors Among African-American Prostate Cancer Survivors: A Pilot Study

Authors: Woodley L, Matthews L, Young S, Hogans Sr. M, Stolley M
Project Mentor: Melinda Stolley, PhD

Background: Prostate cancer (PC) is the most commonly diagnosed cancer among men, with lowest survival observed among African-Americans (AA). AA men with PC also have high comorbidity burden. Obesity and lifestyle behaviors are associated with PC and comorbidity outcomes. We sought to gain a deeper understanding of AA PCS quality of life, diet, physical activity, and needs to inform the development of an intervention.
Methods: This cross-sectional study integrated a mixed methods approach. Eligible participants were AA PCS who were at minimum 18 years old, had completed initial treatment, and were willing to complete study activities. Men were asked to complete questionnaires regarding demographics, quality of life (QOL), sexual function, dietary intake, and physical activity and participate in a single discussion session.
Results: Sixteen men elected to participate. Average BMI was 31.4, 75% of men were overweight or obese, diets were high in saturated fats while low in fruits, vegetables and fiber, and 50% reported insufficient physical activity levels (<150 minutes of moderate or 75 minutes of vigorous activity weekly). QOL challenges included physical function, pain and sexual functioning. Discussion sessions highlighted men's interest in programs that would enable healthy lifestyles and also provide social support.
Conclusion: Given AA men's inferior outcomes following PC treatment, difficulties faced by this group must be addressed. Participants shared their interest in adopting healthier lifestyles as a way to improve overall health and quality of life. Feeling isolated from other survivors was also a concern. Community-based programs that meet this need are warranted.

Wright, Matthew — Molecular & Cellular Research

High Glucose Environment Modifies Astrocyte Angiogenic Activity: Role of VEGF

Authors: Wright M, Garvin J, O'Hare C, Liu Q, Rarick K, Harder D, and Cohen S
Project Mentor: Susan Cohen, MD

Background: Gestational diabetes exposes a fetus to a hyperglycemic environment. This hyperglycemic environment has been shown to pose risk to fetal neurodevelopment by dysregulating brain angiogenesis, a process primarily regulated by astrocytes. While previous research demonstrates that astrocytes regulate normal cerebral angiogenesis by secreting the pro-angiogenic factor vascular endothelial growth factor (VEGF), it remains unknown how high-glucose modifies this activity. We hypothesize that high-glucose down-regulates astroyctic expression of VEGF.
Objective: To investigate the effects of high-glucose on astrocytic VEGF production secretion and link changes to angiogenic processes.
Design/Methods: Astrocytes derived from postnatal day-3 rats were cultured in normal (NG, 5mM) or high-glucose (HG, 25mM) media over three passages. Whole-cell lysates were analyzed for VEGF message and protein using qPCR and immunoblot respectively. VEGF secretion was measured by subjecting media samples to ultrasensitive ELISA analysis. Endothelial cells co-cultured with NG- or HG-astrocytes for 21 days were analyzed using ImageJ to identify endothelial tube formation-a process indicative of angiogenesis. Results were compared via Student's t-test.
Results: HG conditions significantly decreased astrocyte VEGF mRNA ($n=4$, $p<0.01$), protein ($n=4$, $p<0.05$), and secretion ($n=4$, $p<0.01$). Preliminary data from co-culture experiments suggests that endothelial tube formation is slowed when co-cultured with HG-astrocytes ($n=3$).
Conclusion(s): HG-astrocytes produce and secrete less VEGF compared to NG-astrocytes. This may explain slower tube formation seen in HG-astrocyte co-cultures. Slowed tube formation may be a clinically-significant indicator of how the hyperglycemic environment dysregulates angiogenesis in the developing brain. Future studies will examine the role of PI3K/AKT signaling on VEGF production in HG-astrocytes.

Yaccarino, Vincent — Quality Improvement & Patient Safety

Functional outcome comparison between 6 and 12 month follow-up from acl reconstruction in pediatrics

Authors: Yaccarino V, Tednes M, Van Valin S, Lyon R, Liu XC
Project Mentor: Scott Van Valin, MD

Understanding the recovery following an ACL reconstruction is significant to establish objective criteria to decide when a patient is safe to return to baseline activities. Kinematic and kinetic data during various movements, proprioception data, and peak flexion/extension moments of the knee were gathered for 2 groups (6 and 12 months post-op). A LE model giving 3D kinematics for analysis was then constructed. Kinematic differences noted between the follow-up groups include a higher quadriceps peak moment at 12-months post op, and less flexion/increased flexor moment with increased hip extension/extensor moment of the ACL reconstructed knee during walking at 6 months. There was less knee and hip flexion during running, and less knee flexion during ascending/descending stairs. This data suggests a compensatory gait exists after reconstruction and returns closer to baseline throughout recovery. Given this evidence, motion analysis and isokinetic measurements may be useful objective tools in releasing patients to full activities.

Yepez, Salvador — Molecular & Cellular Research

Isolation of Lipid Rafts from Mouse Peritoneal Macrophages

Authors: Yepez S, Chen Y, Silverstein R
Project Mentor: Roy Silverstein, MD

INTRODUCTION: Our research is based on understanding the role of lipid rafts in macrophage cell formation. Lipid rafts are cholesterol-rich membrane microdomains that serve as specific segments. These segments contain and organize specific membrane proteins in order to facilitate interactions for signal transduction or receptor activation.
HYPOTHESIS: The accumulation of specific macrophage receptors in lipid rafts participates in the generation of foam cells.
STUDY METHODS: Lysates of mouse peritoneal macrophages were divided into two groups: a control group and a group stimulated by oxidized low-density lipoprotein (oxLDL). Ultra-centrifugation was performed using both lysates. Samples were centrifuged at 100,000g for 18 hours with a sucrose gradient of 5-45% to separate cell components based on their densities. Twelve 1-ml fractions were then collected from each gradient and analyzed for specific protein content by immunoblot.
RESULTS: Biochemical assays for cholesterol revealed that most cellular cholesterol from the fractionation was localized in fraction 4 consistent with previous lipid raft studies. Western blots showed partition of proteins as predicted for raft and non-raft fractions. Of these proteins, NKA and CD36 were found at higher concentrations in lipid raft fraction 4, following macrophage stimulation with oxLDL.
CONCLUSIONS: CD36 an NKA receptors were present at higher quantities in the lipid raft fraction when macrophages were stimulated by oxLDL. This is in line with our hypothesis that these receptors may be recruited to lipid rafts to facilitate the formation of atherosclerotic plaque.

Yi, Jessica — Poster H6 — Global Health

Adolescent Health Risks and Behaviors Survey - A School Based Survey in Central Nepal

Authors: Thapa B, Powell J, Yi J, McGee J, Landis J, Rein L, Kim S, Shrestha S, Karmacharya B
Project Mentor: Bipin Thapa, MD, MS, FACP
Community Partner: Dhulikhel Hospital: Department of Community Programs

A comprehensive study of adolescent behavioral health in central Nepal has not yet been performed. This survey assessed trends in demographics, nutrition, hygiene and related infrastructure, causes of injury, violence, mental health, substance use, and female hygiene. A 40-question survey was adapted from the CDC's Youth Risk Behavior Surveillance System and translated to Nepali. Approximately 1200 surveys were administered anonymously to students in 8 different schools in central Nepal. The data has identified nutrition, infrastructure, mental health, and female hygiene as areas for improvement. The number of adolescents who reported going hungry some, most, or all of the time (30.5%, 25.8%, 13.9%) reveals a need for better food access. Students reported positive hand-washing behaviors but some schools may lack infrastructure to encourage good hygiene, as 44.5% of students reported that there was no place to wash their hands with soap and water at school. Mental health data showed that 6.5% of students were dissatisfied with who they are, 6.5% experienced frequent loneliness in the past year, and 11.8% have considered or attempted suicide. A significantly greater percentage of students who reported suicidal ideation also reported engaging in behaviors related to physical violence and substance use. Outcomes such as happiness with themselves, insomnia due to anxiety, and loneliness also differed significantly depending on whether students reported suicidal ideation or attempt. 40.1% of female students reported missing school at least once in the last three months due to menstruation. This data will be used to design community interventions within the population surveyed.

Zellmer, Tim — Clinical & Translational Research

Liver Directed Therapy in Patients with Unresectable Hepatocellular Carcinoma or Liver Metastases: Focus

Authors: Zellmer T, Lea W, White S, Rilling W, Hohenwalter E, Patel P
Project Mentor: William Lea, MD

Objective: To determine effect of liver directed therapy (LDT) on patient reported quality of life (QoL) in patients with unresectable HCC/liver metastases and its relationship to resource utilization.
Methods: Single center prospective, IRB approved study evaluating longitudinal QoL in patients with unresectable HCC/liver metastases receiving LDT. FACT-HEP, PROMIS-29 and VAS assessment tools were administered at initial clinic, day of LDT, and follow up visits. Resource utilization after LDT determined with EMR to record: ED/hospital/ICU admissions, palliative care, completion of advanced directives, and transition to hospice. QoL surveys were scored and assessed. Relationship between resource utilization after LDT and patient reported QoL was correlated.
Results: 27 patients completed QoL surveys at all three time points. Initial clinic visit median Fact-Hep score was 126 (range 68-178), pre-procedure median score was 131 (57-178), and follow up visit median score was 124 (65-180). 63% (17/27) maintained/improved FACT-Hep QoL scores from day of LDT to follow up visit. PROMIS-29 reported QoL scores: physical function was maintained in 89% (24/27); depression, fatigue, and pain interference in 85% (23/27); anxiety and pain intensity in 81% (22/27); sleep disturbance in 78% (21/27); social roles in 70% (19/27). 96% (26/27) maintained pain intensity within 20 points on 0-100 VAS. No patient had immediate procedural complications. 20 are still alive. 7 deceased related to HCC/metastatic disease. 4/7 (57%) died within 3 months of LDT. 4/7 (57%) were transitioned to hospice before death. 33% (9/27) presented to ED from complications of LDT/HCC/metastatic disease within 3 months of LDT. 48% (13/27) received palliative care and 59% (16/27) had advanced directives completed.
Conclusions: These data suggest patient reported QoL is maintained/improved after LDT in patients with HCC/liver metastases. No relationship was found between resource utilization and QoL scores.

Zimny, Alyssa — Poster 70 — Clinician Educator

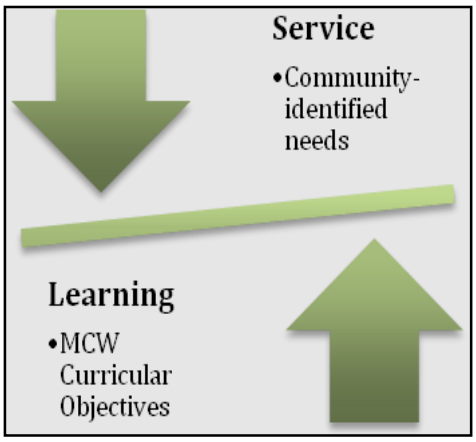
Medical Student Initial Assessments of E-Learning Modules: Radiation Safety and Dosimetry

Authors: Budovec J
Project Mentor: Joseph Budovec, MD

Context: With continuously evolving medical school curricula, students have opportunities to strengthen their diagnostic skills of medical imaging. However, there continues to be limited emphasis on the non-interpretive skills of radiology.
Objective: To evaluate medical students' understanding of radiation dosing and safety principles, prior to and with supplemental education via self-directed E-learning modules.
Methods: Third and fourth-year medical students enrolled in the diagnostic radiology clerkship at the Medical College of Wisconsin between October 2017 and April 2018 completed needs assessment on their current understanding of radiation safety and dosing, as well as their confidence to explain these concepts to others. Data gathered were used to develop two E-learning modules focused on these topics. The modules were designed and published using Adobe Captivate software, and made available to students to use in a self-directed format. At the end of each four-week clerkship, students completed an online postsurvey to evaluate the modules and student level of comfort to describe learned topics to their peers and patients.
Results: Of the students enrolled in the four-week clerkship in diagnostic radiology, 11 completed the needs assessment. Nine students (81.8%) strongly agreed or agreed with the statement that knowledge of radiation was important to their future career. No students, however, strongly agreed with the statement "I am comfortable explaining the risks associated with diagnostic imaging." Of the students who participated in this study, 5 completed the postsurvey after viewing both modules. 100% (n=5) of these students strongly agreed with the statement "I feel comfortable explaining this information to other medical students", and 80% (n=4) strongly agreed with the same statement when applied to educating patients.
Conclusion: These results support the use of E-learning modules in strengthening student understanding of non-interpretive ski

Community Engagement in Pathways

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



Key Features of Service Learning

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

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

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

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

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

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

Community Collaborations

A special thank you to our community partners for providing input and expertise to Pathway planning, core sessions, site visits, advising and service learning projects.

Agape Community Center	Inception Health	Prevent Blindness Wisconsin
AIDS Resource Center of Wisconsin	Independence First	Prevent Suicide of Greater Milwaukee
All Saints Family Care Center	James Madison Academic Campus	Progressive Community Health Clinics
Bread of Healing Clinic	Journey House	Project Ujima
Breast Cancer Outreach	Lutheran Social Services of WI – Refugee Resettlement	Psychiatric Crisis Center (Community Advocates, Inc.)
CHW Child Protection Center	Marquette University	Repairers of the Breach
CHW Patient Navigation	Midtown Pediatrics	Running Rebels
Columbia St. Mary's Family Care Center	Milwaukee Academy of Science	Saturday Free Clinic for the Uninsured
Dhulikhel Hospital (Nepal)	Milwaukee Area Health Education Center	SET Ministry, Inc.
DRIVE	Milwaukee Center for Independence	Sikh Religious Society of Wisconsin, Brookfield Gurudwara
DryHootch	Milwaukee College Prep	Sojourner Family Peace Center
Enhanced Care Clinic	Milwaukee County Office of Emergency Management	United Community Center
Escuela Verde	Milwaukee Health Department	United Way of Greater Milwaukee & Waukesha County
Fight Asthma Milwaukee (FAM) Allies	Milwaukee Public Schools	University of Utah School of Medicine
Fondy Food Center	Milwaukee Women's Center	University of Utah Pain Management Center
Food Doctors	Muslim Community Health Center at the Islamic Center of Milwaukee	University of Wisconsin-Milwaukee
Friedens Community Ministries	Next Door Milwaukee	University of Wisconsin-Oshkosh
Greater Milwaukee Foundation	Outreach Community Health Center	Walker's Point Youth & Family Center
Greater Milwaukee Free Clinic	Patan Academy of Health Sciences, Manipal College of Medical Sciences (Nepal)	Warrior Partnership
Guest House Milwaukee	Pathfinders	Washington High School Community Learning Center
Highland Gardens	Philippine Center	Whole Health
		Wisconsin Shirdi Sai

Milwaukee Regional Medical Center (MRMC) affiliates:

BloodCenter of Wisconsin

Children's Hospital of Wisconsin
Kids deserve the best.

Froedtert Hospital

Clement J. Zablocki VA Medical Center

Thank you for being a Project Mentor to the Class of 2019!

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