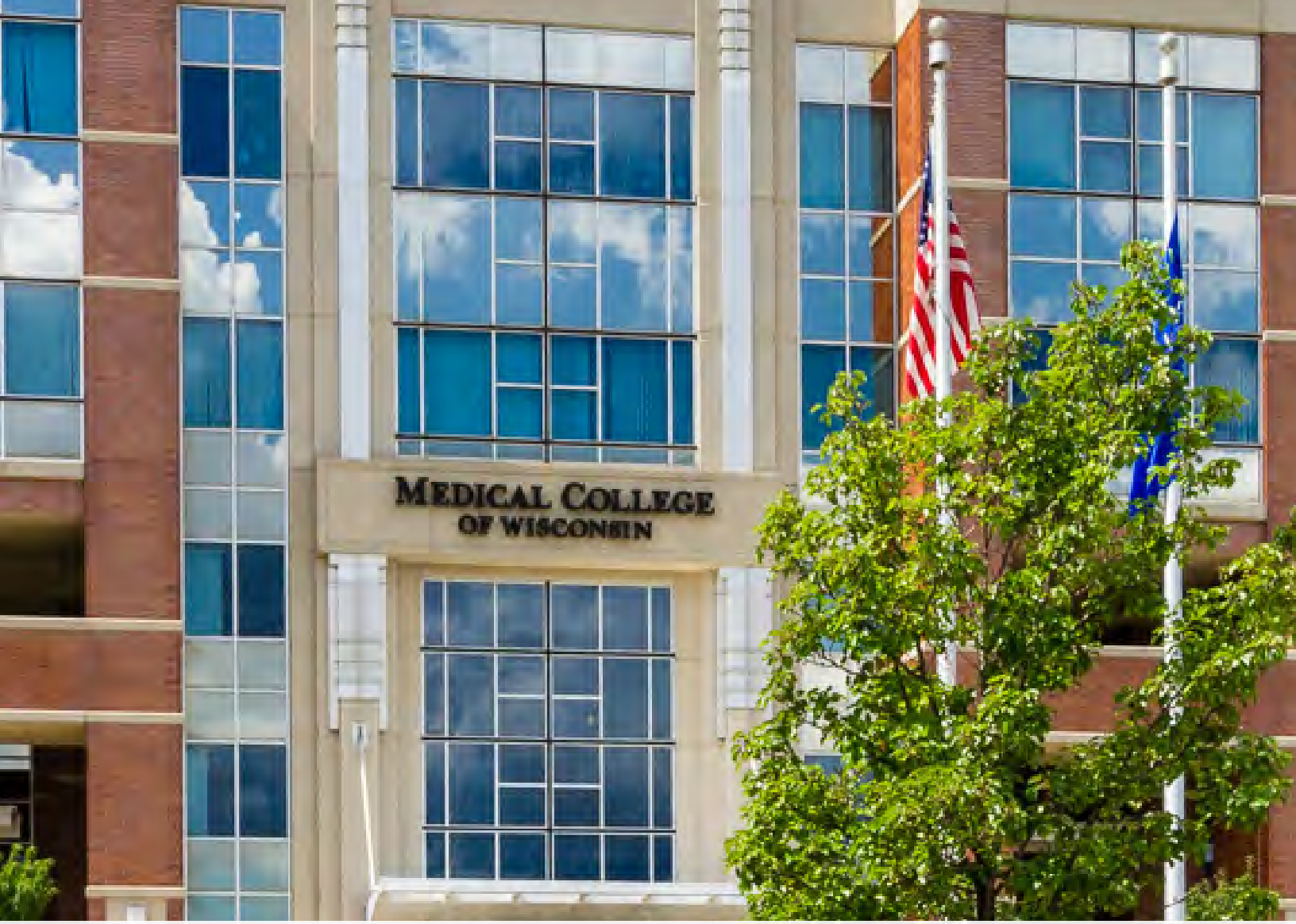

MCW
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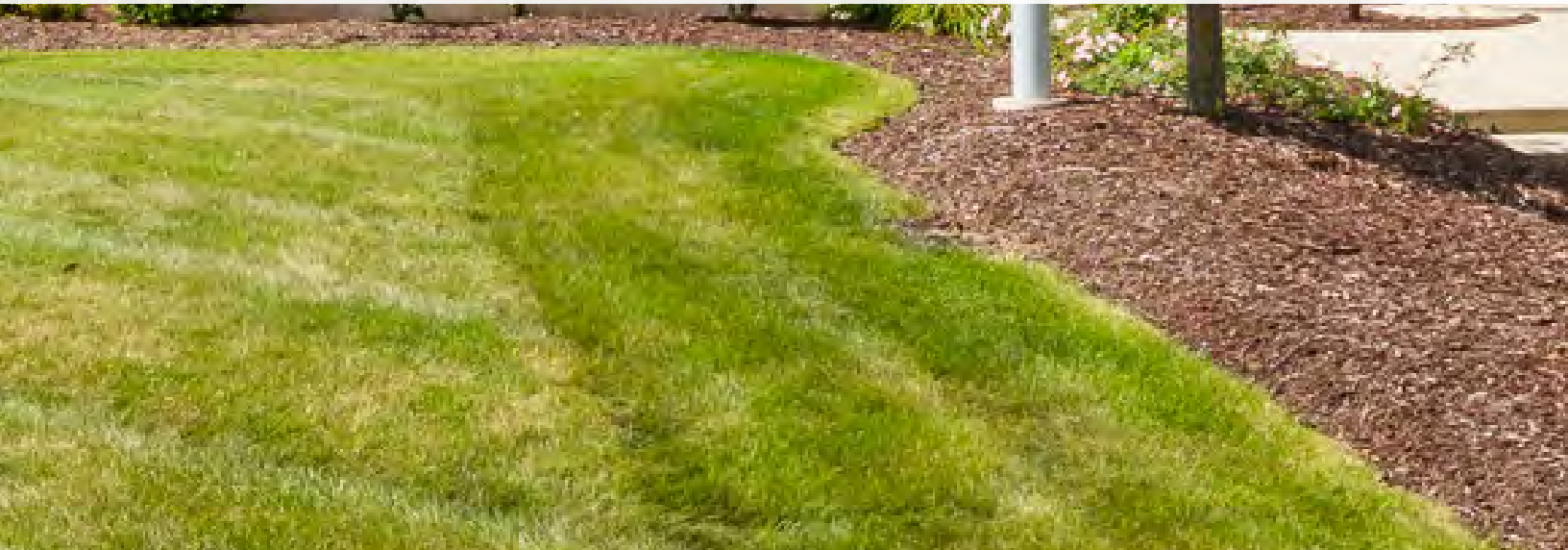
SCHOLARLY PROJECTS
CLASS OF 2022



Director of Scholarly Activities: David Brousseau, MD, MS

School of Medicine Scholarly Pathway Directors

Bioethics	Cynthiane Morgenweck, MD, MA Arthur Derse, MD, JD
Clinical & Translational Research	Joseph Carroll, PhD Jennifer Knight, MD, MS
Clinician Educator	Joseph Budovec, MD
Global Health	Kirsten Beyer, PhD, MPH Megan Schultz, MD
Health Systems Management & Policy	John Meurer, MD, MBA William Hueston, MD
Molecular & Cellular Research	Joseph Carroll, PhD Alison Kriegel, PhD
Quality Improvement & Patient Safety	Catherine Ferguson, MD
Urban & Community Health	Rebecca Bernstein, MD, MS Linda Meurer, MD, MPH

Scholarly Pathway Staff Team

Meaghan Hayes, MEd
Sarah Leineweber
Rachel Sommer, MS
Kelly Cornelius, MS
Sue Korek, MAED

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 172 Class of 2022 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.

Abdel-Reheem, Abdul-Rahman | Clinician Educator

Teaching URM Students Skills in Teaching and Leadership in order to Become Innovative Healthcare Leaders

Authors: Abdel-Reheem AK, Weisgerber MC, Budovec JJ.

Project Mentor: Joseph Budovec, MD

HYPOTHESIS

The objective of the investigation is to encourage the URM students enrolled in the Step-Up boot camp to become community leaders and foster a passion in educating others as they progress through their educational journey and to become leaders in healthcare and academic medicine. The study aims to prove that through the sessions in education provided to the students that their interest in academic medicine and skills in educating others will increase.

STUDY METHODS:

The investigation was conducted during the 2019 Step-Up Bootcamp. Three Education in Medicine sessions were developed and administered during the duration of the boot camp. An anonymized survey regarding categories such as students' interest in teaching were administered before and after the sessions using a Likert scale of 1-5.

RESULTS:

Student results were aggregated and averages in each metric were analyzed. Overall averages improved from 4.1 to 4.5. Individual metrics were further analyzed with improvements in each category measured. The largest increase was observed in Comfort in Teaching with an increase from 4.19 pre-survey average to 4.73 post-survey average.

CONCLUSIONS:

Results indicated that students' interest and comfort in teaching improved following the three sessions. The study suggests that sessions regarding skills in teaching and leadership can improve the student's interest and confidence in being leaders and educators. A longitudinal study of the students that participated should be done to see if students that participate do matriculate to medical school and pursue academic positions when in practice as physicians.

Adu-Gyamfi, Afia | Health Systems Management & Policy

Impact of removal of automatic seven-day stop orders for inpatient antimicrobials

Authors: Adu-Gyamfi AB, Dutcher L, Hamilton KW, Cressman L, Lautenbach E.

Project Mentor: John Meurer, MD, MBA

BACKGROUND: Automatic discontinuation of antimicrobial orders after a pre-specified period has been a strategy for reducing excess days of therapy(DOT) as part of antimicrobial stewardship efforts. However, inadvertent treatment interruptions may occur, contributing to adverse patient outcomes. To evaluate this, we examined the impact of the removal of an electronic 7-day ASO program on hospitalized patients.

METHOD: We performed a quasi-experimental study in 3 acute care hospitals. In the pre-intervention(ASO present) period, we had an electronic dashboard to identify and intervene on unintentionally missed doses. For the post-intervention period, the ASO was absent. We compared the primary outcome, DOT per 1000 patient days(PD) per month. The Wilcoxon rank-sum test compared median monthly DOT/1000 PD. Interrupted time series analysis compared trends in antibiotic DOT/1000 PD and the immediate impact of the ASO removal. Manual chart review on a subset of 300 patients, equally divided, was used to assess unintentionally missed doses.

RESULTS: ASO present period—a monthly median of 644.5 DOT/1000 PD were administered, compared to 686.2 DOT/1000 PD in the ASO absent period($p<0.001$). There was a non-significant increase by 46.7 DOT/1000 PD(95% CI -40.8 to 134.3) in the month immediately following removal of ASOs. Though monthly change in DOT/1000 PD increased in the ASO absent period it was not significant($p=0.41$). Manual chart abstraction showed that in the ASO present period, 9 of 150 patients had a sum of 17 unintentionally missed DOT, while 0 in the ASO absent period did.

CONCLUSION: Following removal of the ASO, there was an overall increase in antibiotic use but the change in monthly trend was not significantly different. Even with a dashboard to identify missed doses, there was still a risk of unintentionally missed doses in the ASO present period. Therefore, this risk should be weighed against the modest difference in antibiotic utilization garnered from ASOs.

Affeldt, Zach — Health Systems Management & Policy

Identifying contributing factors to the economic burden of motorcycle crashes.

Authors: Hargarten S, Affeldt Z, Kohlbeck S.
Project Mentor: Stephen Hargarten, MD, MPH

Use of a helmet by motorcyclists involved in crashes has proven to decrease mortality, injury severity, and cost of admission. Lack of helmet use results in a strain on hospital resources and millions of dollars of preventable medical expenses each year. Our study aimed to quantify the differences in hospital charges between helmeted and unhelmeted riders based on several hospital admission metrics and to what degree those metrics individually impacted cost. We examined 16 helmeted and 52 unhelmeted riders with isolated head injuries who presented to the Froedtert Memorial Lutheran Hospital emergency department between 2004 and 2019. Admission data was pulled from the Froedtert Hospital Trauma Registry Database regarding Glascow coma scale on presentation, days spent in the intensive care unit, days requiring a ventilator, length of hospital stay, injury severity score, abbreviated injury score, and discharge disposition. Helmeted riders were less likely to: present to the ICU (OR .68, P < .069), require a ventilator (OR .48 P < .088), be sent to rehab or the morgue (OR .25, P < .066). Overall admission cost for helmeted and unhelmeted riders was comparable at USD $46599.09 vs $49,532.54 (P < .433). Factors found meaningfully impact admission costs were discharge disposition (P < .003), ISS/AIS (P<.009 and P < .035), length of hospital stay (P<.001). Helmets decrease the likelihood of sustaining injuries associated with independent factors for increasing hospital costs. This suggests that helmets have a protective value in safety but also for decreasing financial burden placed on injured motorcyclists.

Afreen, Esha — Urban & Community Health

State Law Designed to Decrease Postoperative Opioid Prescriptions: Is it Best for the Patient?

Authors: Colvin Z, Afreen E, Palatnik A, Peterson E.
Project Mentor: Erika Peterson, MD

INTRODUCTION: To discourage providers from overprescribing opioids, Wisconsin enacted Wisconsin Act 266 on 4/1/2017. This legislation mandated a search of the prescription drug monitoring program (PDMP) database if prescribing opioids for >3 days duration. Our objectives were to examine whether opioid prescribing patterns, pain control, and postpartum health care utilization changed after enactment of this law.
METHODS: A retrospective cohort study of women delivering by cesarean delivery from 4/2016 to 4/2018 at a large academic hospital in Wisconsin was done. Women were excluded if there was no postpartum follow-up care in the hospital system, were prescribed opioids other than oxycodone, or underwent additional major procedures. Maternal and obstetric characteristics, number and total amount of opioids prescribed at discharge, and additional encounters or opioid prescriptions required for inadequate pain control, were compared in women delivering the year prior to and the year after the law was enacted.
RESULTS: A total of 1,312 women met criteria for analysis. There was a significant decrease in number (28.1 vs 22.8, p<0.001), and total amount (142.7 vs 116.7mg, p<0.001) of opioids prescribed at discharge in the year after the law was enacted. There were no differences in additional encounters for postpartum pain control or need for additional opioid prescriptions. Both outcomes remained statistically significant after performing a multivariable linear regression.
CONCLUSION: Opioid prescribing after cesarean delivery significantly decreased after Wisconsin Act 266 was enacted without compromising postoperative pain control. Future mandates should be considered at a national level to decrease excess opioid prescribing.

Aguayo, Antonio — Global Health

Identifying barriers to standardizing trauma care with an electronic medical record platform (T6) in Cuba

Authors: Aguayo A, Celestino C.

Project Mentor: Marc de Moya, MD

Community Partner: Hospital Clínico Quirúrgico Calixto García de la Habana, Cuba

BACKGROUND: Access to standardized trauma care following a traumatic injury plays a critical role in reducing morbidity and mortality in developing countries. Standardized trauma care ranges from emergency transport to the adherence to hospital protocols that facilitate communication However, despite the growing availability of literature, we know little about the state of trauma and acute care surgery in Havana, Cuba where distinct barriers exist because of the embargo.

METHODS: Using the T6 (EMR) platform on an iPad, we assessed the technological barriers that would need to be overcome for the transition to an (EMR) platform. In addition, we assessed the social and political challenges that would make standardizing trauma care difficult through interviews with Chief of Trauma Surgery Dr. Martha Larrea-Fabra.

RESULTS: This feasibility study identified barriers that fall into three major categories: technological, social, and political. The transition from a paper to an (EMR) platform is a technological challenge that requires funding for resources and training. Limited collaboration with foreign doctors has failed to produce the necessary trust for a project such as this one. In addition, research interests remain under government control and we do not have an appropriate gauge on whether implementing standardized trauma protocols is of interest to government officials.

CONCLUSIONS: Based on these findings we believe implementing an (EMR) platform in a low-resourced setting is feasible but further collaboration is required. First, we need a better understanding of hospital infrastructure to assess their technological and healthcare needs. Second, we need to establish trust that will stimulate quality research towards standardizing trauma care. Overcoming these two barriers is a critical step towards gaining the support of government officials towards the implementation of standardized protocols that reduce morbidity and mortality.

Akyeampong, Opoku — Global Health

The Local Economic Impact of Global Health: The Greater Milwaukee Global Health Landscape Study

Authors: Ozawa J, Taylor N, Akyeampong O, Frazer T, Ehlinger Affotey S, Rios A, Sanchez J, Hargarten S.

Project Mentor: Joyce Sanchez, MD

Community Partner: Research Triangle Institute International

The Milwaukee metropolitan area is home to over 1.5 million people of diverse backgrounds and several major academic centers, hospital systems, and biohealth industries. A literature review revealed limited data describing the investment in local global health activities from these entities. The Milwaukee Global Health Consortium (MGHC), through partnership with RTI International sought to Quantify the impact of Milwaukee's GH sector on Wisconsin's economy in the base year, 2019.

Economic and educational data was collected from MGHC members and Milwaukee's largest global biohealth companies through interviews and surveys. Companies were selected based on available financial data and response to information requests. Economic data collected primarily focused on employment, operating expenses, exports, and research relating to global health. Twenty greater Milwaukee area organizations were represented. In order to estimate the indirect and induced impacts of the direct employment and expenditure, the IMPLAN: economic impact modeling platform was used.

Investment in Milwaukee's global health (GH) sector results in the employment of 6,132 people and $2.9 billion of economic activity. After accounting for secondary and tertiary impacts of spending by organizations and their employees, the GH sector was estimated to support 16,961 jobs, $1.3 billion in labor income, and $4.6 billion in economic output. The top disciplines of focus were infectious diseases (55%) and chronic diseases (50%), maternal, child, and newborn health (40%) and injury/violence (30%). Top activities included education, outreach and training (55%), clinical or professional services (40%), and research and feasibility studies (30%).

Albiero, Maxwell

Clinical & Translational Research

Analysis of trunk power and joint stresses between professional and collegiate pitchers

Authors: Albiero ML, Dziuk C, Cross JA.
Project Mentor: Janelle A. Cross, PhD

The dynamic motion of a baseball pitch generates high elbow and shoulder torques that can result in injury. Previous research has noted the importance of properly transferring energy from the lower extremities through the throwing arm to decrease joint stress. The goal of this study was to compare segmental powers between two levels of pitchers at various moments throughout the pitching cycle and observe their influence on upper extremity torques. Thirteen professional and thirteen collegiate pitchers participated in this study. Forty-seven reflective markers were attached to the subjects at specific landmarks. An 8-camera motion analysis system was set up surrounding an artificial pitching mound, where participants threw 10 fastballs. Data were exported and processed using Visual 3D software. Welch's T-tests compared the means between groups with a significance set at $p < 0.05$. Professional pitchers were found to have significantly greater torso power at foot contact, maximum shoulder external rotation, ball release, and overall peak torso power. They also demonstrated significantly greater pitch velocity. Professional pitchers generated similar elbow varus torque and shoulder internal rotation torque compared to collegiate pitchers. These findings suggest professional pitchers more effectively use torso power to help increase pitch speed without increasing overall joint torques.

Andryk, Logan

Clinical & Translational Research

Clinical Outcomes of Upper Extremity Ambulators Post Reverse Total Shoulder Arthroplasty

Authors: Andryk L, Knight B, Mickschl D, Grindel S.
Project Mentor: Steven I. Grindel, MD

INTRODUCTION: Patients requiring ambulatory assist devices such as canes, walkers, and wheelchairs often have significant rotator cuff dysfunction and pain stemming from the excessive forces placed on the shoulder joint with ambulation. Reverse Total Shoulder Arthroplasty (rTSA) is often used for treatment for this shoulder pathology, though there is minimal data analyzing its outcomes specific to upper extremity ambulators. The objective of this study is to determine the overall effectiveness of the rTSA procedure for treatment of shoulder pathology in this population.
METHODS: The study involved a retrospective analysis of 35 rTSA procedures performed on upper extremity ambulator patients (ages 48-88, average=72.54 years). Average follow up was 32 months (range 24-84 months). The following pre-operative and post-operative characteristics were recorded for each patient: range of motion, pain scores, American Shoulder and Elbow Surgeon (ASES) scores, Constant Murley scores, and Simple Shoulder Test (SST) scores.
RESULTS: ANCOVA statistical analysis consistently showed that a patient's pre-operative status is highly correlated with expected gains post-operatively. Average pain scores improved from 6.31/10 to 1.95/10 (gain=4.36; $p<0.0001$). Forward flexion improved from 69.69° to 127.57° (gain=57.88°; $p<0.0001$), while abduction improved from 42.2° to 112.57° (gain=70.4°; $p=0.0002$). Murley scores improved from 23.4 to 61.5 (gain = 38.1; $p=0.030$). Patients also showed consistent gains in ASES and SST scores, though they were not statistically significant.
CONCLUSION: rTSA leads to significant post-operative improvements in range of motion, function, and pain relief in the upper extremity ambulator population. Patients with lower pre-operative function showed higher gains post-operatively, leading to similar post-operative levels. Ultimately, upper extremity ambulator patients with rotator cuff dysfunction will benefit from a rTSA procedure.

Ayala, Gelique

Clinician Educator

Assessing Foveal Structure in Individuals with TYR R402Q and S192Y Hypomorphic Alleles

Authors: Ayala GD, Linderman RE, Valenzuela RK, Woertz EN, Brilliant M, Tarima s, Carroll J.
Project Mentor: Joseph Carroll, PhD

PURPOSE: To assess the impact of two TYR hypomorphic alleles (R402Q and S192Y) on foveal pit and FAZ morphology. Design: Cross-sectional study.
SUBJECTS: One hundred fifty-eight subjects with normal vision (70 males and 88 females; mean ± SD age = 30.1 ± 12.7 years) were recruited. Subject self-reported race/ethnicity included 104 White subjects, 25 Asian, 16 Black, seven admixed subjects of White and Asian heritage, three American Indian/Alaskan natives,, one native Hawaiian/pacific islander, and two subjects that did not report ethnicity.
METHODS: Volumetric scans of the macula were obtained for each subject using optical coherence tomography (OCT) and retinal thickness maps were analyzed using custom software. Sequencing of over 100 pigmentation-related genes were performed, and results were reviewed for the presence or absence of the TYR polymorphisms R402Q (rs1126809) and S192Y (rs1042602). Linear mixed model analysis was used to assess associations between genotype and foveal pit morphology
MAIN OUTCOME MEASURES: Foveal pit depth, diameter, and volume in relation to TYR genotype.
RESULTS: Homozygosity for the TYR R402Q allele was associated with reduced pit volume ($p = 0.040$) and decreased pit depth ($p = 0.014$) but had no association with pit diameter ($p = 0.146$) or FAZ area ($p = 0.133$). Homozygosity of the TYR S192Y allele was associated with reduced FAZ area ($p = 0.010$). Neither heterozygosity for the TYR R402Q allele nor homozygosity or heterozygosity for the TYR S192Y allele were associated with differences in foveal pit depth, diameter or volume ($p > 0.05$).
CONCLUSION: While the role of the TYR R402Q and S192Y hypomorphic alleles in albinism remains controversial, our data suggest that these variants may contribute to the extensive inter-individual variability in foveal morphology in the normal population. Our results contribute to the evolving picture of the relationship between ocular pigmentation and foveal morphology.

Ayoub, Malek

Clinical & Translational Research

The Road Less Traveled – Is Hospital Distance from Home a Risk Factor for Post-Surgical Readmissions?

Authors: Ayoub M, Peterson CY, Hetzel E, Singh S, Gould J.
Project Mentor: Jon Gould, MD

BACKGROUND: Distance traveled for surgery from home is a potential risk for readmission.
METHODS: A retrospective chart review using institutional ACS NSQIP data (2017-2018) was conducted to identify patients who underwent one of 8 procedures. Distance traveled from home was calculated based on zip code.
RESULTS: A total of 1,722 patients met inclusion criteria. The mean patient age was 54.8 (± 16.2), and 932 (52.60%) subjects were female. There were 113 (6.60%) readmissions within the study period. The majority of procedures performed during the study interval were Ventral Hernia Repair. The bivariate analysis by distance demonstrated that patients who resides more than 50 miles away from Froedtert hospital tend to be older (58.2 ± 15.9) and have higher ASA classification than patients who live less than 50 miles ($P < .001$). These patients are also more likely to travel for disseminated cancer. Furthermore, the bivariate analysis by readmission rates shows that patients are more likely to be readmitted if they live further from the index hospital, have higher ASA classification, and are totally dependent ($P < .001$). However, we did not find a significant difference between patients who live more than 50 miles and those who live less than 50 miles. Lastly, each increase of 10 miles in travel distance from the patient's residence to Froedtert hospital was associated with a 3 per cent increase in the probability of readmission after adjusting for patient characteristics, preoperative comorbidities, and postoperative complications before and after discharge (odds ratio = 1.031, 95% confidence level = 1.001-1.062; $P=0.045$).
CONCLUSION: Patients who live further from the index hospital were more likely to be readmitted after commonly performed general surgery procedure. Patients are also more likely to travel further distances for complex procedures such as Whipple and Distal Pancreatectomy.

Baca, Alec — Global Health

Creation and Analysis of a Lao American Collaborative Medical Education Facebook Page

Authors: Baca A, Saysanasongkham S, Wallace C, MD, Seballos S, Konphanthavong S, Khamvongsa S, Luo J, Cohn KA.
Project Mentor: Theodore Mackinney, MD, MPH
Community Partner: Children's Hospital of Philadelphia, National Children's Hospital and University of Health Sciences (Vientiane, Lao PDR)

BACKGROUND: Lao medical students face challenges accessing online learning materials including cost, language barriers, and internet speed. Despite this, they utilize internet resources, commonly through smartphones on free, easy-to-navigate websites including social media.
METHODS: A team of Lao and American medical students/physician created a Facebook page called Soun Suai Phaed ("Medical Education Center" in Lao) to provide accessible lessons on diverse medical topics, including medical English.
RESULTS: Since its inception in 2018, the page has garnered 2234 "fans", 91% of whom are in Lao PDR. Of those in Lao PDR, fans are most commonly located in populated provinces with a medical university (e.g. Vientiane Prefecture and Savannakhet.) The 30 available lessons had a high-performing average engagement rate of 71.5% with certain posts receiving a total engagement greater than 500. Medical English translations into Lao language was the most popular type of post.
DISCUSSION: Soun Suai Phaed has succeeded in garnering a Lao fan base that is engaging in its content, with particular interest in medical English terminology.

Bartynski, Zoe — Global Health

Long-Term Gait and Strength Assessment Following Surgical Repair of Isolated Tibial Shaft Fracture

Authors: Bartynski ZA, Becker BM, Muscott RK, Beck CJ, Martin JM, Harris GF, Schmeling GJ, Fritz JM.
Project Mentor: Gerald F. Harris, PhD

INTRODUCTION: The purpose of this study is to use 3-D gait analysis, strength testing, and survey outcomes to determine if strength and gait are affected two or more years post-surgical repair of fracture.
METHODS: Consented participants had 17 reflective markers placed on anatomical landmarks. The gait cycle data was recorded by 12 Vicon cameras and Nexus software as the patient walked across a 30-foot walkway. Strength was measured using the Biodex System 3 Pro dynamometer with isometric and isokinetic protocols. Subjective measures were taken using the SF-36 survey. Data of the fracture population was compared to a healthy adult population as a control. Strength data was compared between affected and unaffected legs.
RESULTS: The fracture population had a prolonged stance phase ($p=0.015$ fractured, $p<0.01$ unaffected), slower walking speed ($p<0.01$), shorter stride length ($p=0.028$), decreased cadence ($p<0.01$), and decreased single limb support time throughout the gait cycle when compared to the control group ($p=0.01$). Strength data showed a decrease in strength between affected and unaffected limbs that was only statistically significant for isometric hamstring strength at 90° knee flexion and isokinetic quadriceps strength at 60°/sec and 75°/sec resistances. Results from SF-36 surveys show below average functioning in all categories except "Role limitations due to physical health."
DISCUSSION: Statistically significant differences were identified in the gait of the fracture population compared to a control population. There were statistically significant differences in strength between affected and unaffected limbs in the fracture population for certain movements. Therefore, it appears that surgical repair does impact gait and strength in the long term.

Benett, Sarah — Global Health

Implementation and Assessment of the Malawi Developmental Assessment Tool in Kampa, Uganda

Authors: Benett S, Fickau B, Anguzu R, Babikako H, Cassidy L.

Project Mentor: Laura Cassidy, MS, PhD

Community Partner: Child and Family Foundation of Uganda

BACKGROUND: Studies of neurodevelopment in children using tools appropriate for western culture may yield inaccurate results for children in Uganda. We designed and implemented a neurodevelopmental screening program using the Malawai Developmental Assessment Tool (MDAT) at the Child and Family Foundation of Uganda (CFU) to evaluate neurodevelopment in children under 6 years old in Kampala, Uganda, and Kamuli, Uganda.

METHODS: The program was developed in collaboration with the CFU in Kampala. The lead physician, along with the community, led the design and implementation. Parents were offered free screening for their children at the Friday immunization clinic in both locations, which serves a large catchment area. Data from the screenings were entered into KoboCollect and analyzed.

RESULTS: The earliest age where neurodevelopmental progress can be detected is around 18 months. Overall, 13.9% of the children in our study population were found to have an overall neurodevelopmental delay. The highest percentage of delayed children was in the social domain followed by fine motor and then language. 21% of children in the rural setting were found to be delayed where 5% of children in the urban setting were found to be delayed. Specific characteristics like monthly income, urban vs rural residence, and education of primary caretaker are significant characteristics that impact neurodevelopment.

CONCLUSION: Overall, there is significantly more neurodevelopment delay in rural children vs urban children. Early intervention, like MDAT screening, at 18 months could improve the quality of life for these children. There are specific characteristics that play into neurodevelopment including disease exposure and residence of the child. Our next steps include implementing developmental screening for early detection of delay and expand the use of the MDAT throughout Kampala and into rural areas within Uganda.

Bennett, Alexandra — Quality Improvement and Patient Safety

Predictors of Adverse Outcomes in Frail and Elderly Patients

Authors: Bennett A, Lauer K.

Project Mentor: Kathryn Lauer, MD

INTRODUCTION: Frailty has been shown to increase with age and predict post-operative adverse events but there is no universally applied Frailty Index. The purpose of this project is to assess if routinely collected laboratory values and admission screening tools are suitable markers of frailty and can be predictors of adverse outcomes and whether unique screening tools like STOPBang enhance the prediction of adverse events.

SPECIFIC AIMS: To confirm the relationship between age and frailty in our patient population, to determine the predictive value of laboratory data in adverse outcomes, and to assess STOPBang as it relates to frailty and adverse outcomes.

METHODS: This retrospective cohort study used data from FMLH EHR from 2016-2019. Inclusion criteria included a documented albumin, hemoglobin, and STOPBang score. Groups were made based upon age, STOPBang score, albumin, and hemoglobin. Outcome measures included Code 4 events, reversal agent administration, length of stays over 30 days, and mortality.

RESULTS: Patients 65+ were more likely to have low albumin, hemoglobin, and STOPBang score 0-2. Low albumin and hemoglobin were independently associated with having all measured adverse outcomes while patients 65+ were more likely to code or die while in hospital. Patients with all markers of frailty were more likely to code, have length of stays over 30 days, and were more likely to die compared to those with no markers of frailty. STOPBang score of 5+ was able to predict mortality but not other adverse outcomes.

CONCLUSIONS: Albumin and hemoglobin levels are useful markers of frailty and may be able to predict adverse outcomes. Having higher markers of frailty and a low STOPBang score were associated with adverse outcomes compared to high STOPBang score. This suggests patients receiving low STOPBang scores who are subsequently not continuously monitored are having worse outcomes compared to those with high STOPBang scores who are continuously monitored.

Berce, Philip — Urban & Community Health

Obesity, Mortality, and Cardiovascular Disease in African Americans

Authors: Berce P, Yang A, Agarwal P, Wang T, Chelius T, Laud P, Munyura Y, Cowley A Jr, Mattson D, Liang M, Kotchen T, Kidambi S.
Project Mentor: Srividya Kidambi, MD

Previous studies indicate that risk of all-cause mortality and incident cardiovascular disease is strongly correlated with BMI in Caucasians. In AA, however, the results of relationship between BMI and mortality are mixed. With a cohort of 2,666 AA participants and a mean 14-year follow up, we examined the relationship of BMI with all-cause mortality and fatal and non-fatal cardiovascular and renal disease (CVRD) outcomes. Between 1994-2006, AA individuals were recruited for genetic studies of hypertension. Subsequent incidence of fatal or non-fatal cardiovascular and renal disease (CVRD) events was obtained and confirmed by review of paper and electronic medical records. To be included, the subject either had to have a CVRD event or at least 10 years of follow-up data available with no event (n=995). Logistic regression (LR) was performed to determine if BMI predicted mortality or a CVRD event. During follow-up period, there were 335 deaths (12.6%), and of the 995 subjects with adequate follow-up, 260 had a CVRD (26.1%) event. Women had a higher BMI compared to men (30 vs. 27 kg/m2). Men had higher mortality (15% vs. 10.2%) and CVRD event (30.8% vs. 22.2%) rates. LR showed the odds ratio (OR) for death was 1.57 (CI:1.23-2.00) in men compared to women. However, baseline BMI was not predictive of mortality in the total sample. BMI was found to be predictive of CVRD events in the overall sample (OR 1.05, CI:1.02-1.07) and in both genders. A variety of factors including socioeconomic, biologic, and genetic are likely to explain these findings.

Bjorgaard, Stacey — Clinical & Translational Research

Transcriptional alterations of immune cells in Fanconi anemia as defined by scRNAseq analysis

Authors: Bjorgaard S, Hashemi E, Wang D, Yang C, Siebert J, Burns R, Malarkannan S.
Project Mentor: Subramaniam Malarkannan, PhD

BACKGROUND: Fanconi anemia (FA) is a rare inherited bone marrow failure (BMF) syndrome characterized by congenital abnormalities, increased predisposition to malignancy, and impaired immune function. To better understand drivers of immune decline and the accompanying alterations within the immune cell compartment in the context of FA, we performed single-cell RNA sequencing (scRNA-seq) analysis on CD45+ cells from bone marrow and peripheral blood of a patient with a FANCG mutation compared to healthy donors.
METHODS: Bone marrow and blood was collected from FA patient at three and four different timepoints one year apart and from healthy donors (2 blood donors; 4 marrow donors). Mononuclear cells were isolated and stained for immune cell markers. CD45+ and NK cells were FACS sorted followed by library preparation with 10X protocol and sequencing on Illumina NextSeq 550. Feature-barcode matrices were used as input to Seurat package in R studio for dimensionality reduction, clustering analysis, and differential gene expression testing.
RESULTS: Immune cells from FA patient clustered with healthy donors, enabling comparisons within each cell population between donors and patient. Notably, FA patients had significantly more robust adaptive NK and CD56 bright NK populations as compared to healthy donors. Furthermore, FA patient immune cells exhibited decreased expression of transcription factors such as JUN, JUNB, FOS, and IER2.
CONCLUSIONS: Fanconi anemia impacts the immune system by altering cell population composition and transcriptional activity of CD45+ and NK cells. Specifically, the robust CD56 bright NK population in the FA patient suggests a developmental maturation process defect of NK cells in the context of disease, and decreased expression of key transcription factors potentially indicates reduced ability of FA immune cells to mount an effective response to infection or malignancy.

Bosco, Clara

Bioethics & Medical Humanities

Humanity *as a Foundation for Artificial Intelligence in Medicine*

Authors: Bosco C, Jotterand F.

Project Mentor: Fabrice Jotterand, PhD, MA

The benefits of Artificial Intelligence (AI) in medicine are unquestionable and it is unlikely that the pace of its development will slow down. From better diagnosis, prognosis, and prevention to more precise surgical procedures, AI has the potential to offer unique opportunities to enhance patient care and improve clinical practice overall. However, at this stage of AI technology development, it is unclear whether it will de-humanize or re-humanize medicine. Will AI allow clinicians to spend less time on administrative tasks and technology-related procedures and more time being present in person to attend to the needs of their patients? Or will AI dramatically increase the presence of smart technology in the clinical context to a point of undermining the humane dimension of the patient-physician relationship? In this brief presentation, we propose six ethical imperatives for the responsible implementation of AI in clinical practice. Further, the implementation of AI technologies in medicine will have its greatest effect on current and future medical trainees. As a result, medical schools and graduate medical education must adapt their curriculum to educate present and future generations of physicians in the responsible use of these groundbreaking technologies.

Bradley, Arianna

Quality Improvement and Patient Safety

Thirty day postoperative outcomes In pediatric patients following dermatological excision

Authors: Bradley AB, Katz K, Carlberg VM.

Project Mentor: Valerie M. Carlberg, MD

BACKGROUND:
Dermatologic surgery in the pediatric population is indicated for a variety of reasons including for diagnostic purposes, if a lesion is symptomatic, has malignant potential, could lead to disfigurement, or is associated with notable future psychosocial burden for the patient. Several documented complications experienced by pediatric patients who undergo such surgery include infection, premature wound separation, scar stretching, development of keloids. The aim of our project is to better understand the complications our pediatric patients are experiencing following cutaneous excisions. We seek to determine precisely what events are occurring in the immediate aftermath of an excision and how frequently they are occurring in our institution

METHODS:
Retrospective review of patient's undergoing skin excision procedures performed at Children's Hospital of Wisconsin between 1/1/2009 to 08/15/2020. The INSIGHT report generated included 757 total excision events across both outpatient office encounters and cases performed in the OR at the outpatient surgery center along with demographic information including age, race, gender, zip code and patient insurance. Descriptive statistics were calculated from demographic information and Chi-square tests were calculated to analyze frequency of data with a multivariate logical regression model constructed with medical outcomes as the dependent variable

RESULTS:
Preliminary data of procedures performed in the outpatient setting revealed a statistical significance between likelihood of complications and excision site and older age of patients (12-17 years). The most common complications experienced in this population included wound dehiscence and infection and was positively associated with failure to comply with post-operative instructions.

CONCLUSION:
There is a higher association of complications amongst older pediatric patients, likely due to failure to comply with post-operative wound care instruct

Braun, Emilie — Health Systems Management & Policy

Implementing An Early Warning System In An Academic Health System: A Qualitative Study of Nurses

Authors: Braun EB, Penlesky AC, Strong EA, Holt JM, Singh S, Fletcher K, Stadler ME, Crotty BH.
Project Mentor: Bradley Crotty, MD, MPH

BACKGROUND: Early warning systems (EWS) use patient data, such as vital signs, nursing assessments, and laboratory values, to compute a composite score of a hospitalized patient's condition. In June 2018, we deployed a commercially available EWS at an academic hospital with the goal of reducing mortality. EWS alerts triggered based on absolute or relative score decline. Unique to this deployment, a centralized virtual team of nurses monitored alerts and contacted the patient's bedside nurse to communicate risk. The objective of this quality improvement study was to understand the effect of the EWS implementation on nursing workflow.
METHODS: We conducted and audio-recorded semi-structured focus groups during nurse staff meetings on six inpatient units sampled across alert frequency. Discussion topics included EWS experiences, perception of EWS utility, and EWS implementation. Investigators analyzed the focus group transcripts using grounded theory and themes emerged.
RESULTS: We conducted 28 focus groups with 227 bedside nurses across all shifts. Nurses reported that the impact of the EWS was muted by 6 themes: (1) alert timeliness, nurses reported being aware of the patient's deterioration before the EWS alert, (2) lack of accuracy, with most alerts being perceived as false positives, (3) workflow interruptions caused by EWS alerts, (4) questions of actionability of alerts, as nurses were often uncertain about next steps, (5) concerns around an underappreciation of core nursing skills via reliance on the tool, and (6) the opportunity cost of deploying the tool.
CONCLUSION: EWS benefits were tempered by nurse concerns with the EWS itself and its implementation. The lack of clear actionability led to confusion about next steps and was intertwined with concerns around accuracy and workflow interruption. Our study provides information to organizational leaders making decisions about further deployment of the tool.

Brix, Maria — Quality Improvement and Patient Safety

Current state of pediatric concussion discharge management in a pediatric emergency department

Authors: Brix M, Ark T, Thomas DG, Ferguson C.
Project Mentor: Catherine Craun Ferguson, MD

BACKGROUND: Concussions affect millions of children each year. Given the wide spectrum of presentation and the variability in symptom intensity and progression, concussion management, especially upon discharge, is difficult to standardize. We aim to analyze the current state of discharge management of pediatric concussion patients at our institution's emergency department (ED) by learning about the systems around discharge instructions, follow-up recommendations, and activity recommendations. By identifying discharge pitfalls present at our institution, we will be better equipped to design and implement interventions for improvement.
METHODS: Data were collected by retrospective patient chart review and surveys of guardians of children with concussions. Analysis using basic descriptive statistics, contingency tables, and ordinal regression was utilized to report our findings.
RESULTS: Nearly 87% of patients received high-quality, concussion-specific discharge instructions. 67% were instructed to follow up with a primary care provider while 24% were instructed to follow up with a concussion specialist. Higher patient symptomatology was associated with higher likelihood of being referred to a concussion specialist. Only 35% of all patients followed up with a provider after being diagnosed with a concussion in the ED. 23% of patients were provided with "Return to Learn" instructions upon discharge.
CONCLUSION: Our results indicate that although there is some potential for improvement in ensuring all concussion patients receive high-quality discharge instructions, the largest gap in care revolves around follow-up. We anticipate that the greatest potential for improving the system of concussion care in our pediatric ED lies in increased rates of appropriate follow-up.

Brockman, Taylor — Global Health

A Descriptive Analysis of Physical Activity Patterns from Two Urban Elementary Schools in Milwaukee, WI

Authors: Brockman T, Bikomeye JC, Zhou Y, Fritzen-Pedicini C, Namin S, Totoriatis M, Beyer KMM.
Project Mentor: Kirsten M. Beyer, PhD, MPH, MS
Community Partner: Reflo--Sustainable Water Solutions; Milwaukee Public Schools

INTRODUCTION: Many US children do not meet daily physical activity (PA) recommendations. This study aims to quantify PA levels and characterize their differences by demographic characteristics and schoolyard zones among fourth grade students at two urban elementary schools.
METHODS: Actigraph GT3X accelerometers were used to objectively measure school-day PA levels of 79 4th grade students in Milwaukee, WI. Surveys were administered to collect data on demographic characteristics. Average daily step counts, daily moderate-to-vigorous PA (MVPA), daily percent of time in sedentary activity, daily percent of time in light activity, and daily percent of time spent in MVPA were compared by gender with two-sample t-test and by age, race/ethnicity, and BMI categories using ANOVA. The System for Observing Play and Leisure Activity (SOPLAY) was used to further characterize patterns of PA during recess.
RESULTS: Participants achieved an average of 11.03 steps per minute and a total of 3.65 minutes of MVPA during the school day. Sedentary activity comprised 62.7% of the school-day and MVPA only 6.3%. Boys achieved significantly greater steps per minute and daily MVPA than girls and spent a greater percentage of time in MVPA. There were no significant differences in PA by age, race/ethnicity, or BMI category. SOPLAY analysis revealed that sedentary activity comprises, on average, 41.3% of daily recess activity whereas MVPA represents only 16.9% of daily recess activity. Activity levels also differed by schoolyard zone.
CONCLUSIONS: The school-day is largely sedentary. There is need for school-based interventions to increase PA, especially among girls, and reduce disparities.

Brown, Miranda — Urban & Community Health

Factors Influencing Show Rates of Emergency Department Referrals to Primary Care Safety Net Clinics

Authors: Brown M, Stadter G, Decker M.
Project Mentor: M. Christopher Decker, MD
Community Partner: Milwaukee Health Care Partnership

BACKGROUND: Utilization of emergency departments (EDs) for non-urgent conditions has been a long-standing problem leading to excessive health care spending and missed opportunities for patients to form longitudinal relationships with primary care physicians (PCPs). The Milwaukee Health Care Partnership (MHCP) established the Emergency Department Care Coordination (EDCC) program in 2007 to decrease avoidable ED visits and connect high risk patients with primary care health homes. The program includes eight adult EDs and over 20 safety net clinics throughout Milwaukee County; ED providers schedule at risk patients to safety net clinics to establish follow-up care. Between the years of 2018-2019 there were 5,035 appointments scheduled with a 43% show rate to follow-up appointments. This project aimed to identify factors influencing show rate to follow-up appointments and to develop future program interventions to increase appointment show rates.
METHODS: This project utilized the MyHealthDirect (cloud-based scheduling tool used to make EDCC appointments) database of de-identified referral information and performed logistic regressions to determine factors that were associated with show rates.
RESULTS: There was a significant difference in show rate when looking at the following factors: days between ED visit and follow-up appointment, age, and between the individual federally qualified health centers (FQHC) who received the referrals (all p=>0.001). Patients seen within five days of ED visit and patients over 65 years had increased likelihood of attending follow-up appointments.
CONCLUSION: These results demonstrate that older adults are more likely to attend appointments and more efforts are needed to engage younger people to increase their likelihood of attending. In addition, the analysis shows the need to schedule patients with follow up primary care quickly, as a short amount of days from ED visit to PCP appointment was strongly correlated with a higher show rate.

Bureau, Britta L. — Clinical & Translational Research

Preoperative spinal cord untethering in spina bifida children undergoing scoliosis thoracolumbar fusion

Authors: Bureau BL, Sherburne E, Thometz JG, Foy AB.

Project Mentor: Andrew B. Foy, MD

INTRODUCTION: Neuromuscular scoliosis is a common long-term consequence of myelomeningocele (MMC). Many MMC patients with progressive scoliosis are treated with thoracolumbar fusion. All children with myelomeningocele have a tethered spinal cord on imaging, raising concern that correction of the scoliosis will lead to neurologic morbidity. It remains unclear if prophylactic spinal cord untethering prior to scoliosis correction is necessary in children with myelomeningocele.

Objectives: To determine the neurologic and function outcomes of children with MMC undergoing thoracolumbar fusion for scoliosis with and without prophylactic spinal cord untethering.

METHODS: Retrospective, single center chart review of patients with MMC treated with thoracolumbar fusion over the last ten years with or without prophylactic spinal cord untethering.

RESULTS: Seventeen patients with MMC underwent thoracolumbar fusion for scoliosis. Mean age at time of surgery was 13.9 years. Prophylactic spinal cord untethering was performed in 8/17 (47%) patients. The change in Cobb angle after surgery was similar between the two groups (19.4° untethered versus 18.7° no untethering). The ambulatory status was similar between the groups, with 37% of the untethered cohort and 44% of non-untethered cohort being community or household ambulators. There were no changes in intraoperative motor or sensory evoked potential in any patient. No patient had a change in motor level or ambulatory status after scoliosis surgery.

CONCLUSIONS: Our data suggest that prophylactic spinal cord untethering in children with myelomeningocele undergoing thoracolumbar fusion for scoliosis may not be necessary. Our conclusions are limited by the small sample size. A larger review of registry data may yield more powerful conclusions on the necessity of prophylactic spinal cord untethering in this patient population.

Bushee, Chana — Quality Improvement and Patient Safety

Physician awareness of safety hazards in a Pediatric Intensive Care Unit

Authors: Bushee C, Scanlon M, Venkitachalam R.

Project Mentor: Matthew Scanlon, MD

BACKGROUND: Medical errors have been identified as the third leading cause of death in the US. While human error is often identified as the principal cause for preventable deaths, hazards in medical situations are a major source of preventable harm. A hazard is defined as an object or condition that increases the risk of injury to people effected. The Pediatric Intensive Care Unit (PICU) sets a platform for a wide range of hazards due to care complexity. One of the first steps in lowering the number of deaths due to harm is to ensure the healthcare team recognizes hazards. This enables the team to eliminate or mitigate unavoidable risks through precautions to reduce potential of adverse events.

OBJECTIVES: Our aim is to measure any discrepancy between physician perceived hazards and the actual hazards identified by chart review for individual patients.

METHODS: This study utilized chart reviews of patients in the PICU at CHW. Staff physicians were provided the definition of hazards and asked to identify hazards for their patients. Charts of each patient were reviewed to determine their hazards. A list of potential hazards was created prior to starting the project and used as a guide to recognize hazards. During chart review and physician interviews, hazards not listed initially were included when appropriate. This pilot study will include 100 patients, 58 patients were identified for the initial phase. Descriptive statistics is being used to describe this study.

RESULTS: During the initial phase of our study, 58 patients were identified in the PICU with 275 hazards. Physicians caring for patients identified 48 of the 275 (17.4%).

CONCLUSIONS: The initial phase of this study proves the hypothesis that perceptions of physicians regarding hazards in the PICU are low. Results from the second phase are pending. We conclude that awareness among physicians regarding hazards in the PICU should be increased as the foremost step in improving patient safety.

Calderon, Anna (Luise) — Quality Improvement and Patient Safety

Why did you come back to the hospital? A Qualitative Analysis of 72-Hour Readmissions

Authors: Calderon AL, Lamb G.

Project Mentor: Geoffrey Lamb, MD

BACKGROUND: Hospital readmissions are a common, costly problem. Readmissions occurring within a few days of discharge are more likely due to a problem from the patient's original admission, thus they may be more preventable by interventions in the hospital setting.

OBJECTIVE: To determine causes of readmission within 72 hours and identify indicators of readmission during the index admission.

DESIGN: Patients readmitted within 30 days were previously interviewed by a social worker regarding reasons for readmission and their perspective on what might have prevented it. These answers were abstracted from charts of patients readmitted within 72 hours and compared with physician notes. If patients were identified as potentially benefitting from a longer hospitalization, their index admission was reviewed for indicators of readmission.

SETTING, PATIENTS: 131 patient readmissions within 72 hours between 2/1/2019-6/7/2019 in a healthcare system containing an academic medical center.

MEASURES: Reasons for readmission, potential preventive measures, and indicators of readmission were independently reviewed by two authors then grouped into common themes by consensus.

RESULTS: Most patients were readmitted for a reason relating to infection. Patients and physicians suggested a longer index admission to prevent readmission. Of 70 patients who may have benefited from a longer admission, indicators of readmission included patients not returning to their baseline health status, recurrence of a known issue, or new symptoms developing during their index admission.

CONCLUSIONS: Patients should be evaluated for indicators of readmission which may help guide decisions to discharge patients and decrease rates of 72-hour readmissions.

Cameron, Hunter — Clinical & Translational Research

Mid-term Outcomes of a One-stage Revision for Total Knee Arthroplasty Prosthetic Joint Infections

Authors: Cameron HS, Meinerz CM, Nielson JC, Nelsen-Freund EM.

Project Mentor: Edward Nelsen-Freund, MD

INTRODUCTION: Prosthetic joint infection(s) (PJI) is a devastating complication resulting in debilitating morbidity for patients. The standard method of treating an infected total knee arthroplasty (TKA) is a scheduled two-stage revision which offers lower function and significant surgical burden due to multiple operations within a four-to-eight-week period of time. We use a technique which consists of a one-stage revision with standard femoral and patellar components, but an innovative all-polyethylene tibial component fixed with antibiotic-impregnated cement. The advantages of this one-stage revision technique are decreased cost for the patient and health system and decreased surgical burden on the patient. The aim of this study is to assess survivorship of the implants used in the described technique as defined by mechanical failure or failure to eradicate the PJI.

STUDY METHODS: A retrospective chart review was conducted assessing survivorship of implants placed by two orthopaedic surgeons between July 2010 and June 2019. Inclusion criteria were patients over the age of 18 who had a history of TKA PJI and underwent surgical intervention using the described technique. Descriptive statistics concerning gender, age, survivorship, time to failure, and reason for failure were recorded.

RESULTS: 56 TKAs in 54 patients met our inclusion criteria. 37 of the patients were female (66.1%). The average patient age at the time of surgery was 61.01 years old. The average overall survivorship of the implants was 28.28 months. Of the 56 TKAs, 18 failed and the average time to failure was 16.76 months. 12 (21.4%) failed due to mechanical reasons and 6 (10.7%) failed to eradicate infection.

CONCLUSIONS: Our technique shows excellent survivorship eclipsing 2 years on average. Furthermore, this one-stage approach also displayed a low rate of re-infection comparable to that of traditional two-stage revisions (10.7% for our approach vs. 12% for static spacers).

Castanon, Celestino — Global Health

Tablet-Based Point-of-Care Trauma Documentation in a Low-Resource Environment: A Feasibility Study.

Authors: Castanon C, Aguayo A, Larrea M, Schroeder ME, Dodgion CM, de Moya MA.

Project Mentor: Marc A. de Moya, MD

BACKGROUND

Over 90% of all trauma-related deaths occur in low- to middle-income countries (LMICs). A major contributing factor to the high trauma burden in LMICs is the inconsistent degree of injury data collection by hospitals, leading to incomplete trauma registries precluding future quality improvement research endeavors. The goal of this project was to perform a needs assessment to identify barriers to the implementation of a tablet-based point-of-care trauma documentation application that would fit within the constraints of a resource-limited hospital in the metropolitan area of Havana, Cuba.

METHODS

A series of 10 focus group meetings moderated by visiting medical students were conducted with the chiefs of surgery, nursing, and emergency medicine, followed by a thematic analysis of interview transcripts.

RESULTS

Recurrent problems identified included: The need for simpler app menus, the lack of dedicated personnel to record trauma patient information, and the need for the continued use of hard-copy patient records. Proposed solutions included: Introducing the ability to customize and simplify the application menus by the user, recruiting emergency department nurses and medical students to be the trauma scribe, and printing hard copies of the collected data to add to patient charts to ensure adherence to local documentation protocols.

CONCLUSIONS

Implementation of an ETR in this setting is feasible, but requires expanded customizability. This finding is generalizable to other LMICs, as adaptable software can facilitate implementation across different environments. One limitation is the identified needs we describe may not be entirely representative of the unique implementation challenges of other LMICs.

Chinos, Abel — Quality Improvement and Patient Safety

Implementation of medication reconciliations at a student-run free clinic

Authors: Chinos A, Grannan H, Schmidt M, Voyles J.

Project Mentor: Jessica Schnell, MD

BACKGROUND: The Saturday Clinic for the Uninsured (SCU) is a free clinic in Milwaukee, WI operated by medical and pharmacy students from the Medical College of Wisconsin. The SCU does not have a standardized medication reconciliation (MR) process. Literature shows MR can reduce medication error rates up to 75% in the ambulatory setting. This quality improvement project introduces a standardized MR process into clinic flow by designing a procedure that allows student volunteers to complete an MR form with each patient. The specific aim is to improve the accuracy of patient medication profiles in the SCU's electronic medical record (EMR) system.

METHODS: A multidisciplinary team observed existing clinic workflow and collected baseline data on medication errors and discrepancies. A standardized MR process and form were designed and implemented. Patient's medication profiles were reviewed before MR and percentage of patient's medication profile that was correct was calculated. Medication errors were defined as any undocumented medications or different medications within the same drug class. Medication discrepancies were defined as any difference in dose, formulation, or instructions. Percentage of patients with MRs completed per clinic day, MR performance time, and student feedback were collected.

RESULTS: Baseline data show that patients' medication profiles were 40.45% (n=32) accurate prior to MR completion. On average, a patient had 2.27 and 0.97 medication errors and discrepancies, respectively. MRs were completed in 87.5% of patients scheduled and MR performance time averaged 8.45 minutes.

CONCLUSIONS: The SCU has not reliably updated patients' medication profiles. Baseline data results show that the new MR process can reach 87.5% of patients and considering our proposed MR process has shown to take less than ten minutes per patient encounter, the objective is to reach every patient cared for at SCU to reduce the risk for medication errors.

Christianson, Katherine — Quality Improvement and Patient Safety

Using QI methodology to increase discharge planning during Patient and Family Centered Rounds

Authors: Christianson K, Kalinowski A, Lynch K, Havas M, Rogers A.
Project Mentor: Christopher Spahr, MD

Clear and consistent communication amongst the interprofessional team and hospitalized patients/families regarding discharge planning is essential for safe and efficient transitions of care. Hospital oversight bodies require family inclusion in discharge planning and lack of family preparedness is a common reason for discharge delay. Also, team members expressed need for consistent communication to ensure timely and effective discharge.
Patient and Family Centered Rounds (PFCR) offer a unique opportunity to discuss discharge plans with families and the team. Local baseline data showed discharge planning was rarely discussed during PFCR.
Our primary aim was to increase the percent of observed PFCR events that included discussion of discharge planning to 75% over 1 year.
We conducted a QI initiative with multiple plan-do-study-act (PDSA) cycles at a tertiary pediatric academic medical center. Interventions included 1) Education on rationale for discharge planning communication, 2) Modification of PFCR checklist to include discharge planning, 3) Development of scripting for discharge discussions during PFCR, 4) Modification of EHR note templates to include discharge planning, and 5) Data sharing about rates of discussion on PFCR.
Our outcome measure was the percent of observed PFCR that included discharge planning. Our process measure was the percent of patients with discharge planning in the EHR. Our balancing measure was rounds length. Statistical process control charts assessed the impact of our interventions.
At baseline, discharge was discussed on PFCR 32% of the time. Following our interventions, we noted improvement in our outcome with a shift in our mean to 72%, indicating special cause variation. Rounds length did not change.
There was a deficit in discharge discussions during PFCR at our institution. Using QI methodology, we increased verbal discussions of discharge planning during PFCR. Next steps include expanding this initiative across our institution.

Cohn, Alexandra — Bioethics & Medical Humanities

Crafting a commencement oath: Medical students' justifications of enduring principles for new physicians

Authors: Cohn AR, Robinson MO, Bosco CM, Woertz EN, Jasti JA, Brink SM, Khalil M, Meurer JR, Derse AR.
Project Mentor: Arthur R. Derse, MD, JD

Medical students traditionally recite a professional oath at the beginning or end of their medical school education. While the Hippocratic Oath and variants thereof have long been used, recently a trend of frequent oath revision has emerged. From this new practice of oath revision and adaptation, three questions emerge. 1. What is the purpose of an oath? 2. What content should be included? 3. How should students engage meaningfully? The Medical College of Wisconsin commissioned the formation of a student committee to assess and revise the traditional oath taken by its graduating medical students. Using the Declaration of Geneva as a template, each line was carefully analyzed and proposed changes were discussed by the committee. Four major themes were identified in the justifications for the collective revisions: 1) modernized language, 2) succinct wording, 3) removal of subjects lacking consensus within the medical community within the medical community, and 4) an emphasis on self-reflection and well-being. This manuscript aims to stimulate ongoing discussion about physician identity and duty as well as provide a template for those interested in writing their own oaths.

Compton, Tyler — Molecular & Cellular Research

NIR light reduces ischemia/reperfusion injury and induces protective macrophage differentiation

Authors: Compton T, Poellinger N, Struve J, Krolikowski J, Ninomiya JT, Weihrauch D.
Project Mentor: Dorothee Weihrauch, DVM, PhD

Tissue damage and necrosis are a consequence of ischemia reperfusion injury (IRI). In skeletal muscle, ischemia reduces aerobic energy capacity of cells, leading to adverse biochemical alterations and inflammation. This study aims to show exposure to near infrared light (NIR) during a period of ischemia reduces IRI by decreasing necrosis and inflammation in addition to decreasing M1 and increasing protective M2 macrophages. C57/Bl6 mice underwent unilateral tourniquet-induced hindlimb ischemia for 3hrs followed by reperfusion for either 15 or 30 minutes. NIR consisted of an array of 670nm LEDs with a heat sink to avoid heating. Mice were randomly selected into 3 groups. Group 1 underwent IRI with 30-minute reperfusion. Group 2 underwent IRI with a 15-minute reperfusion. Each group consisted of 50% no NIR, 50% NIR with exposure of 50 mW/cm2 for 5 minutes/1hr after tourniquet placement. Group 3 were controls anesthetized for 3 hours omitting IRI. Laser doppler flow imaging was performed on all mice to confirm ischemia and reperfusion; data was expressed as ratio of ischemic limb to contralateral control. After reperfusion, mice were euthanized. Quadriceps and gastrocnemius were harvested. ELISAs and western blot for inflammatory markers chlorotyrosine, CXCL1, and CXCL5 were performed. Immunoprecipitation and western blot of macrophage-markers CD68 (M1) and CD206 (M2) were performed and normalized to CD14. CXCL1 and CXCL5 expression was significantly reduced by NIR in IRI group. A significant decrease in CD68 and increase in CD206 expression was observed in animals receiving IR and NIR. Tissue necrosis was decreased by NIR in IRI group visualized by TTC staining. Findings demonstrate exposure to NIR reduced IRI and improved tissue survival. It reduced inflammation, decreased pro-inflammatory M1, and increased protective M2 macrophages. Exposure to NIR reduced inflammation and enhanced regeneration leading to tissue protection following ischemia.

Corwin, Timothy — Urban & Community Health

The Contribution of Mutable and Immutable Social Risk Factors to Cardiovascular Health in Older US Adults

Authors: Corwin T, Ozieh MN, Garacci E, Egede LE.
Project Mentor: Mukoso Ozieh, MD

OBJECTIVE: Identify and examine the longitudinal contributions of mutable and immutable social risk factors to cardiovascular disease (CVD) risk factor control.
METHODS: Five waves of data for adults age ≥50 who reported social risk factor-related information and had three CVD risk factors measured from the Health and Retirement Study were analyzed. The primary outcome was CVD risk factor control defined as hemoglobin A1c (HbA1c) <7.0%, systolic blood pressure <140mmHg and diastolic blood pressure <90mmHg, and total cholesterol/high density lipoprotein <5. Three social risk factor domains were examined as primary predictor variables: 1) psychosocial (including depression, perceived social support, perceived everyday discrimination), 2) neighborhood (including social cohesion, neighborhood physical disorder), and 3) socioeconomic status (including financial hardship, education, income/assets, employment) related factors. Three social risk factor categories (0, 1 vs 2+) were generated, with a score of 0 defined as no social risk factor. Series of generalized estimating equation logistic regression models were used to analyze the association of social risk factor and CVD risk control.
RESULTS: Socioeconomic risk was associated with uncontrolled HbA1c, blood pressure, cholesterol, and having at least two uncontrolled factors. Psychosocial risk was significantly associated with uncontrolled cholesterol. Having two or more social risk factor domains was associated with uncontrolled HbA1c, blood pressure, cholesterol, and having at least two uncontrolled factors.
CONCLUSIONS: Our findings suggest specific social risk domains have a strong and independent longitudinal effect on CVD risk factor control in older adults. In addition, having more than one social risk factor domain is independently associated with presence of more uncontrolled CVD risk factors over time.

Craft, Morgan Ashley — Urban & Community Health

Cultivating Interests in Medicine Through Tiered Mentoring to Diversify Healthcare Professions

Authors: Craft M, Welhouse K, Letellier S, Meurer L.

Project Mentor: Linda Meurer, MD, MPH

Community Partner: Milwaukee Area Health Education Center; Youth Health Service Corps; James Madison Academic Campus

INTRODUCTION: The enrollment of underrepresented individuals in U.S. medical schools is not indicative of the general population. Although their enrollment has increased since the Civil Rights Movement of the 1960s, the number is currently declining. The Youth Health Service Corps (YHSC), a sector of Milwaukee Area Health Education Center, is a tiered mentoring program addressing this issue through partnership with the Medical College of Wisconsin (MCW) and James Madison Academic Campus (JMAC), a Milwaukee public high school primarily serving African American students.
METHODS: During each academic year, interested JMAC students enrolled in the YHSC program, received basic training, committed to attending monthly sessions, and participated in community service activities. The sessions were designed and conducted by MCW student leaders based upon student interest with input from their teachers and the YHSC partners. During the COVID-19 pandemic, sessions were conducted virtually via Google Meet provided by the school. The program was assessed through session evaluations from the students.
RESULTS: Since the inception of the tiered mentoring program in 2014, the program has enrolled 50 JMAC students served by 9 MCW student leaders and other volunteers. Approximately 52% of the students completed one year of the program, 24% completed two years, and 14% completed three years. During the COVID-19 pandemic, the attendance was particularly low with an average attendance of 15%. Qualitative analysis demonstrated that involvement in the program helped participants achieve their goals of learning about more health career fields and increased their confidence in pursuing said careers.
DISCUSSION: The tiered mentoring between JMAC students and MCW student leaders created an environment in which the participants developed a strong sense of self-efficacy and social support, which ultimately increased their motivation, self-worth and interests in pursuing health careers.

Credille, Kevin — Clinical & Translational Research

Determining language dominance in pediatric epilepsy: Correspondence of Wada testing and fMRI modalities

Authors: Koop JI, Credille K, Wang Y, Loman M, Marashly A, Kim I, Lew S, Maheshwari M.

Project Mentor: Jennifer Koop, PhD

Identification of the language dominant hemisphere is an essential part of the evaluation of potential pediatric epilepsy surgery patients. Historically, language dominance has been determined using the Wada procedure, but use of fMRI scanning is becoming more common. Few studies examine the correspondence between fMRI and Wada in pediatric samples. The current study examined the concordance of activation patterns between results from fMRI and Wada in a consecutive sample of 10 pediatric epilepsy patients evaluated for epilepsy surgery. Data showed a strong correlation between Wada and fMRI laterality indices and a 70% concordance rate, despite increased demonstration of bilateral or atypical language representation in this pediatric sample. Clinical implications and interpretation challenges are discussed.

Cummings, Austin — Clinician Educator

Community Partnership of Medical Students and Individuals with Intellectual & Developmental Disabilities

Authors: O'Grady JP, LaCroix M, Andryk L, McNellis B, Kotagiri N, Sendaydiego X, Cummings A, Malloy M, Drew J, Craig A, Levenhagen M, Quigley J.

Project Mentor: Joseph O'Grady, MD

Community Partner: Down Syndrome Association of Wisconsin; Autism Society of Southeastern Wisconsin

BACKGROUND: The MCW Friends for Special Needs (FFSN) student organization aims to strengthen medical education of community members who have intellectual and developmental disabilities (IDD). It is one of many such organizations working to develop and integrate robust cognitive disability sensitivity and engagement content into the nationwide medical school curriculum; however, implementation of such engagement in the local community is lacking. Therefore, in 2017, FFSN initiated community-academic partnerships with the Down Syndrome Association of Wisconsin (DSAW) and Autism Society of Southeastern Wisconsin (ASSEW)..

METHODS: FFSN consulted with DSAW and ASSEW leadership to establish interest and conduct a needs assessment for desired programming. FFSN worked with DSAW to develop a health maintenance education and clinical skills practice workshop for persons with Down Syndrome. Additionally, medical students volunteered in the DSAW Young Leaders Program. Collaboration with ASSEW culminated in a socialization and self-development Game-Night for persons with Autism.

RESULTS: 2 DSAW workshops were held in 2017-2018, with a combined attendance of 13 self-advocates (ages 18-33), 11 parent representatives, and 33 medical students. 10 self-advocates and 2-4 medical students regularly attend the Young Leaders Program. 21 teenage community members and 15 medical students attended the ASSEW Game-Night.

CONCLUSION: Our pilot provided medical community engagement among community members with IDD and MCW medical students. Further directions include assessing whether participation in FFSN events met both medical students' and community members' learning, confidence, and engagement objectives. Additionally, standardized feedback from self-advocates, their parents/guardians, and employees of our partnering organizations will inform future program planning.

Cummings, Jason — Health Systems Management & Policy

A Combined Quantitative and Qualitative Approach to Understanding Graduate Student Wellness Needs

Authors: Cummings J, Kusch J.

Project Mentor: Jennifer Kusch, PhD, MS, MPH

Historically, mental health has not been emphasized in the medical school curriculum. In 2005, Vanderbilt University launched the nation's first formal Medical Student Wellness program. Despite positive results, other medical schools have lagged behind with regard to incorporating formal wellness programs, and student mental wellness has suffered as a consequence. We conducted a comprehensive wellness survey in an effort to gauge MCW students current needs. Three validated wellness assessments (Holistic Wellness Assessment, The TestWell and The WEL-S) were used to help develop the survey questions. We presented the preliminary survey questions at three administrative meetings focused on graduate student wellness. The final survey consisted of 23 questions covering 5 dimensions of wellness (physical, social, emotional, spiritual and intellectual wellness). Two-open ended questions were included at the conclusion of the survey.

232 responses were received. 21.6% of students engage in adequate physical activity, and 30.99% of students do not routinely exercise. Less than half of MCW students have stayed in touch with friends from before graduate school. 64.15% of respondents feel as though their life has a positive purpose, and 69.67% of respondents are able to go through their daily routine in a manner that is consistent with their spiritual values. 72.2% of MCW students report being able to practice their religion unhindered. Most students feel intellectually stimulated at MCW, while only 35.55% of students believe that MCW provides students with all the resources necessary to succeed during academically stressful situations. MCW students consistently demonstrate resilient traits. The most commonly mentioned topics in the open-ended questions were gym access, lighter schedules and mental health access.

These findings combined with those of future similarly structured surveys will help stimulate the development of a robust, comprehensive wellness program at MCW.

Daghfal, Mary | Global Health

Single Center Experience With Vascular Reconstruction For Soft Tissue Sarcoma Resection

Authors: Voruganti N, Daghfal MR, Olofowela A, Rossi PJ, Wooldridge A, Mansukhani NA.
Project Mentor: Adam Wooldridge, MD, MPH

OBJECTIVES: Resection of soft tissue sarcoma of the extremities (STSE) may require vascular reconstruction surgery (VRS) due to direct involvement or proximity of the tumor to vascular structures. Autogenous conduit is preferred for VRS, but is not always available. The purpose of this study is to evaluate our experience with resection of STSE with vascular involvement and explore the utility of prosthetic conduit for VRS.
METHODS: Retrospective single center review of patients. Data was obtained from the institutional Clinical Research Data Warehouse and manual chart review. Adult patients who underwent resection of STSE with or without VRS at our center between 1990 and 2019 were included. Excluded were patients with STS other than that of the extremities and those with STSE resected at an outside hospital. Primary outcome was conduit patency. Secondary outcomes included overall survival, amputation rate, wound healing, and sarcoma recurrence.
RESULTS: Of those undergoing VRS, 2 autologous conduit and 13 prosthetic conduit patients were included in this study. The difference in average graft patency at 30 days and 1 year were both statistically nonsignificant. Graft patency at 30 days was 50% for autologous conduit and 92% for prosthetic conduit with P=0.26; and at 1 year was 0% for autologous conduit and 50% for prosthetic conduit with P=0.49. Secondary outcomes between the three groups were statistically nonsignificant, except for amputation rate and patient survival at 5 years. Group I, II, and III had an amputation rate of 0%, 7%, and 20% with a P=0.033, and a patient survival rate at 5 years of 88%, 58%, and 45% with a P=0.02.
CONCLUSIONS: Prosthetic conduit is a viable alternative to autogenous conduit for VRS but further studies are needed to confirm this. STSE resection requiring VRS had higher amputation rates and lower survival rates as compared to STSE resection without vascular involvement or STSE resection with vascular involvement without VRS.

Davitt, Caroline | Quality Improvement and Patient Safety

The GuMDROP Survey: Current Practices in Gestational Diabetes Diagnosis & Management in ACOG District VI

Authors: Harrison R, Flynn K, Palatnik A.
Project Mentor: Anna Palatnik, MD

INTRODUCTION: Gestational diabetes mellitus (GDM) affects 5-14% of pregnant women with many requiring treatment beyond diet and exercise, yet there is no consensus on glycemic threshold for conversion to pharmacotherapy. This survey-based study is designed to characterize current Midwest practices to better determine the typical "provider's discretion" in GDM management, as is indicated in ACOG's treatment recommendations. We hypothesize the survey will demonstrate consensus in diagnostic criteria but reveal inconsistencies in patient management/pharmacotherapy.
METHODS: An empiric survey of 22 questions and 7 demographic questions was designed and validated with 7 cognitive interviews (OB-Gyn, MFM & Endocrinology). The survey was administered both on paper and electronically via Qualtrics to registrants of the ACOG District VI & Wisconsin Section Annual Conference in Lake Geneva, WI over three days in August 2019.
RESULTS: 65 providers completed the GuMDROP survey, with 35% of respondents attending physicians and 65% residents. 97% of responders practiced General OB-Gyn and managed, on average, 10 GDM patients/month. 95% of respondents regularly diagnosed GDM based on two-step criteria while only 15% based on one-step (2 hour 75g OGTT). 100% of respondents used patient monitoring via home glucometer to monitor blood glucose levels after diagnosis. In a typical patient with GDM, 81% of responders would not treat with insulin or oral hypoglycemics at 10% of elevated glucose values, 47% would consider but not treat at 20-30% and 54% would treat at 30%. As percentage of elevated glucose values rose to >50%, percentage of prescribing providers rose to 100%. 79% of respondents endorsed official evidence-based recommendations for GDM pharmacotherapy initiation would be "very useful" to their practice.
CONCLUSION: District VI showed marked heterogeneity in the threshold of abnormal glucose values indicating a typical patient with GDM should initiate pharmacotherapy.

Doll, Elizabeth — Urban & Community Health

Pharmacokinetics of Sublingual versus Oral Estradiol in Transgender Women

Authors: Doll EE, Sarvaideo JL, Gunsolus I, Lamberton N, Tangpricha V.

Project Mentor: Jenna L. Sarvaideo, DO

BACKGROUND: Sublingual administration of estradiol (E2) may be a safer and more effective hormone replacement therapy (HRT) route than oral estradiol, the most commonly used formulation. Sublingual E2 is thought to bypass the first pass effect by the liver, making it less likely to impact hepatic clotting factor synthesis, and thus decreasing the risk of thromboembolic events posed by oral administration. However, studies of sublingual E2 in transgender women are lacking, and establishing a baseline understanding of the pharmacokinetics in this population is necessary.

OBJECTIVE: To investigate the pharmacokinetics of 17ß-estradiol (E2) administered orally versus sublingually in transgender women.

METHODS: Single doses of 17ß-estradiol were administered orally (1.0 mg) to ten transgender women, then sublingually (1.0 mg) after a one-week washout. Blood samples were taken at baseline and T = 1,2,3,4,6,8 hours after dosing. Samples were frozen and analyzed using LC-MS/MS and immunoassay.

RESULTS: Sublingual estradiol had a significantly higher peak serum concentration at 144 pg/mL by LC-MS/MS compared to oral estradiol 35 pg/mL by LC-MS/MS (p=0.003). Although peak concentration for sublingual E2 was reached at t=1 hour (v. t = 8 hour for oral), sublingual E2 maintained higher overall mean concentrations of estradiol across the 8 hours compared to oral E2. Additionally, sublingual E2 was found to have an increased E2 to estrone (E1) ratio at all timepoints (1.1 ± 1.0 v. 0.7 ± 0.4, p= <0.0001), which may be favorable given that E2 is a more potent estrogen than E1.

CONCLUSION: Sublingual estradiol is a reasonable alternative to oral E2 in both method of administration and pharmacokinetics of dosing. Preliminary data also suggests sublingual E2 may be more physiologically potent than oral E2. The data from this pilot study will be useful to inform future studies on optimal dosing, safety, and efficacy of sublingual estradiol.

Fahl, Emily — Urban & Community Health

Physician Perspectives of Assessing and Addressing Social Needs for Patients at Safety Net Clinics

Authors: Fahl E, Ruffalo L.

Project Mentor: Leslie Ruffalo, PhD

BACKGROUND: There is a national movement in healthcare to identify and address patients' social needs in order to provide quality care and improve patient outcomes. It is important to understand physicians' attitudes regarding a patient's social needs and the implications of these perceptions to inform strategies that will improve the healthcare system, physician wellbeing, and patient satisfaction.

METHODS: We conducted phone interviews with primary care physicians from federally qualified health centers or free clinics in Milwaukee. The purpose of the interviews was to glean their perceptions of social needs and management of social determinants of health at their clinic. We conducted a descriptive content analysis of the interview transcripts. We categorized themes by physician, clinic, community, and system and applied them to a SWOT model.

RESULTS: We conducted 12 interviews; 9 female and 2 male. The average age was 48 years (range 32-68 years). We interviewed 5 family medicine doctors, 2 pediatricians, and 4 internal medicine doctors. 8 participants were white, 2 were black, and 1 was Pakistani. Themes related to physician strength included humility and dedication; burnout and bias were notable for physician threats. For clinic strengths, participants highlighted the value of having an interdisciplinary team. Lack of organizational sustainability among community-based resources was noted as a community weakness. System opportunities included health insurance stability and policy change.

CONCLUSION: Understanding the current state of social needs within the safety net system can lead to the identification of solutions that can benefit patients, physicians, and the health of the public.

Feng, Jonathan

Quality Improvement and Patient Safety

Multi-modal Actions of BAX and BTSA1 on Mitochondrial Bioenergetics and Membrane Integrity

Authors: Feng JP, Cheng Q, Natarajan GK, Camara AKS, Kwok WM.

Project Mentor: Wai-Meng Kwok, PhD

The Bcl-2 associated X protein, BAX, induces mitochondrial outer membrane permeability (MOMP) leading to cytochrome c release. BAX also interacts with complex I of the electron transport chain and suppresses ROS generation, particularly in cancer cells. To further delineate these multi-modal effects of BAX, we investigated 1) the impact of BAX on mitochondrial bioenergetics under different substrate conditions and 2) the ability of BAX to induce lipidic pores and/or proteinaceous channels. The effects of BTSA1, a potent activator of BAX, were also investigated. Mitochondria isolated from rat hearts were energized with either complex I substrate Na-pyruvate malate (PM) or complex II substrate Na-succinate (Suc). Our results show that BTSA1, in the absence or presence of exogenous BAX, increased the rate of mitochondrial O2 consumption in both PM- and Suc-energized mitochondria. BAX increased the rate of ROS production in PM-energized mitochondria, whereas BTSA1, with or without addition of BAX, decreased the rate of ROS production in Suc-energized mitochondria. Addition of BAX depolarized PM- and Suc-energized mitochondria and BTSA1, with or without BAX, hyperpolarized PM-energized mitochondria. The molecular mechanism of BAX-induced MOMP was investigated by monitoring membrane integrity using planar lipid bilayer electrophysiology. We found that bilayer disruption occurred via 1) gradual increase in current across the bilayer with ion channel-like activity and 2) instantaneous increase in current indicative of lipid bilayer breakdown. BTSA1 significantly enhanced both these effects. Our studies show that BAX may increase or decrease mitochondrial ROS production in a substrate-dependent manner and this differential effect may involve complex II. The formation of both lipidic pores and proteinaceous channels are possible and are not mutually exclusive. Additional experiments are needed to identify factors leading to these different formations.

Feuerborn, Mai'ana

Urban & Community Health

Limited Social Support, Non-Compliance, and Trauma Do Not Affect Short Term Bariatric Surgery Outcomes

Authors: Li L, Lak K, Barry C.

Project Mentor: Courtney Barry, PsyD

INTRODUCTION: Forty percent of bariatric surgery patients have a psychiatric diagnosis at the time of surgery. Data suggests that patients experiencing early post-operative readmissions or extended length of stay are more likely to have a psychiatric diagnosis. The relationship between specific psychosocial markers and surgical outcomes has yet to be established. This study explores the role of social support, compliance, and psychiatric trauma on short-term outcomes after bariatric surgery.

HYPOTHESIS: Patients with pre-operative markers of limited social support, non-compliance, and history of trauma will have increased length of stay, increased 30-day readmissions, and increased post-operative complications. These factors will have no effect on excess weight loss (EWL).

METHODS: Patients who underwent laparoscopic Roux-en-Y gastric bypass or laparoscopic sleeve gastrectomy at a single academic institution between January 2014 to June 2018 were retrospectively reviewed. Data was gathered from 575 patients, and 469 patients were included in study. Data was collected from pre-operative psychiatric assessment. Primary outcomes included post-operative length of stay, 30-day readmissions, and post-surgical complications. All statistical analyses were carried out using SPSS.

RESULTS: Statistical analysis methods included t-tests and regression analyses. Significance was defined as $p<0.05$ and factors that were controlled included patient demographics and medical history. Statistical analysis found no significant difference in short-term post-surgical outcomes in patients with preoperative markers of limited social support, non-compliance, or history of trauma. There was likewise no significant difference found in %EWL in patients with any of these psychosocial markers.

CONCLUSION: Patients with the psychosocial markers of limited social support, non-compliance and history of trauma will not have worsened short-term post-operative outcomes following bariatric surgery.

Fickau, Brittany — Global Health

Assessing HIV Care for People who Inject Drugs in Kampala, Uganda: Barriers to Adherence

Authors: Fickau B, Benett S, Anguzu R, Dan K, Twaibu W, Atuhairwe G, Tumwesigye N, Dickson-Gomez J.
Project Mentor: Julia Dickson-Gomez, PhD
Community Partner: Uganda Harm Reduction Network

Detecting and treating people living with HIV (PLWH) early in their diagnosis is critical for improving patient health and reducing HIV transmission. To achieve this goal, those with HIV must know they are infected, access medical care, and initiate and be adherent to antiretroviral therapy (ART) to achieve viral suppression. In Uganda, HIV incidence is increasing, mainly among its most at-risk populations: men who have sex with men, female sex workers, and people who inject drugs (PWID). This study was intended to learn more about HIV care, barriers to accessing treatment for PLWH who use substances, and knowledge of harm reduction methods. thirty medical providers who work closely with hiv+ populations were recruited to participate in one-on-one interviews surrounding barriers to providing care, adherence, opinions regarding most at risk populations, and knowledge of harm reduction methods. thirty plwh who inject drugs were interviewed one on one about their attitudes surrounding hiv, reactions and responses to their diagnosis, and experiences with treatment. Interviews were translated (if applicable), transcribed, and coded to determine themes. Common themes to both interview groups surrounded challenges maintaining adherence to ART due to substance use, food and water insecurity, housing concerns, lack of transportation, and stigma within the community and health care facilities. The interaction of these factors on adherence can be explained using syndemic theory. Ability to maintain adherence in key populations is dependent on interrelated and intertwined social factors of poverty, substance use, and stigma. To improve adherence, these other factors must also be considered and addressed.

Fitzgerald, John — Clinician Educator

Evaluation of Anatomical Education Resources at a Private Medical College

Authors: Fitzgerald J, Patitucci T.
Project Mentor: Teresa Patitucci, PhD

Human dissection is considered the gold-standard for anatomy education in the medical field. Although dissection has its own unique challenges, it is considered essential to student physicians as they prepare for their careers and surgical clinical rotations, as it provides the ability to partake in critical thinking, practice manual skills, and develop an understanding of the relationship between a patient's symptoms and pathophysiology. At the Medical College of Wisconsin, students have the opportunity to partake in a cadaveric dissection lab in the Clinical Human Anatomy course. Along with this opportunity, they have several additional resources, including but not limited to, a dissection manual to aide in their dissections, and access to dissection videos and atlases. A survey from students across four academic years showed the manual could be improved to align better with the dissections and streamlined to aide students in individual study schedules. This project aimed to address these concerns by creating a well-received dissection manual. Due to the changes that were made in response to the COVID-19 pandemic, this project was modified to assess course resources used before and after social distancing guidelines were in place. Responses showed students who were not in the dissecting laboratory full-time were more likely to use virtual resources such as pre-recorded video dissections to study ($p=0.0146$) and were more likely to want cadaveric images provided as an aide to their dissection manuals ($p=.04$). Streamlined dissection manuals with images and virtual resources should continue to complement the dissection component of human anatomy.

Ford, Jordanne — Quality Improvement and Patient Safety

Examining current patterns of opioid prescribing and use after bariatric surgery

Authors: Ford J, Kindel T, Higgins RM, Lak KL, Hausler A, Hetzel E, Gould JC.
Project Mentor: Jon C. Gould, MD, MBA

BACKGROUND: Evidence-based guidelines on the appropriate amount of opioid medications to prescribe following bariatric surgery are lacking. We sought to determine our current opioid prescribing practices, patient utilization, and satisfaction with pain control following elective bariatric surgery.
METHODS: A retrospective chart review and phone survey were conducted on patients who underwent laparoscopic or robotic sleeve gastrectomy (SG) or Roux-en-Y gastric bypass (RYGB) from April 2018 to March 2019 at a single academic medical center. Opioid medications were converted to morphine milligram equivalents provided (MMEs).
RESULTS: In total, 192 patients met inclusion criteria. The median amount of opioid medication prescribed on discharge was 300 oral MMEs, although there was a significant difference between the MMEs prescribed to patients with and without chronic opioid therapy (median 300 MMEs opioid naïve vs. 375 MMEs chronic opioid therapy, p=0.01). Significantly fewer SG patients required a refill of their opioid medication compared to RYGB (8.3% vs. 23.9%, p=0.003). Of the 192 patients, 87 (45.3%) completed the phone survey. Fifty-six patients (64%) reported they took half or less of the initially prescribed opioids. Of the patients with leftover medication, 36% reported that they did not dispose of the medication. Overall understanding of pain control options after surgery were significantly lower in patients who felt they were prescribed "too little" opioids (p=0.01), patients requiring refills (p=0.02), and patients who were not satisfied with their pain control (p=0.02).
CONCLUSION: There is a gap between the amount of opioid medication prescribed and taken by patients following bariatric surgery in our practice. Patients who were the least satisfied with their pain control reported knowledge gaps about pain control options that was more significant than patients who were more satisfied. Future projects should explore ways to reduce opioids post-operatively.

Fredrickson, Kyle — Quality Improvement and Patient Safety

Bone Marrow Aspirate Concentrate (BMAC) injection for the treatment of knee osteoarthritis

Authors: Fredrickson KM, Zach KN.
Project Mentor: Karie Zach, MD

INTRODUCTION: Osteoarthritis is a very common, debilitating disease. Current initial treatments aim for symptom management. Orthobiologics is a new and exciting field in the treatment of knee osteoarthritis. Regenerative therapies include Bone Marrow Aspirant Concentrate (BMAC) as well as Platelet Rich Plasma (PRP) injections, though their efficacy at this point is unclear. In this study we aimed to measure self-reported. outcomes following BMAC and PRP treatment.
METHODS: 51 patients who had undergone BMAC or PRP treatment for knee osteoarthritis were asked to report their symptoms prior to and following therapy. Symptoms were measured with standard WOMAC survey and subjective 1-100 pain scale. We found the change in symptoms at two months and one year post treatment.
We also reviewed patient imaging prior to treatment and assigned a Kellgren Lawrence grade to their disease. Average change in total WOMAC score was calculated for each grade.
RESULTS: Patients receiving only BMAC injection saw an average decrease in total WOMAC score of 35.04% at two months(N=10) and 55.30% at one year(N=7). Patients receiving both BMAC and PRP injection saw an averaged decrease of 32.31% at two months(N=10) and 44.72 at one year(N=6). Patients receiving only PRP injection saw an average decrease of 4.52%(N=2) at two months and 25.77%(N=2) at one year.
Symptomatic improvement was than compared across grades. We found that patients at all grades of disease saw improvement in symptoms. More advanced disease, seen with grade 4, experienced the least improvement in symptoms.
CONCLUSION: Our data suggests that patients undergoing BMAC and PRP for treatment for knee osteoarthritis are experiencing subjective improvement in symptoms. This supplies evidence for the continued use of these therapies. Conclusions however are limited due to the retrospective non-blinded nature of this study and the small sample size. Further evidence is needed on the efficacy of these treatments.

Gainer, Haley

Urban & Community Health

Identifying the Underlying Mechanism of Targeted Muscle Reinnervation in Amputees using an Animal Model

Authors: Roth E, Hoben G, Gainer H.
Project Mentor: Gwendolyn Hoben, MD, PhD

INTRODUCTION: Targeted Muscle Reinnervation (TMR) surgery works clinically at improving neuropathic pain in amputees but the mechanism remains unknown. The TMR procedure involves suturing the free end of amputated nerve to an intact nerve connected to it's muscle. We hypothesize a mechanism of pain reduction is reduced sensory neuron regeneration.
MATERIALS AND METHODS: This was a rat animal model with spared nerve injury to the tibial and common peroneal nerve to create a neuropathic pain phenotype resembling limb amputation. There were two groups of 5 subjects each: TMR and SNI. The TMR group received the TMR procedure 3 weeks after SNI. The SNI group had no intervention and was a control. Behavior testing to test for expression of pain phenotype was performed on both groups 3 weeks after the SNI and one and three weeks after the TMR. Four weeks after TMR retrograde labeling was performed on both groups. One week later, rats were sacrificed, their L5 DRGs were harvested and cut at 20 microns using a cryotome. The number of sensory cell bodies in the L5 DRGs of all groups was counted using ImageJ.
RESULTS: The TMR rats had a total of 4365 sensory neuron bodies in DRGs identified using retrograde labeling compared to the SNI rats that had 2875 sensory neuron bodies in DRGs with a t-test significance of p=0.044.
CONCLUSIONS: TMR causes increased DRG and sensory neuron activity potentially due to an increase in sensitivity of the sensory nerves to inflammatory mediators and excitatory signaling.

Garcia-Ramirez, Fernando

Clinical & Translational Research

Functional Outcomes in Adolescents After ACL Reconstruction

Authors: Garcia-Ramirez F, Van Valin S, Liu XC.
Project Mentor: Xue-Cheng Liu, MD, PhD

INTRODUCTION: The most common autografts used for anterior cruciate ligament reconstruction (ACLR) among adolescents are the bone-patellar tendon-bone (BPTB) and the semitendinosus-gracilis tendon (ST-G). Past studies have assessed post-operative functional outcomes using patient-reported measures and motion analysis. This study provides comprehensive motion analysis, while introducing proprioception and isokinetic strength testing.
METHODS: Eighteen patients (11F; 7M) were included in this prospective case-controlled study. Patients underwent ACLR from 2012 to 2019 and were assessed at least six months post-surgery. Vicon's motion capture system recorded knee rotation during walking, running, and stairs. Four force plates measured knee torque during walking. Knee proprioception was tested at 30 and 60 degrees of extension. Biodex isokinetic strength testing assessed passive peak torques during knee extension and flexion. Statistical analysis was performed using a Wilcoxon signed-rank test.
RESULTS: During walking, the ACLR leg displayed reduced maximum knee extension (p=0.01) and torque (p=0.04) at heel-off but increased knee flexion torque (p=0.02) at toe-off compared to the contralateral leg. During stairs descent, the ACLR knee showed reduced maximum knee extension (p=0.03). The ACLR leg displayed improved proprioception (p=0.02) during knee extension at 60 degrees.
CONCLUSION: During walking, the hamstrings of the ACLR leg appear to be stronger than that of the contralateral leg at heel-off. The ipsilateral quadriceps appear weaker at toe-off. No proprioceptive or isokinetic strength deficits are observed. We conclude that adolescents achieve adequate knee mechanics, muscle strength, and sensory feedback for activities of daily living at least six months post-ACLR with either BPTB or ST-G autograft.

George, Joshua

Quality Improvement and Patient Safety

Evaluation of the GoCheck Kids Photo-screener as a tool for Pediatric Amblyopia Screening

Authors: George J, Kassem I.

Project Mentor: Iris Kassem, MD, PhD

BACKGROUND: Amblyopia is currently one of the leading causes of preventable vision loss. While early detection and treatment are key to altering disease progression, there currently exist many challenges to screening. Usage of application-based photo screening tools may aid in addressing screening gaps.

METHODS and Materials: Amblyopia screening was completed on patients ranging from 6 months to 6 years of age using the GoCheck Kids photoscreener, an iPhone application based screening tool. Results of the screening were compared to that of a complete ophthalmologic exam conducted at the Children's Hospital of Wisconsin Ophthalmology clinics to assess the validity and ease of use of the photo screener. Passed and failed screenings were evaluated using the American Association of Pediatric Ophthalmology and Strabismus Vision Screening Committee guidelines.

RESULTS: 169 scans were completed of which 130 had gradable results. Sensitivity of the tool was determined to by 87.76 percent and specificity was 67.70 percent. Positive predictive value was 90.16 percent and negative predictive value was 62.32 percent.

CONCLUSIONS: The GoCheck Kids photoscreener can potentially serve as a useful and simple screening tool for amblyopia risk factors when a more thorough eye exam is difficult to complete in pediatric clinics.

Georgescu, Abigail

Clinician Educator

The 30 Minute Sprint: Recognizing Intrapartum Prematurity Counseling Limitations

Authors: Georgescu A, Muthusamy A, Basir MA.

Project Mentor: Mir Basir, MD

Current guidelines are limited for intrapartum counseling for threatened births at later premature gestational ages (GA). The objective of this study was to describe the characteristics and content of intrapartum counseling provided to women hospitalized for premature birth between 23 and 34 weeks' GA. The study was conducted between April and December 2009 in two teaching hospitals with labor and delivery units and level 3 neonatal intensive care units. Counselors completed a post counseling survey. From 60 sessions, 46 surveys were collected. The median counseling duration was 30 minutes; this was not associated with gestational age. The support-person was not present for most (57%) counseling sessions. There was a positive correlation (p=0.001) between the number of maternal questions and her education. There was no difference in counseling content across the 23 to 34 weeks' GA regarding delivery room care, physical/mental disability, and vision problems. This study of characteristics and content of premature birth counseling for birth between 23 and 34 weeks' GA found that the duration of most sessions is 30minutes; the father of the baby is not present during counseling for most premature births, and the topics discussed by counselors are fairly similar and extensive irrespective of the GA. These findings highlight the existing contrast between the recommended counseling practices and the actual practice reported by counselors.

Gershkowitz, Bradley | Clinical & Translational Research

Digital Coaching Strategies to Facilitate Behavioral Change in Type 2 Diabetes: A Systematic Review

Authors: Gershkowitz BD, Hillert CJ, Crotty BH.

Project Mentor: Bradley Crotty, MD, MPH

CONTEXT

In this systematic review, we focus on the clinical impact of digital tools for providing health coaching, education, and facilitating behavior in patients with prediabetes or type 2 diabetes. Our approach was designed to provide insights for clinicians and health care systems that are considering adopting such digital tools.

EVIDENCE ACQUISITION

We searched the CINAHL, Scopus, and Ovid/MEDLINE databases using PRISMA guidelines for studies that reported digital coaching strategies for management and prevention of type 2 diabetes published from January 2014 to June 2019. Articles were reviewed by two independent blinded reviewers. Twenty-one articles met inclusion criteria.

EVIDENCE SYNTHESIS

We found 20 of 21 studies in our analysis showed statistically significant improvements in at least one measure of diabetes control including HbA1c, weight loss, fasting blood glucose, and BMI. Studies reporting weight loss percentage from baseline at 1 year reported values ranging from âˆ’3.04% to âˆ’8.98%, similar to outcomes with traditional coaching in the Diabetes Prevention Program (N = 4). Additionally, all studies including a comparison group of in-person or telephone-based coaching showed statistically better or similar outcomes in the digital coaching group (N = 5).

CONCLUSIONS

The evidence reported in this study suggests that digital coaching offers a promising strategy for long-term management and prevention of diabetes in diverse populations with similar benefits to in-person or telephone-based health coaching. We argue that, with the potential to treat large numbers of individuals in diverse geographic locations, digital coaching offers a promising solution to the rapid increase in diabetes prevalence.

Glait, Megan | Quality Improvement and Patient Safety

Correlating Scores but Contrasting Outcomes for Eat Sleep Console Versus Modified Finnegan

Authors: Ryan K, Moyer A, Yan K, Dasgupta M, Saudek K, Cabacungan E, Glait M.

Project Mentor: Kelsey Ryan, MD

OBJECTIVES: The Modified Finnegan Neonatal Abstinence Scoring System (M-FNASS) and the newer Eat, Sleep, and Console (ESC) model guide the clinical management of neonatal opioid withdrawal syndrome (NOWS). In this study, we evaluate how the M-FNASS and ESC model directly compare in inpatient practice. We hypothesized that ESC scores would correlate with M-FNASS scores, whereas ESC Q:4 management would reduce health care use for infants with NOWS.

METHODS: In this retrospective cohort study, we compared management of infants with NOWS admitted to nursery settings. Epoch 1 was managed by using an M-FNASS algorithm. Epoch 2 was scored simultaneously with the M-FNASS and ESC model and managed by using the ESC approach. In the statistical analysis, we compared M-FNASS and ESC scores and outcomes between epochs.

RESULTS: A total of 158 infants provided 2101 scoring instances for analysis. Demographic characteristics were similar between epochs. ESC scores significantly correlated with overall M-FNASS scores and specific M-FNASS domains. Receiver operating characteristic (ROC) curve analysis revealed that an ESC score containing at least 1 "no" was best predicted by an M-FNASS cutoff value of 7.5 (sensitivity 0.84; specificity 0.70; area under the curve 5 0.842). Length of stay (median 9.5 vs 5 days; P 5 .0002) and initiation (53.39% vs. 32.5%; P 5 .018) and duration of pharmacologic treatment (median 11 vs 7 days; P 5 .0042), as well as length of stay for infants who were pharmacologically treated (median 15 vs 10 days; P 5 .0002), were significantly reduced with ESC-based management after adjustment for covariates.

CONCLUSIONS: The ESC approach meaningfully correlates with the M-FNASS to detect NOWS. Management with the ESC approach continues to be associated with reduced health care use when compared with an M-FNASS approach, implying that the ESC approach may facilitate higher-value inpatient care.

Glicklich, Harrison

Clinical & Translational Research

Examining the association between socioeconomic status and delay in anal cancer diagnosis

Authors: Glicklich H, Mueller B, Ridolfi T, Nyitray A.

Project Mentor: Alan Nyitray, PhD

BACKGROUND: Anal squamous cell carcinoma (ASCC) is the most frequently diagnosed HPV-associated cancer in the United States other than cervical cancer. However, while U.S. cervical cancer screening programs are robust, there is no uniform screening recommendation for this disease. ASCC, therefore, is characterized by later diagnosis, longer time to treatment, and larger tumor size at presentation than any HPV-associated cancer. While high-risk populations such as HIV+ patients may undergo recommended screening via digital anorectal exam (DARE), there is no screening recommendation for so-called "low-risk" patients who do not belong to these groups. The identification of additional risk factors for advanced ASCC is an opportunity to pursue proactive screening and reduce morbidity and mortality associated with this disease. This project attempts to identify risk factors associated with increased ASCC tumor size at presentation within the Milwaukee community.

METHODS/ANALYSIS:

· This is a retrospective observational study of 118 consecutive patients presenting at Froedtert Hospital or a Froedtert-associated facility with an initial diagnosis of primary anal cancer.

· Socioeconomic status (SES) assessed via Area Deprivation Index, calculated from patient census tract.

· Statistical analysis of patient characteristics performed via multivariate linear regression and student's t-test.

RESULTS

· Alcohol use, age, gender, and tobacco use are not associated with increased tumor size and stage at initial presentation for low-risk patients.

· Socioeconomic status is associated with tumor size and stage at initial presentation for low-risk patients, but not for HIV positive patients.

CONCLUSIONS: The Milwaukee healthcare system is meeting some of the screening needs of high-risk HIV positive patients, however low-risk patients of low SES present with disproportionately advanced anal cancer. These patients may benefit from education on low-cost self-directed DARE.

Goulet, Courtney

Global Health

Characterization of Emergency Department Poisoning Epidemiology in Belize

Authors: Goulet C, Sonnenberg T, Stanton M, Habet M, Kostic M, Gummin D, Zosel A.

Project Mentor: Amy Zosel, MD

Strengthening Emergency Care in Belize is a collaborative training program to ensure that every citizen and visitor will have timely access to emergency care. At Karl Heusner Memorial Hospital in Belize City, Belize, medical toxicology was identified as an area of focus. The development of a teletoxicology program can be a resource to the KHMH healthcare providers from the Medical College of Wisconsin Department of Emergency Medicine, Division of Toxicology to enhance the quality of medical care available to their patients.

A total of 24,129 patients presented to the hospital during the study period. Of these, 1.3% were identified as toxicologic complaints. Forty-nine percent of all toxicologic presentations were related to alcohol. Twenty-one percent of cases were related to ingestion of drugs or pharmaceutical agents. Nineteen percent of cases were related to environmental toxins including snake, insect, scorpion, sting ray and plants. Five percent of cases were caused by hydrocarbons. Two percent of cases involved organophosphates. Four percent of cases involved household chemicals. The age distribution of patients seen with a toxicology related presentation, largest population being between 31-40. Fifty percent of all intoxication cases were determined to be intentional abuse, while 10% were from intentional suicide.

This study illustrated that toxicology cases are evident in the Accident and Emergency Room patient population at KHMH. Therefore, it would be beneficial to develop toxicology education and specialist resources for their medical professionals. Once a teletoxicology program is established, a prospective chart review will evaluate the effectiveness of the toxicology consult services. A future survey of the KHMH healthcare providers will also be performed to assess an increase in knowledge of toxicity diagnosis and clinical management and satisfaction with the program.

Grannan, Hailee | Quality Improvement and Patient Safety

Implementation of medication reconciliations at a student-run free clinic

Authors: Chinos A, Grannan H, Schmidt M, Voyles J.
Project Mentor: Jessica Schnell, MD

BACKGROUND: The Saturday Clinic for the Uninsured (SCU) is a free clinic in Milwaukee, WI operated by medical and pharmacy students from the Medical College of Wisconsin. The SCU does not have a standardized medication reconciliation (MR) process. Literature shows MR can reduce medication error rates up to 75% in the ambulatory setting. This quality improvement project introduces a standardized MR process into clinic flow by designing a procedure that allows student volunteers to complete an MR form with each patient. The specific aim is to improve the accuracy of patient medication profiles in the SCU's electronic medical record (EMR) system.
METHODS: A multidisciplinary team observed existing clinic workflow and collected baseline data on medication errors and discrepancies. A standardized MR process and form were designed and implemented. Patient's medication profiles were reviewed before MR and percentage of patient's medication profile that was correct was calculated. Medication errors were defined as any undocumented medications or different medications within the same drug class. Medication discrepancies were defined as any difference in dose, formulation, or instructions. Percentage of patients with MRs completed per clinic day, MR performance time, and student feedback were collected.
RESULTS: Baseline data show that patients' medication profiles were 40.45% (n=32) accurate prior to MR completion. On average, a patient had 2.27 and 0.97 medication errors and discrepancies, respectively. MRs were completed in 87.5% of patients scheduled and MR performance time averaged 8.45 minutes.
CONCLUSIONS: The SCU has not reliably updated patients' medication profiles. Baseline data results show that the new MR process can reach 87.5% of patients and considering our proposed MR process has shown to take less than ten minutes per patient encounter, the objective is to reach every patient cared for at SCU to reduce the risk for medication errors.

Grant, Carly | Clinical & Translational Research

Patient perceptions of congestive heart failure and physical activity: intervention feasibility testing

Authors: Grant C, Wamsley C, Gaglianello N, Swartz A, Nukuna S, Nelson D, Tarima S, Burns E.
Project Mentor: Nunzio Gaglianello, MD

INTRODUCTION: Congestive Heart Failure (CHF) afflicts nearly 6.5 million adults in the US and approximately 50% who develop CHF die within 5 years of diagnosis. Physical activity (PA) reduces the risk of mortality among CHF patients; however, fewer than 10% of patients achieve current recommended goals. Barriers to PA may include fear of anticipated symptoms and developing a vigorous routine is an insurmountable task. A PA intervention that addresses expectations/perceptions of CHF and guides patients in action planning will improve adherence and symptom management.
METHODS: The 3-month intervention is based upon a PA toolkit with integrated symptom assessment log, Fitbit device, and Smartphone application. Participants are contacted weekly to set step goals, document intensity/severity of symptoms, and report issues/concerns. All data is collected and stored in REDCap.
RESULTS: 15 participants ranging in ages from 41 to 90 (8 men, 7 women) with average CHF ACC/AHA Stage C were recruited from Froedtert Hospital. Baseline step values averaged 5000±2900 steps/day with a post-intervention change of 5600±3000 steps/day. 93% of the participants (14 out of 15) showed adequate improvement/maintenance for physical activity. Based on the Short Physical Performance Battery (SPPB) and Patient Activation Measure (PAM) questionnaires, participants showed a statistically significant ($p<0.05$) improvement in CHF knowledge gaps, symptom awareness, and lower extremity functioning.
CONCLUSION: This project demonstrated feasibility of using a publicly available physical activity toolkit in which patients expressed increased awareness of sedentary behavior and symptom management while adhering to a physical activity routine to give insight for future improvements.

Griffin, Jakara

Molecular & Cellular Research

Phenotype restoration of trophoblasts in preeclampsia by 670nm light treatment

Authors: Griffin JK, Krolikowski J, Weihrauch D.

Project Mentor: Dorothee Weihrauch, DVM, PhD

INTRODUCTION: Preeclampsia is a leading cause of maternal morbidity and mortality with an unknown etiology. One proposed mechanism is altered blood vessel formation. Extravillous trophoblasts (HTR*/SVneo) and an extracellular matrix (pECM) are crucial to placental vessel formation; their role in preeclampsia is understudied. Our previous study demonstrated alterations in pECM markers from preeclamptic human and rat placentas.
Objective: Identify changes in HTR8/SVneo when cultured in human and rat preeclampsia microenvironments and explore if a novel treatment using phototherapy (670nm LED light) can restore trophoblast phenotype.
METHODS: Healthy and preeclamptic placental samples were acquired from humans and rats (total sample categories=4) then decellularized to obtain pECMs. HTR8/SVneo were cultured on human and rat pECMs and sampled in proliferation, migration, and apoptosis assays to assess cellular behavior alterations in preeclampsia. 670nm light with 4J/cm2 intensity was later applied to the HTR8/SVneo from the proliferation, migration, and apoptosis assays as a treatment modality. Placental blood vessel factors, placental growth factor (PLGF) and transforming growth factor β (TGFβ), were measured via immunofluorescence from HTR8/SVneo cultured on human and rat pECMs.
RESULTS: Migration and proliferation of HTR8/SVneo on preeclamptic pECM were reduced in humans and rats. Both were restored by phototherapy. Apoptotic HTR8/SVneo were increased in preeclamptic pECM compared to healthy pECM. Phototherapy significantly decreased the number of apoptotic cells. PLGF and TGFβ were downregulated in HTR8/SVneo cultured on preeclamptic pECM from humans and unchanged in rats. The downregulation was reversed by phototherapy.
CONCLUSION: HTR8/SVneo respond to the altered matrix of preeclamptic placentas from humans and rats. Phototherapy restored the phenotype of HTR8/SVneo on preeclamptic pECMs from humans and rats suggesting 670nm light as a therapeutic agent.

Grond, Sarah

Quality Improvement and Patient Safety

Parental and provider perspectives on social media about ankyloglossia

Authors: Grond SE, Kallies G, McCormick ME.

Project Mentor: Michael McCormick, MD

OBJECTIVES: To investigate and identify the concerns and opinions expressed in both parental and provider posts on social media about ankyloglossia.
METHODS: Posts on Twitter between 1/1/2008 and 12/31/2018 were collected using search terms and hashtags specific to pediatric ankyloglossia. The search terms included a primary phrase to indicate ankyloglossia along with a pediatric identifier. Tweets that met inclusion criteria were analyzed qualitatively via conventional content analysis. After all tweets were categorized, descriptive statistics were completed to determine frequency of each theme.
RESULTS: In total, 5951 tweets were retrieved. Parents authored 982 (16.5%) of tweets, and 782 (13.1%) were by providers. The remaining 4187 tweets did not fit criteria for either the parent or provider groups. Amongst parents, the most common themes mentioned were feeding problems (309 tweets [32.4%]), followed by lip tie (215 [22.5%]), anxiety or emotion (207 [21.7%]), and maternal breastfeeding complications (127 [13.3%]). The number of tweets about tongue-tie and frenotomy in 2018 had increased by 2,395 % since 2009. Amongst providers, 215 tweets were judged by the coders to provide an opinion on ankyloglossia, of which 94.4% had a pro-frenotomy sentiment. When a specialty was identified, tweets were most often by dentists (250 [31.9%]), followed by lactation consultants and International Board Certified Lactation Consultants (IBCLCs) (157 [29.7%]) and non-otolaryngologist physicians (79 [10.1%]). Otolaryngologists accounted for 8.7% (68 tweets) of posts about ankyloglossia.
CONCLUSION: Our findings demonstrate the spectrum of opinions that exist among both parents and providers about ankyloglossia. This can aid in shared-decision making by enabling the counseling provider to guide recommendations based on medical evidence with the understanding that there is a large amount of non-scientific information and opinions disseminated that may be shaping decisions.

Grover, Erik

Quality Improvement and Patient Safety

Laboratory Monitoring: Process Improvement in a Nephrology Clinic

Authors: Grover EL, Wesson JA, Maike, AS.

Project Mentor: Jeffrey A Wesson, MD, PhD

BACKGROUND

Laboratory monitoring is central to providing effective and efficient patient care in the management of kidney disease, as disease progression is generally asymptomatic. Many patients were observed arriving at their appointment without labs drawn, triggering a process improvement project to address this problem.

METHODS

The project was conducted in a Nephrology clinic at the Milwaukee Veterans Affairs hospital. The percentage of patients missing labs before their appointment was determined and underlying causes were examined. Lab orders were checked, staff members were interviewed, and patients were surveyed about whether they received notifications for their lab appointments.

RESULTS

A sample of 130 patients pre-COVID revealed 18% were missing pre-clinic labs. A sample of 42 patients post-COVID showed 38% of patients were missing labs, likely resulting from most appointments being converted to virtual visits. Survey results revealed 38% of patients did not receive notification and 20.5% forgot to complete labs. A plan-do-study-act (PDSA) cycle targeting these specific patient groups was conducted in a separate Nephrology clinic. Orders were verified and patients were called within one week of their scheduled appointment for four weeks. Fourteen patients were notified with only 14% missing labs at PDSA cycle completion under post-COVID conditions.

CONCLUSION

Timely patient-centered communication regarding pre-appointment labs resulted in an increased number of patients obtaining labs. A study of our intervention with a larger patient population, in addition to further PDSA cycles to address this process improvement, is justified.

Gunasekaran, Vimal

Health Systems Management & Policy

Quantitative Correlation of Lumbar Foraminal Stenosis with Local Morphological Metrics

Authors: Gunasekaran VS, Hejdak D, Meyer B, Klein A, Koch K.

Project Mentor: Kevin Koch, PhD

PURPOSE: Clinical evaluation of lumbar foraminal stenosis typically includes qualitative assessments of perineural epidural fat content around the spinal nerve root and evaluation of nerve root impingement. The present study investigates the use of several morphological MRI-derived metrics as quantitative predictors of foraminal stenosis grade.

METHODS: 62 adult patients that underwent lumbar spine MRI evaluation over a 1-month duration in 2018 were included in the analysis. Radiological gradings of stenosis were captured from the existing clinical electronic medical record. Clinical gradings were recorded using a 0-5 scale: 0=no stenosis, 1=mild stenosis, 2=mild-moderate stenosis, 3=moderate stenosis, 4=moderate-severe stenosis, 5=severe stenosis. Quantitative measures of perineural epidural fat volume, nerve root cross sectional area, and lumbar pedicle length were derived from T1 weighted sagittal spine MRI on each side of all lumbar levels. Spearman correlations of each measured metric at each level were then computed against the stenosis gradings.

RESULTS: A total of 347 volumetric segmentation and radiological foraminal stenosis grade sets were derived from the 62-subject study cohort. Statistical analysis revealed significant correlations ($p < 0.001$) between the volume of perineural fat and stenosis grades for all lumbar vertebral levels.

CONCLUSION: The results of the study have demonstrated that segmented volumes of perineural fat predict the severity of clinically scored foraminal stenosis. This finding motivates further development of automated perineural fat segmentation methods, which could offer a quantitative imaging biometric that yields more reproducible diagnosis, assessment, and tracking of foraminal stenosis.

Haider, Shabi

Health Systems Management & Policy

Understanding the Perception of Health in the Rohingya Community

Authors: Haider S, Maheen A, Ansari M, Stolley M.
Project Mentor: Melinda Stolley, PhD

The Rohingya are Burmese nationals, and due to the government authorized ethnic cleansing, the Rohingya must find safety in nearby countries. In these countries, many Rohingya live in camps, where they experience additional violence, lack of access to basic needs, and increased health concerns. Within the past 4 years, over a thousand Rohingya families have been resettled in Milwaukee, Wisconsin. Considering the impact of the trauma experienced by the Rohingya, we sought to identify the health needs and perceptions of the Rohingya community in Milwaukee. This project consisted of 10 in-depth key informant interviews with stakeholders from refugee resettlement agencies, healthcare clinics, and community-based organizations. The interviews were transcribed, coded, and analyzed for themes. We identified the following preliminary themes: 1) Health is defined as being able to meet basic needs of the family and is prioritized over individual concerns; 2) Prior and existing mistrust for healthcare institutions and fear of systems of authority impact healthcare-seeking behavior; 3) Past trauma is common and negatively impacts physical and mental health; 4) Religion and spirituality influence beliefs about illness, recovery, and wellbeing; 5) Linguistic, cultural, and educational barriers impact healthcare access and quality, and the understanding of disease leading to fatalistic attitudes. We intend to use these findings to inform the development of future studies and programs tailored to the health needs of the Rohingya community in Milwaukee. We hope to implement sustainable interventions that can build relationships of trust, improve health outcomes, and support the efforts of our Rohingya neighbors.

Hall, Alexander

Clinical & Translational Research

Venous thromboembolic disease in patients with hepatic malignancy undergoing liver directed therapy

Authors: Hall AD, White SB, Baumann-Kreuziger LM, Rilling WS.
Project Mentor: William Rilling, MD

PURPOSE:
The purpose of this study was to investigate the incidence of venous thromboembolism (VTE) in patients who have undergone liver-directed therapy (LDT) and identify possible independent risk factors for developing VTE following LDT.
METHODS:
An IRB approved single institution retrospective chart review was conducted to determine the incidence of VTE following LDT from 6/1/2010 and 8/1/2019. After the incidence was established, charts were reviewed for patient demographics, diagnosis, type of LDT, development of VTE and timing after LDT, extent of malignancy, performance status, comorbidities, and laboratory values. Independent risk factors were analyzed and comparisons were made between patients that did and did not have VTE following LDT.
RESULTS:
967 patients underwent LDT in this time period. 65 (6.7%) patients developed VTE at any time point following LDT and 17/65 (26.2%) of these events were within 60 days of LDT. The following risk factors were significant ($p<0.05$) or trending towards significance ($p<0.10$) for developing VTE within 60 days of LDT: presence of extrahepatic disease (OR 5.4, p=0.013), TARE (compared to TACE, OR 2.846, p=0.094), cholangiocarcinoma (compared to HCC, OR 5.250, p=0.059), and hepatic metastases (OR 2.947, p=0.075). Increased albumin was associated with decreased risk of developing VTE after LDT (OR 0.299, p=0.030).
CONCLUSIONS:
Based on this data, the overall risk for VTE after LDT appears to be low. As LDT becomes increasingly utilized, multifactorial models could help provide the necessary information to develop anticoagulation protocols peri-procedurally for patients felt to be at high risk.

Hanson, Ryan — Clinician Educator

It takes a village: educational opportunities to support perinatal mental health

Authors: Hanson RM, Kaljo K, Domeyer-Klenske A, Kruper A.
Project Mentor: Abbey Kruper, PsyD

INTRODUCTION:
Postpartum mood and anxiety disorders (PMADs) increase maternal morbidity and mortality, impact infant outcomes, and are often under-recognized. Barriers include stigma of PMADs or not appropriately screening patients. Meanwhile, medical students indicate team integration as an area for improvement within their clinical learning environments (CLEs). Students desire a greater role on the team and opportunities for supervised practice with patient care.
OBJECTIVES: To develop opportunities to educate and involve medical students to support perinatal mental health. To create a CLE where students feel they can make an impact.
INTERVENTION: Development of Med Student PREP: Psychosocial Risk Evaluation Process. The PREP curriculum includes two phases: Education and Intervention. Education involved student completion of an online learning module prior to their Ob-Gyn clerkship. Components included: risk factors, symptoms, communication strategies, and treatment options. Intervention included students reviewing medical charts and collaborating with patient care.
RESULTS: A pre-survey was completed by 58 medical students. Majority of respondents indicated disagree or strongly disagree regarding knowledge of PMADs (80%) and confidence in their ability to screen patients for PMADs (73%). Most students were confident in their ability to discuss clinical impressions with the team (68%) and desire opportunities to interview patients (88%).
CONCLUSIONS: The PREP curriculum may improve the recognition and treatment of PMADs and students' sense of belonging within the CLE. This curriculum may be applied to other members of the care team to further promote outcomes for perinatal mental health.

Hendrickson, Emily — Clinician Educator

Predicting Respiratory Complications in Trauma Patients with Rib Fractures Using Vital Capacity

Authors: Hendrickson E, Berning B, Bergner C, Carver T.
Project Mentor: Thomas Carver, MD

BACKGROUND: Traumatic rib fractures can result in significant morbidity. There is evidence to suggest vital capacity (VC) can predict outcomes in rib fracture patients; however, minimal data exists about the utility of VCs obtained in the emergency department (ED). The goal of our study was to analyze if VC's performed in the ED could predict pulmonary outcomes.
METHODS: A retrospective chart review was conducted of rib fracture patients admitted to a Level 1 trauma center over a one-year period. Patients who had a VC taken in the ED before admission were included. Collected data included demographics, VC percent predicted, admission disposition, and respiratory complications as defined by unplanned transfer to ICU, unplanned intubation, need for noninvasive respiratory support, or pneumonia. A VC of 40% was chosen as a risk factor for respiratory complications. Statistical analysis was performed using chi-squared test and multivariate logistic regression.
RESULTS: Two hundred thirty-eight patients were included in analysis. Mean VC in the ED was 43.7. Higher first VC on admission was associated with fewer respiratory complications ($R = -0.29$, $p = <0.001$), as were higher second VCs ($R = -0.23$, $p = < 0.001$). There was a statistically significant association between a VC cutoff value of 40% and respiratory complications ($R = 0.24$, $p = 0.0003$).
CONCLUSION: These findings support using a VC of 40% to help clinicians determine ED admission disposition as those with a lower VC are at risk of developing respiratory complications. This study provides the basis for a future randomized control trial.

Hernandez, Leilani | Quality Improvement and Patient Safety

Chemotherapy adherence for obese high-risk breast cancer patients and the role of dose-dense chemotherapy

Authors: Hernandez L, Fergestrom N, Neuner J.
Project Mentor: Joan Neuner, MD, MPH

INTRODUCTION: Increasing relative dose intensity (RDI) in obese women with breast cancer is important because obese patients have both high risk for low RDIs and worse outcomes than normal weight patients. Utilizing dose-dense chemotherapy has previously been found to improve outcomes for breast cancer patients. This study sought to understand the interaction between BMI and dose-dense regimens and its possible effects on RDI.
METHODS: We examined a cohort of patients treated at a multispecialty academic cancer center for whom chemotherapy was guideline-recommended during the study period: triple negative or HER2-positive subtypes, and either positive lymph node metastases or tumor size > 1.0 cm. We obtained administration dates and doses for the following agents from the institutional electronic health record (EHR): doxorubicin, cyclophosphamide, paclitaxel, docetaxel, and carboplatin. Other variables extracted from the EHR included BMI categories (non-overweight, overweight, obese), race, HER2 status, stage, and Elixhauser co-morbidity score. Logistic regression models were performed to examine associations of each variable with our primary outcome (RDI<85%) and a composite chemotherapy adherence outcome of whether she had either a low RDI, delay, or discontinuation. Separate models were run analyzing the interaction between dose-dense and BMI.
RESULTS: We identified 244 eligible patients, of whom 117 (48%) received a dose-dense regimen. Mean BMI (SD) was 29.9 (7.6) and 43.6% of patients in the dose-dense group were obese. The odds of having a low RDI is 2.3 times higher if the patient was obese (CI:1.051-5.097; P=0.0371). However obese patients receiving dose-dense chemotherapy had a 91% decreased risk of having a low RDI (CI: 0.031-0.257).
CONCLUSIONS: This research provides significant support in use of dose-dense regimens amongst obese patients for maintenance of a high relative dose intensity.

Ike, Trish | Clinician Educator

Addressing Cancer Disparities in Racine through the Community Cancer Health Education Program

Authors: Ike T, Jensik K, Stolley M.
Project Mentor: Melinda Stolley, PhD
Community Partner: Racine Kenosha Community Action Agency

BACKGROUND: Racine County faces a high cancer burden with cancer diagnosis rates that are higher than state averages. Because cancer disparities in Racine persist and, in some cases, may be growing, this project's objective was to develop a cancer education curriculum for community members in Racine. We then tested the impact of the resulting program, the Community Cancer Health Education Program (C-CHEp) on cancer knowledge, fear and fatalism, cancer screening and health behaviors.
METHODS: We presented C-CHEp at community events such as the 7th annual Baby Expo sponsored by the Racine Kenosha Community Action Agency and at the Dr. John Bryant Community Center. To evaluate the program, C-CHEp attendees (75 participants total) completed a pre- and post-survey to measure cancer knowledge, fear and fatalism, cancer screening and health behaviors.
RESULTS: After the presentation, there was an improvement in cancer knowledge for certain questions including: cancer is one disease, cancer screening is different for men and women, maintaining a healthy body weight reduces cancer risk, and breast-feeding helps reduce the risk of breast cancer. In addition, participants were either "very likely" or "extremely likely" to increase their fruit intake, increase their vegetable intake, increase their physical activity, and get cancer screenings if applicable. We did not see a change in most items related to fear and fatalism
CONCLUSION: The findings of this study conclude that the Community Cancer Health Education Program increases the potential for positive health outcomes by increasing cancer knowledge, but minimally affects cancer fear and fatalism.

Kalinowski, Alexandra — Quality Improvement and Patient Safety

Using QI Methodology to Increase Discharge Planning During Patient and Family Centered Rounds

Authors: Kalinowski A, Christianson K, Havas M, Lynch K, Rogers A.
Project Mentor: Christopher D Spahr, MD

Clear, consistent communication among the care team and hospitalized patients/families regarding discharge planning is essential for safe, efficient transitions of care. Hospital oversight bodies require families be included in discharge planning, the majority of families' questions concern discharge, and lack of family preparedness is a commonly documented reason for discharge delay. Additionally, providers expressed a need for more consistent discharge communication.
Patient and Family Centered Rounds (PFCR) offer the opportunity to discuss discharge plans with families and the care team. Local baseline data showed discharge planning was rarely being discussed.
Our primary aim was to increase the percent of PFCR that included discharge discussions to 75% over 1 year.
We conducted a QI initiative with multiple PDSA cycles at a pediatric academic medical center. Interventions included 1) Education on rationale for discharge communication, 2) Modification of institutional PFCR checklist to include discharge planning, 3) Development of scripting for discharge discussions 4) Modification of EHR note templates to include discharge planning, and 5) Data sharing about rates of discussion on PFCR.
Our outcome measure was percent of observed PFCR that included discharge planning. Our process measure was percent of patients with discharge planning documented in the EHR. Our balancing measure was rounds length.
At baseline, discharge was discussed on PFCR 32% of the time. Following our interventions, we noted improvement with a shift in our mean to 72%, indicating special cause variation. Our balancing measure showed no change in rounds length, remaining at ~11 min/patient.
There was a deficit in discharge discussions during PFCR at our institution. Using QI methodology, we increased discussions of discharge planning during PFCR. Next steps include assessing the impact of discharge discussions on length of stay and post discharge adverse events.

Kalsi, Satvir — Clinical & Translational Research

Three preoperative scoring systems in a retrospective analysis of 158 patients with spinal metastases

Authors: Kalsi S, Gelsomino M.
Project Mentor: Michael Gelsomino, MD

OBJECTIVE: The present study was undertaken to evaluate the predictive accuracy of three commonly used preoperative scoring systems (Bauer, Tokuhashi, and Tomita) for spinal metastasis.
STUDY DESIGN: This is a retrospective study.
METHODS: Nine parameters were assessed for 158 patients: visceral metastasis, site of spine metastasis, number of spinal metastases, number of bone metastasis (not spine), epidural compression, Karnofsky performance score (KPS), deficits at presentation (Frankel grade function), radiation, and surgery. For statistical analysis, univariate Cox regression analysis was performed with P value of ≤ 0.05 considered significant. Predictive accuracy of the three preoperative scoring systems score were measured via area under the curve from receiver operating characteristic (ROC) curves.
RESULTS: The following factors showed significant influence on survival in univariate analysis: visceral metastasis primary tumor ($P < 0.018$), KPS ($P < 0.001$), deficits at presentation ($P < 0.008$), and surgery ($P < 0.044$). Cox regression analyses revealed that the hazard ratio of the absolute score for three preoperative scoring systems showed statistical significance in all patients (Bauer ($P < 0.001$), Tokuhashi ($P < 0.004$), and Tomita ($P < 0.004$)). Although Tomita scoring system was the most accurate at predicting survival (AUC 0.687), all three scoring systems had areas under the ROC curve 0.6 or more.
CONCLUSION: According to the data of the present study all three preoperative scoring systems are predictive of survival in patients with spinal metastases with the Tomita scoring system being most accurate in predicting survival.

Kamalia, Mohammed

Clinician Educator

Seasonal Trends in Donor Heart Availability: An Analysis of the UNOS Database

Authors: Kamalia MA, Smith NJ, Rein L, Ramamurthi A, Miles B, Joyce LD, Mohammed A, Joyce DL.
Project Mentor: David L. Joyce MD, MBA

BACKGROUND: Despite the widespread belief that donor organ availability varies around holidays and seasons, there is little empirical data supporting this long-held belief. Variations in donor heart availability may be of interest to patients and clinicians in determining transplant listing strategies. We sought to identify any meaningful differences in organ availability based on calendar trends.
METHODS: The UNOS/OPTN registry was queried and data for all heart donations from October 1987 through March 2017 was abstracted and analyzed. Monthly heart donation rates were modeled using Poisson regression including month (categorical) and a spline term for year. Daily heart donation rates were modeled using cosinor Poisson regression, assuming a 12-month seasonal period. The holiday effect was assessed using conditional logistic regression.
RESULTS: Seasonal plots suggest a significant, although modest, increase in organ availability during the summer months, except for region 1. The regions with the highest amplitude were region 7 (peak: July 20th, amplitude: 13.7%) and region 6 (peak: July 4th, amplitude: 11.1%). There was no significant difference in the odds of heart donation when comparing holidays vs. non-holidays using national data (odds ratio [95% CI]: 1.00 [0.97, 1.03], p = 0.99) or any regional subsets.
CONCLUSION: There was no observable correlation between donor heart availability and holidays. However, a significant seasonality effect was observed with higher donation rates occurring during warmer months. These findings shed objective light on previously held anecdotal trends and add another factor to consider for end-stage heart failure patients listed for heart transplantation.

Kasemodel, Robert

Molecular & Cellular Research

Neuroadaptations in the spinal cord and substantia nigra following hypercapnia in goats

Authors: Kasemodel R, Alshammasi R, Burgraff NJ, Buchholz KJ, Neumueller SE, Pan L, Hodges MR, Forster HV.
Project Mentor: Hubert V. Forster, PhD

Patients that retain CO2 in respiratory diseases such as chronic obstructive pulmonary disease (COPD) have worse prognoses and higher mortality rates than those with equal impairment of lung function without hypercapnia. The time-dependent physiologic effects of chronic hypercapnia in goats was recently characterized, which suggested potential neuroplastic shifts in ventilatory control mechanisms. Indeed, our lab found glutamatergic and inflammatory neuroplastic changes in the brainstem respiratory nuclei (BRN) and more rostral structures involved in cognition. However, little is known about the spinal cord's involvement in respiration during hypercapnia despite it being the final site of integration of signals from the BRN and major output to the primary and accessory muscles of respiration. Furthermore, potential neuroplastic alterations in the substantia nigra have not been previously characterized. Herein we tested the hypothesis that changes occur in glutamatergic and inflammatory signaling within the cervical spinal cord and in the substantia nigra during chronically elevated inspired CO2 (InCO2)-hypercapnia. Healthy goats were euthanized after either 24 hours or 30 days of chronic exposure to 6% InCO2 or room air, and spinal cords and brains were rapidly extracted for western blot analyses to assess GluR, GluN and IL-1β receptor expression within the cervical spinal cord and substantia nigra. Within the substantia nigra, following 24hr exposure to 6% InCO2, a significant decrease in GluR2 was found and following 30 days of exposure, there was a significant increase in IL-1β. There were no significant differences between treatment groups for any of the glutamate receptor subunits or IL-1β within the cervical spinal cord. We conclude that time- and site-specific neuroplasticity may contribute to the physiologic changes that occur during chronic hypercapnia.

Kelly, Ethan — Clinician Educator

Student Motivation to Attend, or Not Attend Class & Faculty Opinions on In-Person Attendance

Authors: Kelly EP, Franco J.
Project Mentor: Jose Franco, MD

According to the Association of American Medical Colleges, less than half (47.3%) of US medical students regularly attend in-person lectures, with just under a quarter (23.5%) "almost never" attending class. More students are watching recorded lectures, with over half (58%) saying they preferred this method. While this national trend likely exists at MCW, there is insufficient confirmatory evidence. This survey-based research quantifies student attendance preferences and identifies factors influencing student attendance. Faculty perceptions of this trend are gathered and examined through a separate web-based survey.

METHOD: Understanding attendance preferences and motivations were ascertained from MCW medical students and faculty through two separate online surveys using Qualtrics. A total of roughly 600 MCW 2nd, 3rd, and 4th-year medical students received a 7-question survey. Fourteen MCW faculty members received an 8-question survey.

RESULTS: 112 students responded (~19% response rate) and 9 faculty members responded (~64% response rate). 74% (N= 83) of responders prefer online learning with >36% (N = 41) attending class "almost never." The top reasons cited were the availability and convenience of pre-recorded lectures. Faculty members confirmed the trend but felt no decline in the quality of education between the two settings. Responses acknowledged the convivence of virtual education, however interpersonal connection and real-time feedback was an advantage with in-person learning.

CONCLUSION: MCW is experiencing a decline in classroom attendance, similar to previously reported data – largely due to the convenience of online learning. MCW must provide an educational experience that acknowledges these realities and incorporates active learning into their curriculum.

Kelly, Brenna — Health Systems Management & Policy

Improving Sun Safety Knowledge in Parents of Young Children: Trialing the SHADE Program

Authors: Kelly B, Lalor L, Lee L.
Project Mentor: Leah Lalor, MD
Community Partner: Bright Horizons Preschool (Watertown Plank)

BACKGROUND: Childhood is a critical time for effective sun protection as children spend more time outside and have more vulnerable skin, putting them at risk for greater UV damage. Childhood is also an important time for establishing habits that can decrease the lifetime risk of skin cancer through sustained sun protection. Children rely primarily on their parents for sun protection, yet parents may not know how to best protect their families, especially if they lack adequate knowledge related to sun safety. Improving parental knowledge through an educational program may have the potential to improve sun health in children.

GOALS: To evaluate parents' baseline sun education levels as well as improvements in knowledge after receiving a virtual sun safety presentation: SHADE (Sun Health And Detection Education)

METHODS: A non-randomized, single group pretest-posttest interventional pilot study of the SHADE program among parents of children enrolled at Bright Horizons Preschool.

RESULTS: Average participant score on initial pretest was 60%. Questions answered incorrectly by 50% or more of participants included topics related to elements, clothing protection, sun rays, risk factors, and skin cancer in individuals with Skin of Color*. Strikingly, only half of respondents correctly identified sun exposure as the greatest risk factor for skin cancer. At time of submission, the average participant score on posttest was 87% and 75% participants improved from their initial score. 100% of participants reported greater motivation to practice increased sun safety in their families.

CONCLUSION: After viewing the SHADE presentation, participants were more likely to give correct answers to knowledge based sun safety questions. Participants also reported greater intent to change behaviors following the intervention. Participants felt the presentation was helpful in increasing their sun safety knowledge.

Kenkel, Troy

Quality Improvement and Patient Safety

Gene expression in Ccl28-/- mice during oropharyngeal candidiasis

Authors: Kenkel T, He J, Huppler A.

Project Mentor: Anna Huppler, MD

C. albicans is a normally commensal organism that can cause serious infection in immunocompromised individuals. C. albicans infections have been shown to be controlled by Th17 responses through Interleukins 17 and 23. Supporting this, IL-17 KO mice have been shown to be severely susceptible to oropharyngeal candidiasis (OPC) infections. The adaptive immune response doesn't paint the whole picture however—the innate response is crucial to clearing C. albicans. CCL28 is a chemokine that acts as an anti-microbial peptide (AMPs). It has been shown that CCL28 directly kills C. albicans through a C-terminal motif, yet surprisingly, CCL28 KO mice are resistant to OPC. It was hypothesized that other AMPs would be upregulated to compensate for the lack of CCL28. This study aims to investigate gene regulation in CCL28 KO mice with an OPC model. Ccl28 KO mice were infected with OPC, tongue tissue was harvested on Day 1 and RNA was isolated and reverse transcribed into cDNA. This cDNA was amplified using qPCR and gene expression of Ccl28, Il17, S100a8 and S100a9 was measured. The genes IL-17 and S100a8 showed upregulation in the CCL28 -/- mice compared to wild type in tongue tissue, while S100a9 showed similar expression across all mice. These results show a potential negative feedback mechanism for CCL28 on IL-17. However, S100a8 was the only downstream IL-17 gene to mirror upregulation with IL-17. This shows that there is differential regulation of this signaling pathway depending on infection type. These data also suggest that there could be other genes upregulated such as pro inflammatory cytokines and those controlling neutrophil recruitment.

Kerschner, Alexander

Clinical & Translational Research

Clinical Outcomes of Knee DPVNS Following Arthroscopic Complete Synovectomy +/- Posterior Open Resection

Authors: King D, Vetter C.

Project Mentor: David King, MD

INTRODUCTION:
Diffuse pigmented villonodular synovitis (DPVNS) is a disease characterized by the abnormal growth of the synovial membrane. There is currently no gold standard treatment of DPVNS. This study seeks to compare the recurrence rates and functional outcomes of patients who have undergone two treatments: anterior arthroscopic synovectomy versus combined anterior arthroscopic and posterior open synovectomy.

METHODS:
41 patients were identified with surgery to treat DPVNS in the knee between 2003-2018. Patients were grouped by their initial procedure (combined arthroscopic/open or only arthroscopic) and tracked for follow-up visits, MRIs, and additional procedures; functionality measures (Lysholm Scoring Scale) were collected by phone. Outcomes compared between the two groups include recurrence rates, Lysholm scores, and effect of prior surgery.

RESULTS:
24 patients (58.5%) had a recurrence [16 (57.1%) arthroscopic patients and 8 (61.5%) combined procedure patients]. The difference between the recurrence rates was not statistically significant calculated using a chi square test (p=0.81). The mean Lysholm Score for the combined procedure (75.4) exceeded that of the arthroscopic (68.1), but this difference is not statistically significant calculated by a two-sample t test (p=0.25). Patients with prior knee surgery had higher rates of recurrence than those without a prior surgery [73.3% vs. 50.0% (p=0.32)].

CONCLUSIONS:
This study provides no evidence that the combined arthroscopic/open procedure harms knee function more than an only arthroscopic procedure does. There is no statistical evidence that the recurrence rates differ between treatment methods. The recurrence rate is higher among patients with prior surgeries, but the difference is not statistically significant.

Keung, Lap-Heng | Health Systems Management & Policy

Development of an Interventional Radiology Specific Algorithm for Pre-Procedural Laboratory Testing

Authors: Keung L, White S, Hohenwalter E, Hammen C, Dominguez D.

Project Mentor: Eric J Hohenwalter, MD

PURPOSE:
Unlike other medical specialties, there are no pre-procedural laboratory testing guidelines for interventional radiology (IR) procedures beyond coagulation and hematologic testing, leading to variations in practice. The study purpose was to develop an algorithm for pre-procedural laboratory testing for IR procedures and determine if it reduced unnecessary testing with associated cost savings.

MATERIALS AND METHODS:
A pre-procedural testing algorithm was developed utilizing pre-existing clinical practice guidelines from other medical specialties. The algorithm was then used as the codebase for an Android and iOS mobile application and subsequently distributed to the APP team and incoming cohort of IR fellows who conduct preprocedural assessments. A retrospective chart review of patients undergoing outpatient angiograms, chest port placements, dialysis circuit evaluations, osteoplasties, nerve blocks, and transvenous liver biopsies (TVLBs) was performed for July 2019, prior to algorithm development, and July 2020, after application implementation. The primary data obtained was the day-of lab tests.

RESULTS:
In July 2019, 13% of angiograms (n=67) and 21% of chest port placements (n=43) had additional lab tests ordered beyond the recommendations. In July 2020, 17% of angiograms (n=29) and 11% of chest port placements (n=46) had additional lab tests ordered. Osteoplasty, nerve block, and dialysis circuit evaluation procedures were found to be in line with the algorithm derived recommendations. The sample size of TVLB procedures was not robust enough to draw any meaningful conclusions. Total cost of excess labs was $3,583 in July 2019 and $2,883 in July 2020, a 20% difference in total costs between the two months.

CONCLUSIONS:
Despite the algorithm-derived application, not all outpatient procedures investigated were affected equally. However, there was an associated cost savings for the excess labs ordered between the two studied periods.

Kijak, Julie | Urban & Community Health

Breast Radiation Therapy Practice Patterns Over Time: Analysis of The National Cancer Database

Authors: Kijak J, Bergom C, Aldakkak M, Kong, A.

Project Mentor: Amanda Kong, MD, MS

As proton radiation therapy (RT) usage has become more common in breast cancer, there is little known about its practice patterns for over time. Using the National Cancer Database (NCDB), we collected data for women with localized, non-metastatic breast cancer diagnosed from 2004-2015. Patients were grouped based on treatment with either proton RT or traditional photon RT. A logistic regression model was used to identify predictors for proton RT usage. In total, 503,527 patients were evaluated, 731 received proton RT and the remaining 502,796 received photon RT. Patients treated with proton RT were more likely to be treated in a comprehensive cancer center or academic facility (Odds Ratio [OR]=2.62; 5.26), at a facility located in the Southern or Western United States (OR=1.75; 5.51), a facility located greater than 30 miles from their residence (OR=1.46), with a left-sided tumor (OR=1.34), T2 tumor size (OR=2.51), and diagnosed from 2013-2015 (OR=1.31). Patients were less likely to receive proton RT if African American (OR=0.66), at a facility in the Midwestern US (OR=0.76), if living in an urban area versus a metropolitan area (OR=0.67), have a Charlson-Deyo morbidity score greater than 0 (OR=0.73), diagnosed between the year 2007-12 (OR=0.55; 0.45), estrogen receptor negative (OR=0.66), and did not receive hormone therapy (OR=0.68). Receipt of proton RT was associated with left-sided, ER+, T2 tumors, academic and comprehensive cancer centers, South and West locations and metropolitan areas. This data will elucidate usage trends and can be used as a predictor for proton RT use in breast cancer.

Kode, Vishwajit

Clinical & Translational Research

Anconeus Muscle Flap Transfer for Failed Surgical Treatment of Recalcitrant Chronic Lateral Epicondylitis

Authors: Kode V, Shi SM, Xu MC, Shi GG, Grindel SI.

Project Mentor: Steven I Grindel, MD

BACKGROUND: Chronic lateral epicondylitis can be a painful and functionally limiting condition of the elbow. Non-operative and standard surgical treatment results can vary. Moreover, outcomes for patients who have failed previous surgical treatment are limited. We report our experience using the anconeus muscle flap transfer in comparison to standard surgical treatment and report our clinical results.

METHODS: We performed a retrospective case series of 19 patients with chronic lateral epicondylitis and failure of previous treatments that were managed with anconeus muscle flap transfer. There were 11 males and 8 females, with a mean age of 44 years (range 19-72); 13 were on the right side and 6 on the left. The average time from diagnosis to the surgical procedure was over 1 year (1-10 years) and the average follow-up period was 3.7 years (1-14 years).

RESULTS: The average pain preoperatively was 6.61 and decreased postoperatively to 1.89 (range 0-10) ($P < 0.0001$). Complete flexion, extension and rotation of the elbow were present in all patients except one with a 5° extension lag. The average muscle strength was 4.5/5 and grip strength almost equivalent to the contralateral arm. No infection or other postoperative complications were observed. Patients were evaluated using the Roles and Maudsley score and demonstrated excellent results for 14 patients, good for 4, and poor for 1. The average time for return to work was 2.8 months (1-7 months). Ninety-five present of patients were satisfied with the flap transfer and pain improvement.

CONCLUSION: The anconeus muscle flap transfer is a safe and acceptable procedure providing satisfactory results for chronic lateral epicondylitis of the elbow. This procedure can be useful for treating patients with continued pain after previous standard surgical release.

Koller, Elizabeth

Urban & Community Health

Gender differences in the relationship between food insecurity and body mass index in adults.

Authors: Koller E, Williams J, Garacci E, Egede L.

Project Mentor: Joni Williams, MD, MPH

BACKGROUND: In the United States, nearly 40% of adults aged ≥20 have a Body Mass Index (BMI) ≥30, and 11% of households are reported as being food insecure. In adults, evidence suggests women are more likely than men to be food insecure, and among those with food insecurity, differences in BMI exist between men and women with women reporting higher BMI. However, factors associated with this difference in BMI between men and women are less understood. Therefore, the aim of this study was to assess gender differences in the factors associated with BMI in men and women.

METHODS: Data were analyzed from 25,567 adults from the National Health and Nutrition Examination Survey (NHANES). The dependent variable was BMI. Food insecurity was the primary predictor. Hierarchical models were analyzed entering covariates sequentially in blocks and stratified by gender.

RESULTS: Approximately 51% of the sample was female. Differences in BMI and household food insecurity were statistically different between men and women ($p<0.001$). In the unadjusted model, food insecure women were significantly more likely to have higher BMI compared to food secure women ($\beta = 2.51$; 95% CI 1.96, 3.07). This significance persisted for food secure women after controlling for demographics ($\beta = 1.79$; 95% CI 1.17, 2.41); demographic and lifestyle factors ($\beta = 1.79$; 95% CI 1.19, 2.38); demographic, lifestyle, and comorbidities ($\beta = 1.21$; 95% CI 0.65, 1.77); and in the fully adjusted model for demographic, lifestyle, comorbidities, and dietary variables ($\beta = 1.23$; 95% CI 0.67, 1.79). There were no significant associations between food insecure men and food secure men.

CONCLUSION: In this sample of adults, food insecurity was significantly associated with a higher BMI among women after adjusting for covariates. This difference was not observed among men in the sample. These findings suggest multifactorial interventions are needed to support lower BMI levels among women with food insecurity.

Koraym, Adam

Clinical & Translational Research

Familiarity Trends of Successful Urology Residency Match Applicants

Authors: O'Connor RC, Engelsgjerd S, Koraym A, Wong M, Sandlow JI.
Project Mentor: Robert Corey O'Connor, MD

Urology remains one of the most selective and sought after specialties in the medical field. In 2021, 80% of senior medical students in the US and Canada were successful in matching, the year prior was only 83%, leaving many well qualified graduates unmatched. We sought to determine if training program "familiarity" played a role in the successful match of urological surgery residents. In this study, we define "familiarity" as an applicant's home program, sites of away subinternships, hospitals near their hometowns or departments within previous undergraduate/graduate/research institutions. We analyzed information from successful urology match participants in the United States between 2015 and 2020. Data were collected from the AAMC applications, UrologyMatch.com, and SurveyMonkey®. Information recorded included each candidate's name, hometown, undergraduate institution, graduate, or research program (if applicable), medical school, location of visiting subinternships in urological residency, and urology residency training program. Overall, 1,080 of 1,451 successful urology match candidates (74.4%) met 1 or more "familiarity" criteria. Specifically, 329 (22.7%) and 508 (35.0%) students successfully matched into their home and visiting urology training programs, respectively. Of the remaining applicants, 153 (10.5%) and 90 (6.2%) matched into training programs <150 miles from their hometowns and within institutions of previous academic pursuits (undergraduate, graduate school etc.), respectively. Most (75%) of successful urology residency applicant match into positions of "familiarity". Given the competitive nature of matching into urology, this study can aid a student in increasing their chances of matching by becoming more "familiar" with programs of interest.

Kotagiri, Nayanika

Urban & Community Health

Pediatric Practice Perspectives on a Child Development Screener

Authors: Kotagiri N, Rohloff RT, Meurer JR.
Project Mentor: John Meurer, MD, MBA

INTRODUCTION: The Ages and Stages Questionnaire (ASQ-3) is a common screening tool used to assess the development of young children. Previous studies on ASQ implementations have not shown as dramatic increases in screening rates as seen at Children's Medical Group (CMG) general pediatric practice.
Specific Aims: The study's main objective is to use qualitative responses to analyze the strengths and weaknesses of the ASQ screening process. Providers' perspectives on the screener gave context to the current screening rates at CMG.
METHODS: 10 pediatricians, 3 practice managers, and 2 nurses at 8 CMG sites were interviewed using a standardized list of questions. These questions focused on gathering information about the ASQ's usefulness, usability, and clinic flow.
RESULTS: Several common themes emerged from the qualitative responses. Related to its usefulness, providers stated that the screener allowed them to delve deeper into understanding their patients' development, especially if it may be bordering concern. Similarly, providers found that the ASQ allowed them to better educate parents about their child's development. Providers were motivated to use the ASQ primarily to improve patient outcomes. Finally, providers felt that the ASQ was implemented well into clinic flow and there were high rates of parent completion of the questionnaires.
CONCLUSIONS: Pediatric providers' perspectives reinforce the strength of the ASQ as a screening tool at CMG pediatric clinic sites. It validates the implementation process of ASQ screening at CMG and represents providers' general satisfaction with using the screener. This information can be used to disseminate this screening model to other pediatric practices.

Labadie, DiAndre

Quality Improvement and Patient Safety

A retrospective look at penicillin allergy diagnoses in the Children's Wisconsin ED

Authors: Labadie D, Vyles D.

Project Mentor: David Vyles, DO

BACKGROUND: Penicillin allergies are one of the most commonly diagnosed conditions in childhood. In many cases, these diagnoses are made from symptoms incongruent with a true allergy. Consequently, antibiotic alternatives are prescribed which can be costly and contribute to poor stewardship. As current research in PCN allergies is limited, this project aimed to further examine patients who left CHW ED with a new documented allergy to learn more about how these diagnoses were made.

METHODS: Compiled a list of 140 patients who left the ED with a new documented PCN allergy from July 2018- June 2019. We created a set of criteria to further evaluate the allergy diagnosis including where the diagnosis was made, the type of provider who diagnosed, the indication for antibiotic, days until onset of symptoms, demographics, etc.

RESULTS: Of the 68 MRNs this writer abstracted, 15 were omitted due to lack of supporting data within their chart. Of the patients included, the most commonly prescribed antibiotic was amoxicillin (76%) followed by Augmentin (20%). Ear infections accounted for 80% of indicated antibiotic prescriptions. The average onset of allergic symptoms was 5.25 days after the first dose, with skin rash being the most commonly reported symptom (88%), followed by itching and swelling (18% and 13%, respectively). Urticaria (hives) was only documented in 10% of patients. Interestingly, 38% of patients who were documented with a new allergy had previously tolerated penicillin derivatives in the past. Serum sickness was noted in 26% of documented allergies.

CONCLUSION: Evaluating the clinical symptoms of PCN allergies may help identify whether a reaction documented in the EMR represents a true allergy. Given that nearly 40% of patients previously tolerated penicillin, patients who did not develop urticaria or serum sickness could benefit from an oral PCN challenge to determine their reactivity. Next steps include categorization of symptoms as high or low risk.

Lamm, Scott

Quality Improvement and Patient Safety

MedMoth: An Event to Build Inclusion and Community through Storytelling

Authors: Lamm SA, Sachs J, Berns C, Campbell B, Ferguson CC, Ark TK.

Project Mentor: Jonathan Bock, MD

PURPOSE: Storytelling is a way to foster inclusion, community building and acquisition of understanding across cultures and engagement1,2. We believed the Medical College of Wisconsin would benefit from a narrative-based exercise to foster the links, shared values and understandings in society that enable individuals and groups to trust each other and so work together. MedMoth was an opportunity to showcase student and faculty experiences, build social capital and community in a safe, fun, and transformative storytelling environment.

APPROACH/METHODS: Two MedMoth Storytelling Events, an informal in-person and virtual, event showcasing a series of five-minute personal stories, were held on February 27th, 2020 and April 8th, 2021. A pre-survey and post-survey were given to those attending the events, utilizing the loneliness, engagement and social capital indices.

RESULTS/OUTCOMES: A total of 135 audience members attended the MedMoth Storytelling Events. One-hundred twelve completed the pre-survey (82%) and seventy-four completed the post-survey (54%). The vast majority agreed that the event accomplished its goals of creating a sense of community and vulnerability (58% and 50% respectively). 70% agreed or strongly agreed it beneficial to their own wellbeing. 62% believed it to be effective at fostering equity within the MCW Community. 47% believe it has provided them a new perspective.

SIGNIFICANCE: MedMoth harnessed the power of storytelling to break down hierarchies, create a safe space, build character, encourage compassion, and nurture inclusivity. Over time, with repeated exposure to programming such as MedMoth, we hope to have an increased impact on social capital both community wide and personally.

Landowski, Truman — Clinician Educator

PCPLC Local Analysis: Delayed pull-through surgery in Hirschsprung's babies.

Authors: Landowski T, Calkins CM.

Project Mentor: Casey M. Calkins, MD

BACKGROUND:
Hirschsprung's Disease (HD) is one of the major causes of intestinal obstruction in children. Fortunately, definitive management of HD can be accomplished with a single-staged pull-through surgery. At Children's Wisconsin (CW), the protocol is to wait until the newborn has reached 6 weeks old before performing the primary pull-through (PPT) surgery, allowing newborns to benefit from bonding with their parents during a crucial developmental period before returning to a hospital setting.

AIM/GOAL:
We hypothesized that delaying the PPT surgery until 6 weeks of age does not increase our patients' post-operative length of stay, 30-day complication rate, or ED and/or unplanned surgical clinic visits prior to operation.

METHODS:
A retrospective cohort study was conducted using data from the Pediatric Colorectal and Pelvic Learning Consortium (PCPLC) database from 2014-2018. Primary outcomes were post-operative length of stay, 30-day complication rate, and presence of ED and/or unplanned surgical clinic visits prior to PPT. Simple descriptive statistics were used for analysis.

RESULTS:
Patients who delayed PPT averaged an 18% shorter admission than those undergoing surgery at <6 weeks old. Only 45% of the delayed group incurred a complication within 30 days post-op compared to 100% of the early group. No difference was found regarding ED/unplanned clinic visits between groups.

CONCLUSION:
Our results suggest that delaying PPT does not increase the risk to HD newborns and may be beneficial for their development and post-op recovery. However, this study warrants confirmation from a larger, multi-institution project where statistical relevance can be calculated.

Landry, Kelly — Urban & Community Health

Patient-Reported Barriers to Colonoscopy After Positive Fecal Immunochemical Testing

Authors: Landry K, Antoine A, Bauer L.

Project Mentor: Lauren Bauer, MD, MPH

Colorectal cancer mortality is decreased when patients are screened at the recommended intervals, deeming it important to determine barriers preventing patients from receiving necessary screening [1]. In 2015, the Wisconsin Comprehensive Cancer Control Program was awarded $2.5 million dollars to increase Fecal Immunochemical Testing (FIT) at 9 Federally Qualified Health Centers in Wisconsin. By August 2019, over 500 positive FIT patients were identified [2]. However, the data was limited on what happened to those patients—did they complete their diagnostic colonoscopy? If not, why not? Our project's purpose was to determine the barriers to obtaining this recommended next step in evaluation following positive FIT. Information on patients with positive FITs between 7/1/18 to 3/31/19 from 7 of the 9 FQHCs were obtained. Upon calling 51 of the patients without follow-up colonoscopy out of the total 97 with positive FIT, 4 mentioned receiving a colonoscopy despite their chart report. For the 47 patients without follow-up colonoscopies according to the patient or chart, 31 patients were able to be reached by phone, with 12 of those patients, or 39%, stating they would like to receive a colonoscopy in the future. The most common reported barriers were comorbidities with competing priorities, lack of understanding of importance of procedure, and billing/insurance issues. This project indicated significant barriers for positive FIT patients towards receiving follow-up colonoscopy leading to unmet healthcare needs. This suggests a need for more involved conversation around patient concerns when referring for diagnostic colonoscopy and consistent follow-up calls to address these barriers.

Laridaen, Justin

Clinical & Translational Research

Immediate-use steam sterilization in orthopedic fracture care: Analyzing the risk of infection

Authors: Laridaen JN, Martin JM, Schmeling GJ, Neilson JC.

Project Mentor: John C. Neilson, MD

INTRODUCTION: Immediate-use steam sterilization is an acceptable method to sterilize surgical implants in emergencies, but its abbreviated cycle may lead to increased risk of surgical site infection (SSI). This study aimed to investigate the incidence of SSI related to immediate-use steam sterilized implants. Secondary outcome measures included analysis of the documented rationale for its use, and identification of any deviations in the sterilization process.
METHODS: This retrospective, cohort study compared adult fracture patients undergoing open fixation with use of immediate-use steam sterilized implants (n=90) versus implants sterilized via a standard cycle (n=2314). Immediate-use steam sterilization records from the institution's sterile processing department were obtained for review of rationale and adherence to key components of the sterilization cycle.
RESULTS: Comparison analysis revealed no significant difference in SSI incidence in the immediate use steam sterilization (3 of 90 [3.3%]) and standard sterilization technique groups (26 of 2341 [1.1%]) (P=0.13, OR=2.5, 95% CI=0.5-8.4). Analysis of immediate-use steam sterilization logs revealed inappropriate use in many of the documented events. Key components of immediate-use steam sterilization cycle protocol were often omitted in the electronic records.
CONCLUSION: Immediate use-steam sterilization implant sterilization serves a role in peri-operative fracture care. Documentation must be improved to allow for quality assessment of immediate-use steam sterilization practices and proper tracking of implants and instruments.

Lee, Karen

Clinical & Translational Research

Pitfalls Associated with Ellipsoid Zone Intensity Measurements Using Optical Coherence Tomography

Authors: Lee KE, Heitkotter H, Carroll J.

Project Mentor: Joseph Carroll, PhD

Optical coherence tomography (OCT) allows non-invasive visualization of individual retinal layers and has become a mainstay in the diagnosis and management of a wide range of retinal and systemic disease. As the number of available treatments increases, there is growing interest is developing sensitive OCT-based biomarkers for assessing therapeutic response. In particular, the hyperreflective outer retinal band just posterior to the external limiting membrane (ELM), also known as the ellipsoid zone (EZ), is a widely used biomarker of photoreceptor structure. EZ integrity, width, and area are established metrics that have been correlated with visual acuity and aspects of retinal function on microperimetry and electrophysiology. More recently, EZ reflectivity has emerged as a potentially more sensitive biomarker of photoreceptor structure, as reflectivity has been shown to undergo changes in retinal degenerative conditions prior to changes in EZ integrity. However multiple challenges exist to widespread clinical utilization. For example, variability between devices can impact the appearance of the OCT image through differences in acquisition methods, lack of uniform hardware, and variable image processing methods. In addition, image analysis methods vary widely across studies – this lack of standardization prevents robust comparison of results between studies and inhibits more widespread adoption of these measures. Finally, there is ambiguity as to how well EZ integrity correlates with underlying photoreceptor structure as assessed with adaptive optics scanning light ophthalmoscope (AOSLO). Here, we review these challenges and their impact on the use of EZ reflectivity measurements.

Lemke, Jennifer — Quality Improvement and Patient Safety

Determining the Value of the Complex Care Program on Patients with Medical Complexity

Authors: Lemke JT, Johaningsmeir S, Schnell J.
Project Mentor: Jessica Schnell, MD, MPH

INTRODUCTION: Children with medical complexity (CMC) receive care in both inpatient and outpatient settings and have several specialists involved in their care. The Complex Care Program (CCP) at Children's Wisconsin provides medical co-management and care coordination for CMC in both settings.
AIMS: Identify areas for improvement to optimize the CCP care delivery model.
Increase the percentage of monthly reciprocal contact with a goal 94%.
METHODS: Interviews were conducted with primary caregivers of children enrolled in the CCP. Responses were reviewed to identify common themes.
Of these themes, communication with caregivers was selected as an important area for improvement. A chart review was completed identifying reasons for failed reciprocal contact. Interventions were applied to target these.
RESULTS: Caregiver responses identified frequent communication with families and knowledge of both social and medical factors as areas in which the CCP is most helpful.
Focus on frequent communication through caregiver phone interviews and a chart review identified that from a caregiver perspective, failed monthly contact was most frequently due to caregivers not having questions at that time. From a CCP perspective, failed contact was most frequently due to suboptimal attempts at contacting caregivers.
CONCLUSIONS: Themes identified as helpful by caregivers relate to CCP familiarity with both medical and social components of a patient's background, and knowledge of how to manage these.
Consistent communication between providers and caregivers was identified as a critical area for improvement. Through CCP education/feedback and the introduction of a dot phrase in Epic, monthly contact increased from 84% to 91%.

Lenz, Troy — Clinical & Translational Research

The use of bipolar sealer for hemostasis in sarcoma resection

Authors: Lenz T, King DM, Hackbarth DAJ, Gorman A, Neilson JC.
Project Mentor: John C. Neilson, MD

INTRODUCTION: Sarcomas are rare, malignant connective tissue tumors, often occurring in the lower limbs and pelvic girdle. Definitive treatment is wide-margin surgical excision with blood loss as a major concern because the size and locations of these malignancies. Hemostasis has been achieved historically with electrocautery, which uses very high heat causing eschar and toxic smoke to form while cauterizing blood vessels. Bipolar sealers (BPS) are an alternative to electrocautery by achieving hemostasis with lower temperatures in saline and less tissue damage. We hypothesize that BPS will achieve better or non-inferior hemostasis in these procedures compared to electrocautery along with possibly decreasing case length.
METHODS: A retrospective chart review was performed of FMLH patients who underwent high-grade sarcoma resection from 7/2005-4/2019. Number of transfusions needed was noted as well as peri-operative blood loss. The patient's total blood volume and perioperative blood loss were calculated using the Gross Equation and Hemoglobin Balance Equation method. Descriptive statistics were used to determine the relative risk of needing blood products with electrocautery and with BPS.
RESULTS: There were no significant differences between the groups, with the average age being 64 (s=13.82) for electrocautery and 54 (s=17.32) for the BPS group. There were 30 (16 female) patients in the electrocautery group and 35 (12 female) in the BPS group.
8 and 11 patients required transfusions in the electrocautery group and BPS group, respectively. The relative risk between the two groups was 1.00. The mean blood loss for electrocautery was 1141.17ml (s=768.79) and for BPS was 1280.60ml (s=619.11, p=0.43).
CONCLUSIONS: Using BPS for hemostasis was non-inferior to electrocautery for achieving hemostasis in high-grade sarcoma resection and there was no difference in risk for transfusion between the groups. It is yet to be determined if BPS influences surgical case length.

Li, Darren — Clinical & Translational Research

Naloxone Prescribing in an Academic Emergency Department: Provider Practices and Attitudes

Authors: Li D, Hernandez-Meier J, Zosel A.

Project Mentor: Amy Zosel, MD, MSCS

BACKGROUND: Naloxone reverses opioid overdose but is not universally prescribed. With rises in opioid-related emergency department (ED) visits, emergency providers are in a unique position to identify and treat opioid-related injury, but little is known about their attitudes and practices around naloxone prescribing.
Objective: To investigate the attitudes and practices of Wisconsin ED providers regarding naloxone prescribing. We hypothesized that emergency providers will identify multifactorial barriers to naloxone prescribing and report varying levels of naloxone prescribing behaviors.
METHODS: A survey designed to assess attitudes and behaviors of emergency providers regarding naloxone prescribing practices was emailed to all prescribing providers at one urban academic ED. Descriptive and summary statistics were performed.
RESULTS: Our response rate was 29% (36/124). Nearly all (94%) expressed openness to prescribing naloxone from the ED, but only 58% had actually done so. Few (6%) believed that people who abused opioids would increase opioid use if given increased access to naloxone, or expressed concern about laypersons' abilities to properly administer naloxone. Time constraints was the most frequently identified barrier (39%), followed by a perceived inability to properly educate patients on naloxone use (25%).
CONCLUSION: In a study of emergency providers, the majority of respondents were amendable to prescribing naloxone, yet almost half had not done so. Barriers included time constraints and perceived self-reported knowledge deficits regarding naloxone education. More information is needed to gauge the impact of individual barriers to prescribing naloxone, but these findings may provide information that can be incorporated in provider emergency provider education and potential clinical pathways designed to increase naloxone-prescribing.

Lin, Gloria — Clinical & Translational Research

Therapeutic benefit of SRCP1 in amyotrophic lateral sclerosis: an in vitro model

Authors: Lin G, Seminary E, Ebert AD.

Project Mentor: Allison D. Ebert, PhD

Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disorder caused by the loss of upper and lower motor neurons. It causes muscle weakness, paralysis and ultimately death. ALS is characterized by the buildup of protein aggregates in affected motor neurons, and it is hypothesized that this protein aggregation contributes to neurodegeneration. While the exact mechanism behind this phenomenon has not been determined, protein aggregation breakdown has been an ideal therapeutic target for ALS. Previous studies have discovered a novel gene in the slime mold organism Dictyostelium discoidum, termed serine rich chaperon protein (SRCP1), that prevents the aggregation of long protein tracts. Additionally, we previously found that expression of SRCP1 in human stem cell derived neurons overexpressing the mutant huntingtin gene prevented the usual formation of protein aggregation. Therefore, SRCP1 could have implications in preventing a wider scope of neurodegenerative disorders characterized by protein aggregation, including ALS. Therefore, we used human stem cell derived motor neurons from ALS patients and healthy controls to test whether lentiviral delivery of SRCP1 could reduce insoluble protein and promote motor neuron survival in models of ALS by optimizing the removal of aggregates. However, SRCP1 did not show a significant decrease in insoluble protein abundance between ALS and control motor neurons. This finding indicates that while SRCP1 may play a role in insoluble protein clearance in certain neurodegenerative disease, the pathophysiology of ALS may require activation of other aggregation removal pathways. Further examination into the biochemical pathways behind ALS are needed to aid the development of targeted therapies.

Liu, Lawrence

Clinical & Translational Research

Is Discontinuation of an EMS Post-Event CPR CQI Feedback Form Associated with Worsening of CPR Metrics?

Authors: Liu L, Colella R, Aufderheide T.

Project Mentor: Tom P. Aufderheide MD, MS

INTRODUCTION: An emergency medical services post-event continuous quality improvement (CQI) feedback form, previously shown to improved quality of cardiopulmonary resuscitation delivered at the scene of a cardiac arrest, was permanently discontinued in the Milwaukee County EMS system.
Hypothesis: Discontinuation of the post-event CQI feedback form would be associated with significant deterioration in chest compression rate and depth delivered during cardiac arrest.
METHODS: We retrospectively analyzed CPR quality metrics captured by ZOLL defibrillators in adults with non-traumatic, out-of-hospital cardiac arrest during and after discontinuation of a post-event CQI feedback form. CPR benchmarks included a chest compression rate of 100-120 bpm and chest compression depth at least 5 centimeters deep. The CQI feedback form was supplied to providers involved within 72 hours. CPR quality performed by BLS and ALS providers were compared:1) before discontinuation of the CQI form, and 2) after discontinuation of the CQI form.
RESULTS: The Before group consisted of 556 patients. The After group consisted of 303 patients. For BLS providers in the Before versus After groups, compression rate was 112.6 vs 112.2 bpm, p= .785. Rates <100 bpm were 4.7% vs. 9.1%, p= .527. Average compression depth was 5.4 vs 5.5 cm, p= .454. Percent of total compressions ≥5 cm deep was 63.5 vs. 66.6%, p= .510. For ALS providers in the Before vs After groups, compression rate was 115.2 vs. 116.9 bpm, p= .019. Rates <100 bpm were 3.3 vs. 3.1, p= .002. Average compression depth was 5.6 vs. 5.7, p= .226. Percent of total compressions ≥5 cm deep was 67.3 vs. 68.7%, p=.524.
CONCLUSION: Discontinuation of the post-event CQI feedback form was not associated with statistically or clinically significant deterioration in chest compression rate or depth delivered.

Liu, Benjamin

Health Systems Management & Policy

Reducing Student Anxiety in Pipeline MCAT Training Using Near-Peer Coaching

Authors: Liu B, Hodge A, Jushka C, Hueston W.

Project Mentor: William Hueston, MD.

BACKGROUND: The Medical College Admission Test (MCAT) is a standardized exam taken by prospective medical students in the United States. Doing well on the MCAT is critical for success, and such pressures may enhance any existing test anxiety. For students from Underrepresented in Medicine (URM) backgrounds, this is often compounded by being the first in their family to take the MCAT and difficulty accessing expensive MCAT preparation programs.
METHODS: We conducted a literature review for other interventions on test anxiety. Based on our findings, we elected to establish a near-peer coaching (NPC) program for URM students enrolled at the Medical College of Wisconsin pipeline MCAT program. All 22 students within the MCAT program participated in the first year of the NPC program, and all 17 students in the second year. We quantified baseline and specific time points of test-anxiety levels using a modified west-side test anxiety scale. We asked about MCAT concerns and program impressions via a free-response section and analyzed results with inductive analysis.
RESULTS: Our literature review found no other studies examining MCAT-related test anxiety. NPC was chosen for our study because of its accessibility to our program. Students had higher test-anxiety levels prior to engaging in the NPC program, with 9/19 respondents in the initial cohort having at least moderately high levels; meeting the threshold for anxiety reduction intervention. We observed a decrease in the number of students meeting this threshold after each coaching session and an increase immediately after a mock MCAT exam. Students received the program well, however wanted to be able to choose the content to cover and have more meetings.
CONCLUSION: This observational pilot study suggests that the level of MCAT test-anxiety is high enough to warrant intervention in URM prospective medical students and that NPC is well-received and correlates to reduced test-anxiety levels over time.

Lodhia, Raj — Global Health

Community perceptions on snake envenomation in Panama

Authors: Lodhia R, Olson R, Hernandez C, Bernal de Becerra G, Urriola M, Suárez J, Gundacker N.
Project Mentor: Nathan Gundacker, MD
Community Partner: Ministerio de Salud de la República de Panamá; Instituto Conmemorativo Gorgas de Estudios de la Salud

HYPOTHESIS: Due to high incidence of envenomation and its effect on personal and social well-being, researchers performed an assessment of snakebite knowledge and comprehension. The purpose of this study was to determine common perceptions and misconceptions about snakebite envenomation and treatments in El Valle de Antón, Panama, in order to improve education and treatment options.
METHODS: A 21-question survey was administered to 340 individuals between July 2018 and July 2019 in El Valle de Antón, Panama. Surveys were collected by two team members at the local health center and surrounding communities. Verbal consent was obtained prior to each electronic survey collected. Participants could complete the survey on their own or have surveyors ask questions verbally and complete the survey for them. Study data was uploaded to RedCap (Vanderbilt) and Microsoft Excel for analysis.
RESULTS: Three hundred forty individuals were administered a 21-question survey. Two of the most common snakes found outside of the survey respondents' homes were the venomous fer-de-lance (62.9%) and coral snake (39.5%). Most (80%) respondents (n=272) incorrectly selected that the snake had to be brought to clinic to receive effective care and 60.7% (n=202) recommended tourniquet use to treat snake envenomation. Majority (97%) of respondents reported that they would transfer a snakebite victim to a medical clinic.
CONCLUSION: While interactions with venomous snakes were prevalent, most participants were unfamiliar with treatment strategies that improve health outcomes before transporting snakebite victims to medical clinics. Improved health literacy is needed to address snake envenomation in the rural setting.

Loffredo, Anthony — Health Systems Management & Policy

Clinical Outcomes of Post-operative Dressings in Patients Undergoing a Below Knee Amputation

Authors: Rossi PJ, Del Toro D, Loffredo AJ.
Project Mentor: Peter J Rossi, MD

INTRODUCTION: To prevent contracture after a below knee amputation (BKA), patients are dressed in either a rigid cast or a removable splint. This study compared these dressing methods and their relationship to a reattainment of the ability to stand.
METHODS: A retrospective study was performed on patients that underwent a BKA at Froedtert Hospital in Milwaukee, WI between 2010 and 2018. The number of days after surgery until patients were documented to stand with a moderate assist (50% assistance) or less was recorded. Descriptive statistics and c2 provided statistical analysis.
RESULTS: Among 195 patients that reached the stand with at least 50% independence threshold the mean number of days to first success was 12.64 ± 6.28 for those who received a cast and 13.00 ± 5.84 for those who received a splint. Other factors including age, sex, DM, HTN, DLD, CAD, COPD, smoking status, and statin use were also measured with only age less than 70 versus greater than 70 and sex showing a significant impact on time to stand.
CONCLUSION: Casting or splinting a patient after a BKA provides no significant difference in regard to standing with at least 50% independence. Using standard pricing at Froedtert hospital it was found that the cost of a splint ranged from $10 - $12.03 while a cast cost approximately $29.95 for a small, $35.81 for a medium, and $41.46 for a large. Accounting for patient tolerance to each intervention it is thus more cost effective to utilize a splint after patient's undergo a BKA.

Lumetta, Katherine | Urban & Community Health

Functional Assessment of Concussion Tool (FACT) Application in a Pediatric Concussion Clinic

Authors: Lumetta K, Fehr S, Apps J, Thomas DG.
Project Mentor: Shayne Fehr, MD

BACKGROUND: Concussion patients use symptoms to guide management. We tested a novel mobile app-based assessment (Functional Assessment of Concussion Tool (FACT)), which focused on how symptoms affect daily activities.
OBJECTIVE: This study aims to determine the utility of FACT to assess functional outcomes in pediatric concussion patients.
METHODS: 27 pediatric subjects completed a SCAT3, PCSS, and FACT app assessment in a concussion clinic. Subjects reported the number of symptoms they experienced by symptom domain and rated the domain's impact on normal activity in the FACT app. Subjects completed a PCSS assessment at each subsequent visit. Linear regression determined the predictive value of FACT symptoms and ratings across domains compared to SCAT3 and PCSS symptom scores.
RESULTS: FACT symptom number was predictive of SCAT and PCSS scores across domains ($p<0.03$). The FACT rating score was predictive of SCAT and PCSS scores in some domains ($p<0.02$). In multiple linear regression models, number of FACT symptoms was a predictor of the total SCAT/PCSS scores and SCAT scores in all domains ($p<0.01$) and PCSS scores in some domains ($p<0.01$). However, the FACT rating score was not a predictor of SCAT/PCSS scores. FACT symptom and PCSS scores were not significant predictors of recovery.
CONCLUSION: FACT symptoms are associated with SCAT and PCSS scores across all domains of symptoms, while the FACT rating score was a predictor across some but not all domains. This suggests that FACT may be assessing different elements of symptoms. Neither FACT nor PCSS scores were significant predictors of recovery.

MacBeth, Maggie | Urban & Community Health

Effect of a best-practice alert on the rates of smoking cessation during pregnancy

Authors: Palatnik A, Tillis B, Tsaih SW, MacBeth M, Chen M, Egede L.
Project Mentor: Anna Palatnik, MD

OBJECTIVE: Both the United States Public Health Service and American College of Obstetricians and Gynecologists recommend that clinicians offer effective tobacco dependence interventions to pregnant smokers at first prenatal visit and throughout pregnancy. The objective of this study was to determine the effect of a best-practice alert (BPA) on counseling and smoking cessation rates in pregnancy and to assess demographic risk factors associated with increased rates of smoking in pregnant women.
STUDY DESIGN: In 2018, we created and added a BPA to our electronic prenatal record. The BPA let providers know at each prenatal visit if the patient is still an active smoker and provided the 5A's method for counseling on smoking cessation. We then compared the rates of smoking cessation in pregnancy 1 year before and after BPA. Secondary outcomes examined were documentation of smoking cessation counseling in the chart and rates of obstetric outcomes associated with tobacco smoking.
RESULTS: After BPA implementation, the rates of smoking cessation in pregnancy increased from 18.4% prior to BPA implementation to 52.6% after BPA implementation ($p<0.001$, OR 4.93, 95%, CI 3.26-7.57). Documentation of counseling increased as well. Non-Hispanic white women, public insurance, and concurrent illicit drug or alcohol use were associated with higher rates of active tobacco smoking status (Table 1).
CONCLUSION: The rate of smoking cessation in pregnancy and counseling documentation during prenatal visits increased after implementation of the BPA. We recommend adding a smoking cessation BPA to electronic prenatal records to increase smoking cessation rates during pregnancy

Magana, Victor

Clinician Educator

Clinical Care of LGBTQ+ Patients

Authors: Magana V, Petroll A.
Project Mentor: Andrew Petroll, MD

BACKGROUND: The LGBTQ+ population continues to face significant health disparities. Through experiential, didactic, and self-directed learning, students can learn to provide competent care to this diverse and continually growing population.
METHODS: We developed a 4-week elective course for M4 students at MCW. Students were precepted by providers in Froedtert & MCW's Inclusion Health Clinic, an LGBTQ+-focused multidisciplinary clinic. Provider specialties include primary care, psychiatric care, infectious diseases, endocrinology, GI, and OBGYN. Students then filled out a survey and were interviewed regarding the course's effectiveness, comprehensiveness, and deficits.
RESULTS: Four students completed the course in its inaugural year, AY2021, of whom, 3 completed our survey and individual interviews. Overall, students reported an increase in their knowledge of LGBTQ+ health disparities and their clinical abilities related to major competencies the course aimed to improve. They viewed the course as providing a comprehensive training experience in LGBTQ+ health. They regarded the faculty members as knowledgeable, compassionate, and relatable. No significant deficits were noted, though students reported that a standardized patient component would help hone their skills further.
CONCLUSION: Clinical Care of LGBTQ+ patients gave MCW M4 students the opportunity to improve their knowledge and clinical skills in caring for this diverse patient population. It would benefit the MCW student population to expand on this elective course in the future to allow more students the opportunity to improve their knowledge and clinical competency in caring for this historically underserved community that continues to face major health disparities.

Maheen, Aniya

Health Systems Management & Policy

Understanding the Perception of Health in the Rohingya Community

Authors: Haider S, Maheen A, Ansari M, Stolley M.
Project Mentor: Melinda Stolley, PhD

The Rohingya are Burmese nationals, and due to the government authorized ethnic cleansing, the Rohingya must find safety in nearby countries. In these countries, many Rohingya live in camps, where they experience additional violence, lack of access to basic needs, and increased health concerns. Within the past 4 years, over a thousand Rohingya families have been resettled in Milwaukee, Wisconsin. Considering the impact of the trauma experienced by the Rohingya, we sought to identify the health needs and perceptions of the Rohingya community in Milwaukee. This project consisted of 10 in-depth key informant interviews with stakeholders from refugee resettlement agencies, healthcare clinics, and community-based organizations. The interviews were transcribed, coded, and analyzed for themes. We identified the following preliminary themes: 1) Health is defined as being able to meet basic needs of the family and is prioritized over individual concerns; 2) Prior and existing mistrust for healthcare institutions and fear of systems of authority impact healthcare-seeking behavior; 3) Past trauma is common and negatively impacts physical and mental health; 4) Religion and spirituality influence beliefs about illness, recovery, and wellbeing; 5) Linguistic, cultural, and educational barriers impact healthcare access and quality, and the understanding of disease leading to fatalistic attitudes. We intend to use these findings to inform the development of future studies and programs tailored to the health needs of the Rohingya community in Milwaukee. We hope to implement sustainable interventions that can build relationships of trust, improve health outcomes, and support the efforts of our Rohingya neighbors.

Maisel, Mitch

Clinical & Translational Research

Femoral Shaft Gunshot Fractures: Long-Term Post-Operative Gait and Strength

Authors: Maisel ME, Lenhart RL, Loeffler TE, Martin JM, Beck CJ, Schmeling GJ, Harris GF, Fritz JM.
Project Mentor: Gregory Schmeling, MD

BACKGROUND: There is minimal data on the functional outcomes of femoral shaft fractures. This study analyzed the post-operative gait and leg strength of participants at least 2 years after isolated femoral shaft fractures due to gunshot wounds (GSW) compared to control data.
DESIGNS: Five males (34±4 years) fitted with 17 reflective markers and 10 surface EMGs walked along a 30ft walkway while motion data was recorded using Vicon motion cameras. Temporal-spatial gait parameters and kinematics were compared between the fracture population and historical control data. Isometric and isokinetic strength testing was collected using a Biodex System 3 Pro-Dynamometer and compared knee flexion and extension between the surgically repaired and unaffected limbs. Statistical analyses were conducted using Welsh's unpaired two-tailed t-tests.
RESULTS: The GSW fracture population exhibited significantly reduced peak torque/body weight with their affected limb compared to the contralateral during isometric contractions of the quadriceps and hamstrings at 60° and 90° of knee flexion ($p=0.01$). Compared to control data, the fracture population displayed significant differences in kinematics at the pelvis, hip, knee, and ankle joints ($p<0.001$), as well as statistically reduced temporal-spatial parameters ($p<0.001$) including walking speed, stride length, and cadence.
CONCLUSIONS: The GSW fracture population exhibited weakness in their surgically repaired limbs, as well as altered gait kinematics during ambulation, implying a lack of adequate recovery post-operatively. As these deficits have been shown to be predictive for future disability, current physical therapy protocols may need to be reevaluated in order to improve the long-term functional outcomes for these patients.

Malas, Kareem

Molecular & Cellular Research

Mitochondrial K+/H+ Exchanger activity identified in guinea pig cardiomyocytes

Authors: Malas KM, Heisner JS, Zare A, Camara AKS, Stowe DF.
Project Mentor: David Stowe, MD, PhD

Mitochondria play an important role in buffering major cellular cations during cardiac ischemia and reperfusion (IR) injury. Thus, knowledge of the kinetics of mitochondrial channels and exchangers is important so that we rationally treat mitochondrial dysfunction during cell stress. During ischemia, increased cellular Ca^{2+} activates mitochondrial Ca^{2+}-sensitive big conductance K^+ channel (mBKCa) resulting in mitochondrial K^+ uptake and mitochondrial swelling. Mitochondrial K^+ (mK^+) extrusion kinetics, however, are not well-described. We proposed mK^+ extrusion occurs through the mitochondrial K^+/H^+ exchanger (mKHE), a transmembrane protein that has not been molecularly defined but is believed to exchange H^+ entry for mK^+ exit. We hypothesized that if we stimulated mKHE activity by introducing K^+ into the matrix via NS1619, a mBKCa agonist, then the mitochondria will both acidify and contract as mK^+ is exchanged out for H^+. Guinea pig cardiomyocyte mitochondria were isolated and suspended in a Cs^+-based buffer. Matrix pH and volume were measured by fluorescence spectrophotometry and light-scattering spectrophotometry, respectively. Treatment with NS1619 resulted in matrix acidification and an initial swelling followed by contraction to baseline volume at extra-matrix pH's of 6.9 and 7.6. Concomitant treatment with paxilline (mBKCa antagonist) mitigated these effects. With other notable mitochondrial channels and exchangers inactive due to the absence of Na^+ and Ca^{2+} in the buffer, we concluded the matrix acidification and contraction were directly due to mKHE re-establishing cationic homeostasis. Mitigation of these effects by paxilline helped confirm the changes in pH and volume were indeed directly due to mBKCa and mKHE activity and not other secondary factors. As more evidence of mKHE activity emerge, the better understanding we have of how mitochondria regulate K^+ disturbance. These insights can one day guide novel treatment options for IR injury.

Mallery, Quinn

Bioethics & Medical Humanities

Evaluation of decision aids for patients considering a left ventricular assist device

Authors: Mallery QJ.

Project Mentor: Ryan Spellecy, PhD

BACKGROUND: Between 250,000-350,000 patients in the USA suffer from advanced heart failure. Left ventricular assist devices (LVAD) can be used as either destination therapy or a bridge to transplant for patients with advanced heart failure and limited comorbidities. LVADs have been proven to reduce short-term mortality and reduce hospital admission rates. However, patients must accept risks and lifestyle changes including being dependent on a power source, driveline site care, water precautions, etc. Decision aids (DA) are used to improve knowledge and reduce decisional conflict.

METHODS: We reviewed the inventory of DAs collected by Ottawa Hospital Research Institute for all DAs related to LVAD. We analyzed DAs based on the International Patient Decision Aid Standards (IPDAS) checklist and Flesch-Kincaid Readability Test. A literature review of published studies on each DA was performed.

RESULTS: Two DAs currently exist for advanced heart failure patients considering LVAD: I Decide LVAD (Colorado Program for Patient Centered Decisions) and Deciding Together (The Patient Centered Outcomes Research Institute). I Decide LVAD scores 29/29 while Deciding Together scores 26/29 on the IPDAS checklist. I Decide LVAD is written at a 6th grade reading level while Deciding Together is written at a 7th grade reading level. I Decide LVAD has been shown to improve correlation between stated values and treatment choice at 1 month but not 6 months. Deciding Together has been shown to increase reported satisfaction with life after implantation while not affecting rates of acceptance vs. decline of LVAD.

CONCLUSION: There are two high quality DAs available for patients with advanced heart failure who are considering a LVAD. Physicians may want to consider patient preference when choosing a DA. I Decide LVAD offers improved readability and reduced length. Deciding Together further highlights patient perspectives and has evidence of improved satisfaction.

Martell, Madeline

Molecular & Cellular Research

Behavioral outcomes of neuropathic pain

Authors: Martell M, Pan B, Hogan Q.

Project Mentor: Quinn Hogan, MD

The CDC estimates that 20% of U.S. adults live with chronic pain, which is linked to dependence on opioids, anxiety and depression, and reduced quality of life. Research has failed to generate new analgesic medicines for chronic pain, which may be due to the inadequacy of preclinical models. Pain is defined as an unpleasant sensory and emotional experience associated with high intensity tissue stimulation. Currently, measured outcomes to evaluate an animal's pain typically rely on spinal reflexes alone. Therefore, there is a need for improved methods to measure pain in preclinical models that better encompass the emotional experience of pain. The objective of this study was to develop sensitive tests of spontaneous behaviors that characterize the phenotype induced by chronic pain in rat models. The methods explored included ultrasonic vocalizations (USVs), spontaneous home cage behavior, and spontaneous behavior in an open field. We hypothesized that our novel methods of measurement would detect distinct behaviors in animals with chronic pain. After tibial nerve injury (TNI), we found that rats showed increased grooming and decreased exploring during home cage monitoring and during the open field test. In addition, ultrasonic vocalizations showed that TNI rats exhibited a reduced latency to 22kHz calls indicating increased irritability. These novel methods to assess chronic pain show promise for future implication when assessing pain in experimental models in order to develop new analgesics that can be translated into clinical use.

Marting, Spenser

Urban & Community Health

Responding to trauma: culturally effective, trauma-informed strategies for urban middle and high schools

Authors: Marting SP, Hasan C, Dilley L, Meurer JR.

Project Mentor: John Meurer, MD, MBA

Community Partner: Milwaukee Succeeds

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

Mather, Tara

Quality Improvement and Patient Safety

Abdominally-Based Free Flap Breast Reconstruction in the Severely Obese Population: Is it Safe?

Authors: Mather TL, Tobin C, Tillman R, Doren E, LoGiudice J, Hijjawi J, Adamson K.

Project Mentor: Karri Adamson, MD

INTRODUCTION:

Class 3 (severe) obesity is defined as a body mass index (BMI) greater than 40 kg/m2. Obesity is common and an independent risk factor for breast cancer. The plastic surgeon will be tasked with providing reconstruction for obese patients after mastectomy. This presents a surgical dilemma because patients with elevated BMI are known to have greater rates of morbidity when undergoing free flap reconstruction, however free flap reconstruction is associated with greater functional and aesthetic outcomes. This study quantifies complication rates in a cohort of patients with class 3 obesity who underwent abdominally-based free flap breast reconstruction. This study may be able answer whether this surgery is feasible or safe.

METHODS:

Patients with a class 3 obesity who underwent abdominally-based free flap breast reconstruction between January 1, 2011 and February 28, 2020 at our institution were identified. A retrospective chart review was performed to record patient demographics and peri-operative data.

RESULTS:

Twenty-six patients met inclusion criteria. 80% of patients had at least one minor complication including infection (42%), fat necrosis (31%), seroma (15%), abdominal bulge (8%), and hernia (8%). 38% of patients had at least one major complication (requiring readmission (23%) and/or a return to the operating room (38%)). No flaps failed.

CONCLUSION:

Abdominally-based free flap breast reconstruction in patients with class 3 obesity is associated with great morbidity, however, no patients experienced flap loss or failure which may imply that this population can safely undergo surgery so long as the surgeon is prepared for complications and takes steps to mitigate risk.

Matzke, Joshua | Urban & Community Health

A Health Needs Assessment Among Milwaukee's Homeless

Authors: Matzke JM, Johnston B, Schneider T, Nelson DA.
Project Mentor: David Nelson, PhD
Community Partner: StreetLife Communities

INTRODUCTION: It is known that those experiencing homelessness use acute health care services at a much higher rate than the general population, while underutilizing preventive care and primary care. Although resources for this community have improved over the last decade, there are still unmet needs. This project assesses the needs and barriers to care and resources from the community's perspective.
METHODS: This survey tool was informed and advised by those with lived experience of homelessness and those who work closely in the space. It was approved and supervised by MCW IRB (PRO00036564). The survey was disseminated on outreach routes around the city of Milwaukee. Data was transcribed, reviewed and analyzed using various statistical methods.
RESULTS: Results indicated that 48% perceive their health as "poor", while another 25% rated their health as "fair". Emergency departments were the highest utilized health resource. 58% of participants indicated they had a primary care physician, while 64% reported possessing active healthcare insurance. There were many perceived barriers to care, but lack of transportation, money, and inadequate hours were most common. Substance use was also a common perceived barrier, as 18% reported using opiates daily.
DISCUSSION: The needs of those experiencing homelessness are broad and complex. To improve health equity and access, outcomes, and perceived health, a biopsychosocial model of health must be adopted by health systems and physicians. Steps that can be taken to address these issues include primary care coordination, improved food and housing stability screening and resources, harm reduction resources, and outreach.

Maurer, Jenna | Urban & Community Health

"Eyes on the Future:" Engaging a Future Generation of Latino Physicians and Scientists

Authors: Maurer JE, Medic V, Kim JE.
Project Mentor: Judy E. Kim, MD
Community Partner: St. Augustine Preparatory Academy

BACKGROUND: Latinos are considered an underrepresented group in science and medicine. Therefore, innovative methods are needed to increase Hispanic and Latino exposure, interest, and representation in these fields.
OBJECTIVE: A pipeline program called "Eyes on the Future" was created, and implementation and acceptance by the stakeholders was evaluated. It was believed that a program incorporating early exposure to medical science during education and mentoring by medical students may be effective.
METHOD: 8th grade students at St. Augustine Preparatory Academy in Milwaukee, which provides education to predominantly Latino students, participated in the project. Several activities led by MCW medical students were designed to engage the students throughout the year, including an interactive presentation on the eye with an **INTRODUCTION** to STEM careers, a collaborative eye dissection, and a visit to the STAR Center at MCW for clinical simulations. Students and teachers were asked to complete an anonymous evaluation upon culmination of the program.
RESULTS: For the STAR Center visit, teachers selected 26/120 students who showed exceptional motivation and interest in the presentation and eye dissection. While the majority of students (63%) selected the STAR Center as their favorite event, the majority of students (81%) also indicated that they did not have a least favorite event. The number of students who demonstrated an interest in science/medicine before the program as compared to after increased from 40% to 73%. Both students and teachers expressed an overall satisfaction with the program, especially the hands-on components. Teachers reported high student engagement, which corresponded with comments from the students reflecting a joy in learning new things.
CONCLUSIONS: Creation and implementation of a pipeline program for mostly Latino middle school students was feasible, well-received, and may serve as a model that can be followed at other schools.

Mayer, Katlyn

Quality Improvement and Patient Safety

Factors Associated with Patient Safety in Prehospital Medicine

Authors: Mayer K, Mattrisch L, Colella MR, Weston BW, Grawey T.

Project Mentor: Thomas Grawey, DO

BACKGROUND: Medical error is a leading cause of death in the United States. While this phenomenon is well-studied in the hospital environment, little is known about error in the prehospital setting. Several factors are thought to contribute to medical error particularly within Emergency Medical Services (EMS.) Provider fatigue, pediatric patient population, increased illness severity, racial minority status, and presence of a language barrier are all factors that have been shown to increase the likelihood of error in EMS.

METHODS: We completed a retrospective chart review of EMS runs reported to the Milwaukee County Office of Emergency Management's Continuous Quality Improvement Program (CQIP) for possible medical error in 2018, and categorized the error according to type, patient demographic (race, age, language, shock index as a measure of illness severity), and temporal demographic (time of day and time of year) among other factors. We then compared those reported runs against all runs in the year 2018 to identify potential risk factors for medical error.

RESULTS: Of the 264 reported cases, 215 were included in analysis and compared against 32,922 general population runs from 2018. Cases were removed due to missing demographic data. We found that errors are significantly more likely ($p<0.001$) to be made on EMS runs that are cardiac or trauma in nature, and in patients who were sicker on scene (shock index ≥1.) There was also a significantly higher error rate in pediatric patients vs adult patients (7.8% vs 4.11% $p<0.001$). There was a tendency toward higher error rate in the last eight hours of the shift (midnight to 8AM,) but this was not significant ($p=0.41$). There was not enough reported data regarding race and language to be able to draw conclusions.

CONCLUSIONS: Prehospital medical error is more likely to occur in sicker patients and in the pediatric population. The study has several limitations such as reporting bias and possible incomplete retrospective data.

McCormick, Caroline

Quality Improvement and Patient Safety

H+/K+ATPase Expression in the Larynx of Laryngopharyngeal Reflux and Laryngeal Cancer Patients

Authors: McCormick CA, Samuels TL, Battle MA, Frolkis T, Blumin JH, Bock JM, Wells C, Yan K, Althman KW, Johnston N.

Project Mentor: Nikki Johnston, PhD

OBJECTIVES: The gastric H+/K+ ATPase proton pump has previously been shown to be expressed in the human larynx, however its contribution to laryngopharyngeal reflux (LPR) signs, symptoms and associated diseases such as laryngeal cancer is unknown. Proton pump expression in the larynx of patients with LPR and laryngeal cancer was investigated herein. A human hypopharyngeal cell line expressing the proton pump was generated to investigate its effects.
Study Design: In-vitro translational

METHODS: Laryngeal biopsies were obtained from 3 LPR and 8 laryngeal squamous cell cancer (LSCC) patients. ATP4A, ATP4B and HRPT1 were assayed via qPCR. Human hypopharyngeal FaDu cell lines stably expressing proton pump were created using lentiviral transduction and examined via transmission electron microscopy and qPCR for genes associated with inflammation or laryngeal cancer.

RESULTS: Expression of ATP4A and ATP4B was detected in 3/3 LPR, 4/8 LSCC-tumor and 3/8 LSCC-adjacent specimens. Expression of ATP4A and ATP4B in FaDu elicited mitochondrial damage and expression of IL8, PTGS2, and TNFA ($p<0.0001$); expression of ATP4B alone did not.

CONCLUSIONS: Gastric proton pump subunits are expressed in the larynx of LPR and LSCC patients. Mitochondrial damage and changes in gene expression observed in cells expressing the full proton pump, absent in those expressing a single subunit, suggest that acid secretion by functional proton pumps expressed in upper airway mucosa may elicit local cell and molecular changes associated with inflammation and cancer.

McKenzie, Paige | Urban & Community Health

Racial differences in brain responses to smoking cues.

Authors: McKenzie PT, Anderson D, Engelmann JM.
Project Mentor: Jeffrey Engelmann, PhD

African American (AA) cigarette smokers have lower rates of smoking cessation and higher rates of relapse during a smoking cessation attempt than Non-Hispanic Whites (NHWs). Previous research has supported the hypothesis that relapse episodes are associated with the presence of cigarette-related cues and that AAs may have more smoking-related cues in their environments. Racial differences in brain reactivity to smoking cues have not been systemically investigated. Our study targeted specific areas of the brain that are associated with higher cue reactivity during times that smokers are most susceptible to relapse and compared differences in activation between races. We recruited 21 AA and 16 NHW smokers and used blood-oxygenation-level-dependent functional magnetic resonance imaging (BOLD fMRI), a non-invasive measure of human brain activity, to compare brain activation in response to smoking-related and neutral cues. The difference in brain responses to smoking-related versus neutral cues was compared between race (AA and NHWs) usingâ€¯3dMEMA software. We found that AAs showed greater brain reactivity to smoking cues than NHWs in several brain regions involved in addiction, including parahippocampal gyrus and posterior insula. Higher activation in these areas may reflect a difference in prioritized attention to smoking cues, resulting in more intrinsic motivation to environmental stimuli, and strengthened neural processes. Further research exploring differences in brain reactivity may be helpful in establishing effective personalized intervention strategies for AAs as they navigate smoking cessation attempts.

McNamara, Michael A | Health Systems Management & Policy

Describing the Treatment Approach for Central Cord Syndrome (CSS) at a Single Academic Center

Authors: McNamara MA, Wang MC, Kurpad SN.
Project Mentor: Shekar N. Kurpad, MD, PhD

INTRODUCTION: Central Cord Syndrome (CCS) is a unique spinal cord injury that primarily affects the upper extremities. There is currently no consensus for the best treatment plan for these patients. The purpose of this study is to describe characteristics, treatment, and outcomes among CCS patients in a single tertiary care academic center.
METHODS: Patients were identified using ICD9-CM discharge codes 952.03 and 952.08 between January 2008 and December 2018. Demographics and treatment information were abstracted through chart review. The study team assigned each extremity a score of 0 (normal strength) to 3 (no movement), as well as Modified Rankin Scores (mRS) 0-6 at admission and discharge.
RESULTS: 64 eligible records were reviewed and 45 had sufficient data for inclusion. The mean age was 60.0 years and 32 (73%) were male. At admission, subjects demonstrated a mean upper extremity strength of 3.0/6 and lower extremity strength of 1.4/6, consistent with CCS diagnoses. 33 (73%) patients underwent spine fusion surgery; 21 (64%) from a posterior approach (PCDF), 8 (24%) from an anterior approach (ACDF), and 4 (12%) from a combined approach. 27 (82%) patients underwent urgent spinal surgery within 7 days of the traumatic injury on average 2 days after hospital admission. Patients who were selected for PCDFs were found to have presented with significantly worse mRS scores than ACDFs (Mann-Whitney p=0.02) at admission. At discharge these differences were no longer significant (p=0.06).
CONCLUSION: In this series of CCS patients, urgent PCDF operations were most common. Retrospective review found that patients selected for PCDF presented with worse neurological deficits measured by mRS compared to those selected for an anterior approach; however, the mRS difference attenuated at discharge. Future directions should focus on surgical timing and approach as indicators of improvement in CCS patients.

McNellis, Brittany | Quality Improvement and Patient Safety

Retrospective Pilot Study for Evidence-Based Clinical Management of Inpatient Pediatric Rhabdomyolysis

Authors: McNellis BM, Harmelink MM.

Project Mentor: Matthew Harmelink, MD

BACKGROUND: Rhabdomyolysis is a life-threatening condition of muscle breakdown, which causes release of toxic intracellular materials into the bloodstream. Despite potentially lethal complications, evidence-based protocols regarding diagnosis and management are limited and often rely on individual or institutional preferences. Development of a clear, evidence-based algorithm could allow for improved patient outcomes, shorter hospital stays and decreased use of hospital resources.

PATIENTS AND METHODS: Demographic, laboratory and treatment data were collected for patients aged 0-21 years, with a diagnosis of Rhabdomyolysis (ICD-10 code M62.82) between January 2013 and December 2018. Patients who developed renal complications were excluded. Statistical analyses were employed to assess current diagnostic and management strategies against those available in the literature with a goal of creating initial recommendations for a clinical practice guideline for all etiologies of rhabdomyolysis.

RESULTS: 63 patients met inclusion criteria for the study, which captured 76 episodes of rhabdomyolysis. Etiology could not be determined by presenting or peak creatinine kinase (CK) values, however nadir CK values did vary by etiology. Diagnosis and management strategies were inconsistent, specifically involving practices of tracking myoglobinuria and fluid rate. Furthermore, data did not support a correlation between IV fluid rate and rate of CK decline for any etiology.

CONCLUSIONS: Strategies for diagnosis and management rhabdomyolysis are extremely variable and have not followed currently published recommendations. We recommend CK and microscopic urinalysis on admission, with CK repeated Q12 and urinalysis repeated Q12 until two consecutive samples are negative for myoglobin. There is no evidence to support titrating IV fluid rate to rate of CK decline, and therefore we recommend patients be placed on 2x maintenance IV fluids for the duration of rhabdomyolysis episode.

McQuade, Kaitlyn | Quality Improvement and Patient Safety

Impact of Continuous Quality Improvement on Out-of-Hospital Cardiopulmonary Resuscitation

Authors: McQuade K, Colella MR, Aufderheide TP.

Project Mentor: Tom P. Aufderheide, MD, MS

OBJECTIVE: An emergency medical services (EMS) post-event continuous quality improvement (CQI) feedback form, previously shown to improve quality of cardiopulmonary resuscitation (CPR), was permanently discontinued by Milwaukee County EMS. We evaluated the association of discontinuation of the CQI program on achievement of out-of-hospital CPR quality benchmarks.

METHODS: Retrospective review of CPR quality metrics in adults with non-traumatic, out-of-hospital cardiac arrest during and after implementation CQI feedback form. Metrics included chest compression fraction (goal >75%) and pre- and post-shock pause (goal: <10 seconds (s)).

RESULTS: Comparison between Before Group (x=556) versus (vs) After Group (x=303). For BLS only, in the Before versus After group, the average compression fraction was 83.58 ± 7.76% vs 83.22 ± 13.42%, p=.812, pre-shock pause was 2.41 ± 2.19 s vs 15.41 ± 12.11 s, p<0.001, pre-shock pause ≤10 s was 97.6% vs 31.8%, p<0.001, post-shock pause 12.83 ± 6.07 s vs. 2.23±2.93 s, p<0.001, and post-shock pause ≤10 s was 31.7% vs. 95.5%, p<0.001. For ALS only, in the Before vs After group, the average compression fraction was 86.99 ± 8.62% vs. 82.34 ± 11.38%, p<0.001, pre-shock pause was 14.10 ± 15.85 s vs. 18.55 ± 28.30 s, p=.103, pre-shock pause ≤10 s was 83.7% vs 82.6%, p=.686, post-shock pause was 5.04 ± 5.54 s vs. 6.57 ± 35.94 s, p=.589, and post-shock ≤10 s was 97.7% vs. 99.0%, p=.198.

CONCLUSION: Discontinuation of a post-event, self-reviewed CQI feedback form was associated with a statistically significant deterioration in quality of CPR.

Meeuwsen, Sarah | Clinical & Translational Research

Racial Disparities in Post-Acute Rehabilitation Following Stroke: A Pilot Study

Authors: Meeuwsen S, Ball C, White C.

Project Mentor: Christopher White, MD

INTRODUCTION:

Racial disparities are well-documented in healthcare, owing to socioeconomic factors, access to care, minority stress, and bias. While stroke is known to disproportionately affect minority groups, much less is known about disparities as they relate to post-stroke rehabilitation. This study aims to assess for differences in the rehabilitation setting, timing of rehabilitation, post-rehabilitation disposition, and overall functional change based on race and ethnicity for patients at a large academic medical center.

METHODS:

I2b2 was used to identify adult patients diagnosed with stroke and with an initial PM&R consult placed during their acute hospital stay from 1/1/2017 to 12/31/2019. Variables collected include demographic information, timing of PM&R consultation and IPR admission, FIM scores, and discharge disposition. Results analyzed with Chi-square, Wilcoxian Rank Sum, and T-test for statistical significance ($P<0.05$).

RESULTS:

There was no significant difference between White patients (N=318) and non-White patients (N=182) in admission into IPR ($p=0.082$), post-rehabilitation disposition ($p=0.401$) or FIM efficiency ($p=0.796$). Length to decision-making regarding rehabilitation setting was significantly delayed in Hispanic patients (N=11) when compared with non-Hispanic patients ($p=0.0128$).

DISCUSSION:

By better identifying health disparities and the factors contributing to them, these issues can be directly addressed in the future. Differences in post-acute disposition approached statistical significance and a larger sample size may reveal a disparity. Additionally, further exploration into delays in decision-making in Hispanic patients may be warranted. Future directions include expanding this study to include additional diagnoses of traumatic brain injury, amputation, and spinal cord injury.

Miller, Joe | Quality Improvement and Patient Safety

Impression of Interventions in Patient Safety Education: No Blame Culture and Addressing Cognitive Biases

Authors: Miller JJ, McIntosh B.

Project Mentor: Brady McIntosh, MD

To improve the educational quality and psychologic safety of learners during patient safety education, we instituted several curriculum changes to our Patient Safety rounds to create a model for education that is resident-led, blame-free, and centered around subconscious bias in clinical medicine. This was accomplished by abandoning the traditional, didactic approach of education in favor of a grand rounds style presentation where the resident physician picks their own case in which a patient safety event occurred and presents it at the conference, paying key attention to the role of cognitive bias and methods of preventing this same event going forward. A culture of psychologic safety at patient safety rounds is nurtured by the Patient Safety education faculty lead presenting their own case at the first conference, encouraging an environment free of blame at each conference, and allowing residents ownership over their case selection and adequate preparation time. These interventions were assessed via a 7-question survey to 20 emergency medicine residents, using a Likert scale. The interventions were viewed as favorable by 10 of 10 survey respondents. These data suggest that the interventions are well received by the residents and warrant further investigation to determine key elements of psychological safety in safety event reporting.

Miller, Lauren J — Molecular & Cellular Research

Reducing Side Effects: Glutamine and the Prevention of Mucositis and Bacteremia During Chemotherapy

Authors: Miller LJ, Scheuermann A, Harker-Murray P.
Project Mentor: Sridhar Rao, MD, PhD

BACKGROUND: Oral mucositis is a common side effect of chemotherapy experienced by pediatric patients. Mucositis can lead to pain with oral intake, cachexia, need for hospitalization, bacteremia and/or delay in chemotherapy - all of which can impact treatment related mortality. Glutamine is an amino acid used by the gut to promote enterocyte proliferation and integrity, however, concentrations can significantly decrease in times of stress. Based on adult literature, we hypothesized that glutamine supplementation during chemotherapy treatment would reduce the severity of mucositis and potentially prevent blood stream infections.
METHODS: This study began in November 2020 and is ongoing. Subjects received a 60-80 mg/kg dose of an oral suspension of glutamine twice per day for 14 days. In the initial round of evaluation, 11 patients completed 13 courses of glutamine supplementation. After completion of a course, the patient charts were retrospectively reviewed for dosage and duration of supplementation, presence and severity of mucositis, and presence of infection.
RESULTS: Our patient population was 54.5% male and 45.5% female. Average age was 7 years old (range 1-15 years), the majority with a diagnosis of leukemia. Out of the 11 patients, 9 did not have mucositis when beginning supplementation, and all subjects did not have mucositis at the end of supplementation. No subjects developed any infection during supplementation. Using binomial probability, the reduction in the incidence of mucositis in pediatric chemotherapy patients is statistically significant (p=0.005).
CONCLUSIONS: Preliminary results suggests positive outcomes with glutamine supplementation in preventing the development of mucositis, reducing severity and potentially preventing blood steam infections during chemotherapy

Mistry, Janki — Global Health

Needs Assessment & Identification of the Multifaceted COPD Care Bundle in the ED of a Nepali Hospital

Authors: Shrestha R, Shrestha AP, Sonnenberg T, Mistry J, Shrestha R, MacKinney T.
Project Mentor: Dr. Theodore MacKinney, MD, MPH
Community Partner: Kathmandu University School of Medical Sciences (Dhulikhel, Kavrepalanchok, Nepal)

PURPOSE: Acute care of patients with exacerbation of COPD (AECOPD) in the ED is crucial, however not studied extensively in Nepal. The purpose of this study is to identify measures to optimize AECOPD care in ED with a bundle care approach in a resource-limited setting.
METHODS: We conducted a prospective cross-sectional observational study as an initial baseline of the QI project. Demographic data, clinical characteristics, current diagnosis and treatment performances of AECOPD were recorded. Primary outcome measures were 30-day ED revisit and near-fatal events which were compared with other variables and performances with binary and logistic regression. The multidisciplinary team performed the root cause and Pareto analysis to identify the potential gaps in the AECOPD care.
RESULTS: The AECOPD performance measures were suboptimal. Written AECOPD emergency management clinical guidelines and advice regarding pulmonary rehabilitation were absent. Among the 249 AECOPD encounters, bilevel positive-airway pressure ventilation was started in 6.4%. At discharge, 11.8% and 39.7% were given oral steroids and antibiotics respectively; 2.2% were advised vaccination. Near-fatal events and 30-day revisit occurred in 19% and 38.2% of the encounters respectively. Those who required domiciliary oxygen had significantly higher 30-day revisits (OR=2.5; 95% CI=1.43–4.4;P value=0.001) as did those who were previously admitted (OR=1.98; 95% CI 1.11–3.59;P value=0.022). Those who had a 30-day revisit had increased near-fatal events (OR=2.86; 95% CI=1.362–6.18;P value=0.006). The opportunities for improving the ED care were identified and interventions and their indicators are summarized for future implementation.
CONCLUSION: The current COPD performance measures were suboptimal with high 30-day revisit and near-fatal outcomes. We suggest the urgent implementation of the enlisted feasible bundles-care involving team and protocol-based management plans for AECOPD in a resource-limited ED.

Moore, Elizabeth | Quality Improvement and Patient Safety

A Missed Opportunity in Cancer Prevention: Delivery of the HPV Vaccine in a Hospital Setting

Authors: Moore E, McFadden V.

Project Mentor: Vanessa McFadden, MD, PhD

OBJECTIVE: Pediatric hospitalizations are a missed opportunity for delivery of the Human Papilloma Virus (HPV) vaccination. Previous literature has identified barriers to HPV vaccination in the outpatient setting and has indicated the hospital setting as an opportunity to increase vaccination rates. The aim of this study was to increase the rate of delivery of the HPV vaccine to adolescents discharged from the pediatric hospital medicine service at our academic children's hospital.

METHODS: This study included adolescents 13 years and older who were discharged from the hospital medicine service at a tertiary children's hospital. Two quality improvement interventions were implemented: 1) modification of discharge order sets to include vaccination status and 2) provider training seminars regarding the delivery of the HPV vaccine. Follow up materials were distributed to providers by email. The primary outcome measure was rate of delivery of the HPV vaccine. The process measure was documentation accuracy of patient vaccination status.

RESULTS: From May 2019 through February 2020, 488 patients were included in this study. The aims of this study were met including a 13% increase in HPV vaccination rates, the primary outcome measure, and an 18% increase in documentation accuracy, the process measure. Length of stay was not impacted.

CONCLUSIONS: The quality improvement measures implemented were successful in increasing the rate of delivery of the HPV vaccine. These interventions were also successful in increasing documentation accuracy of vaccination status

Morris, Keayra | Clinical & Translational Research

The Prevalence of Depression, Anxiety, and Substance Abuse in Medical Students

Authors: Morris K, Franco J, Cipriano D.

Project Mentor: Jose Franco, MD

INTRODUCTION: Nearly half of medical students experience psychological distress during training. This predisposes them to serious mental health concerns including depression and anxiety, conditions that are frequently comorbid with substance use. The high rates of depression and anxiety may make this population vulnerable to developing substance abuse.

METHOD: First through fourth year medical students completed an anonymous online survey assessing depression, anxiety, and substance use. Linear regressions were used to assess factors predicting the severity of depression, anxiety, and substance abuse. Chi squared tests evaluated whether participants with depression or anxiety were more likely to have high risk alcohol behaviors and use drugs.

RESULTS: Of all respondents, 22.3% and 21.8% met criteria for clinically significant depression and anxiety, respectively. Twenty-four percent of participants reported high-risk alcohol use and 16.4% reported drug abuse. Participants that met criteria for clinically significant depression (PHQ-9 ≥ 10) were more likely to have high-risk alcohol use behaviors $X2$ (1, $N = 266$) = 7.4, $p = .008$, and were more likely to have used drugs in the last year $X2$ (1, $N = 301$) = 9.7, $p = .003$ than those without depression. Similarly, participants that met criteria for clinically significant anxiety (GAD ≥ 10) were more likely to also have high-risk alcohol use behaviors $X2$ (1, $N = 265$) = 9.6, $p = .003$, and were more likely to have used drugs in the last year $X2$ (1, $N = 301$) = 4.5, $p = .038$ than those without anxiety.

CONCLUSIONS: Medical students experience depression and anxiety at alarming rates. Those with depression and anxiety were more likely to engage in high-risk alcohol use behaviors or use illegal drugs. Further research is needed to examine the directionality of these relationships and to develop interventions aimed at improving medical student mental health.

Moyer, Andrea | Quality Improvement and Patient Safety

Superiority of ESC to M-FNASS for NAS Management in the Newborn Nursery Category: General Pediatrics

Authors: Ryan K, Moyer A, Glait M, Yan K, Dasgupta M, Saudek K, Cabacungan E.
Project Mentor: Kelsey Ryan, MD

OBJECTIVE: The Modified Finnegan Neonatal Abstinence Scoring System (M-FNASS) and the newer Eat, Sleep, and Console™ (ESC) guide clinical management of Neonatal Opioid Withdrawal Syndrome (NOWS). This study evaluates how M-FNASS and ESC directly compare in inpatient practice. We hypothesized that ESC scores would correlate with M-FNASS scores, while ESC management would reduce healthcare utilization for NOWS-affected infants.
METHODS: This retrospective cohort study compared management of NOWS-affected infants admitted to nursery settings. Epoch 1 were managed using a M-FNASS algorithm. Epoch 2 were scored simultaneously with M-FNASS and ESC and managed using the ESC approach. Statistical analysis compared M-FNASS and ESC scores and outcomes between Epochs.
RESULTS: 158 infants provided 2101 scoring instances for analysis. Demographic characteristics were similar between Epochs. ESC scores significantly correlated with overall M-FNASS scores and specific M-FNASS domains. ROC curve analysis demonstrated an ESC score containing at least one "no" was best predicted by a M-FNASS cutoff value of 7.5 (sensitivity 0.84, specificity 0.70, AUC = 0.842). Length of stay (median 9.5 vs. 5 days, p=0.0002), initiation (53.39% vs. 32.5%, p=0.018) and duration of pharmacologic treatment (median 11 vs. 7 days, p=0.0042), as well as length of stay for pharmacologically treated infants (median 15 vs. 10 days, p=0.0002) were significantly reduced with ESC-based management after adjusting for covariates.
CONCLUSION: ESC meaningfully correlates with M-FNASS to detect NOWS. Management with ESC continues to be associated with reduced healthcare utilization when compared to a M-FNASS approach, implying that ESC may facilitate higher value inpatient care.

Nelipovich, Shelby | Urban & Community Health

Current Practice and Rationale of Prescribing Dexamethasone for Patients Hospitalized for Asthma

Authors: Nelipovich S, Porada K, Vepraskas S, Soung P, Chou E.
Project Mentor: Erica Chou, MD

OBJECTIVE: This study assesses factors that influence pediatric hospitalist providers' decisions to prescribe prednisone or dexamethasone for patients hospitalized for status asthmaticus. We hypothesized prednisone is preferred for more severe cases, dexamethasone is preferred for noncompliant patients, and the Emergency Department (ED) steroid protocol has no impact.
METHODS: A survey was developed to assess factors influencing dexamethasone prescribing practices. It was completed by our institution's pediatric hospitalists in June 2019 and April 2021. Responses were summarized using descriptive statistics, inter-rater agreement was analyzed with Cohen's kappa statistic, and bivariate comparisons were analyzed with $\chi 2$ tests.
RESULTS: 36 of 39 providers completed the survey in 2019; 31 of 43 completed it in 2021. Providers reported wide disagreement with the use of dexamethasone in both surveys (2019 vs 2021: 34% vs 55% in favor, 43% vs 35% neutral, 23% vs 9% opposing, p=0.191). There was moderate agreement with prescribing dexamethasone for patients with poor oral tolerance or a history of medication noncompliance (2019: κ=0.485, p=0.002; 2021: κ=0.281, p=0.048). There was moderate agreement with prescribing prednisone for patients with higher severity of baseline asthma or current exacerbation (2019: κ=0.537, p<0.001; 2021: κ=0.500, p<0.001). The ED steroid protocol did not influence prescribing practices (p>0.05). There was an increase in reported prescribing frequency of dexamethasone from 2019 to 2021 (p=0.007).
CONCLUSIONS: In the hospital setting, prednisone is preferred for severe asthma cases, while dexamethasone is preferred for cases of poor oral tolerance or medication non-compliance. The ED's prescribing practices did not influence providers' steroid choice.

Nelson, Gretta | Clinician Educator

PROGRAM DIRECTOR PERCEPTIONS ON PALLIATIVE CARE TRAINING DURING CARDIOLOGY FELLOWSHIP

Authors: Nelson G, Johnston F, Mueller C, Dabbouseh NM.
Project Mentor: Nora Dabbouseh MD

OBJECTIVE: The ACC/AHA recommends discussions surrounding goals of care for appropriate patients. Historically, palliative care(PC) and hospice services have been underutilized in cardiac patients with advanced disease, suggesting that further education is needed. We evaluated the perception of cardiology fellowship directors on their programs' PC training.
METHODS: We conducted a survey of 197 cardiology fellowship directors. We aimed to assess directors' perceptions of the access to and quality of PC training within cardiology fellowships.
RESULTS: We received 49 responses for a response rate of nearly 25%. Even though 89% of respondents felt graduating fellows knew when to refer patients for PC or hospice; only 38% felt PC or hospice is employed early enough for cardiac patients. While 98% of respondents feel that PC training for cardiac patients is either somewhat, very or extremely important, many programs do not include a lecture on PC as part of the core curriculum and have not considered adding PC teaching to their formal curriculum. This discrepancy may have several explanations. Most directors perceived their programs' PC education to be strong. This may suggest a perception that PC training is occurring on an informal basis or that fellows come in with a strong background.
CONCLUSIONS: There is a dichotomy between the perceived strength of cardiology fellows' PC training and its translation into the clinical setting. This suggests the importance of incorporating PC training into cardiology training. Further investigation could(1) improve appropriate use of PC and hospice(2) elucidate the functional benefits of formal versus informal training.

Ng, Ashley | Health Systems Management & Policy

Presenting characteristics and progression of pediatric morphea

Authors: Ng A, Drolet BA, Siegel DH, Chiu YE.
Project Mentor: Yvonne Chiu, MD

BACKGROUND: Morphea is a rare fibrosing disorder with a highly variable disease course that can lead to severe dyspigmentation and disfigurement.
Objectives: Our objectives were to characterize the natural presentation of pediatric-onset morphea, including demographic data and clinical features, to assess responses to systemic and topical therapies, and to identify clinical indicators of relapsing disease.
METHODS: We conducted an interim analysis of a prospective registry for pediatric-onset morphea since its establishment in 2012. Clinical information and treatment regimens were collected. The Localized Scleroderma Assessment Tool and Physician Global Assessments were used to quantify disease activity and damage. Statistical analysis was performed using descriptive and multivariate methods.
RESULTS: In total, 56 children were included in the study. There was a female (63%) and white (71%) predominance, and the mean age of onset was 8 years old. Circumscribed morphea presented with the least clinical damage at the time of enrollment, which was significantly lower than generalized morphea ($p=0.041$). Extracutaneous manifestations were commonly observed with linear morphea (31%), and we did not find an association between age of onset and extracutaneous symptoms. Children responded similarly to topical or systemic treatment, demonstrating improvement in morphea activity after the initial 2 months of therapy. The median duration of systemic treatment was 24 months, and patients achieved inactive disease after 6 months on average. Several subjects experienced disease relapse (n=9/21, 43%). The likelihood of relapse was not influenced by morphea subtype, gender, comorbidities, family history of autoimmune disease, young age of onset, or extracutaneous involvement ($p>0.05$).
CONCLUSIONS: All children with morphea should be closely monitored for signs of disease relapse which can occur months following the cessation of treatment.

Nguyen, Peter

Quality Improvement and Patient Safety

The Cardiff Model for Violence and Opioid Prevention

Authors: Nguyen P, Kohlbeck S, Zosel A, Hernandez-Meier J.

Project Mentor: Jennifer Hernandez-Meier, PhD, MSW

BACKGROUND:
The opioid epidemic is a major public health issue. Like violence, our understanding of opioid misuse is limited by incomplete information collected by health care. Community violence data sharing models, such as the Cardiff Model, may be translated to track opioid overdoses, provide insight on geographic hotspots of opioid use, and innovate preventative approaches. It is unknown if nurses would be amenable to such data collection.

METHODS:
Emergency Department (ED) nurses at a Level I Trauma Center were surveyed for initial feedback on the feasibility of obtaining self-reported patient data on opioid misuse. Responses are collected on a 6-point Likert-type scale (strongly agree-strongly disagree) and recoded to dichotomous Agree/Disagree answers.

RESULTS:
A majority of the N=18 nurses agreed that they were interested in collecting data on opioid use/overdose (n=14; 78%), collecting this data was congruent with the mission of their ED (16; 89%), and that they were comfortable inquiring about the location of opioid use/overdose (16; 89%). A minority (n=8; 44%) of nurses agreed that patients will cooperate when answering opioid use/overdose questions, but a majority (n=11; 61%) agreed that patients will provide accurate physical location data about the opioid use/overdose.

CONCLUSIONS:
A majority ED nurses showed interest in asking questions pertaining to patient opioid use/overdose and many agreed that self-reported patient data may be reliable. However, nurses have contrasting opinions on patient cooperativity. Nurses' perceived hesitation by patients includes breaches in privacy and use of their data for law enforcement retribution towards themselves or acquaintances.

Nguyen, Andrew

Urban & Community Health

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

Authors: Nguyen A, Thao M, Lor K.

Project Mentor: Mai See Thao, PhD

Community Partner: United Hmong of Wisconsin Outreach; Hmong Wisconsin Chamber of Commerce

BACKGROUND: The Hmong population is a minority group of Asian refugees who resettled into the United States in the late 1970s. This group has faced unique stressors from suffering significant losses during the Vietnam War, to being persecuted and forced to flee their homeland. One example of the health consequences faced by the Hmong population could be seen in the disproportionate prevalence rate of type 2 Diabetes. A closer inspection of the social determinants of health and the underlying cultural factors affecting their disease process is warranted.
Objective: Examine the diabetic experience in the Hmong population by exploring social determinants and cultural factors that influence the management of type 2 Diabetes. Data and findings gathered will be disseminated back to the community to help bolster future interventions.

METHODS: Focus groups will be divided based on gender. The sessions will be facilitated by trained community researchers with discussions guided by pre-determined research questions. Discussions will be audiotaped and transcribed for qualitative analysis using grounded theory.

RESULTS: Numerous common themes were identified ranging from gender to cultural differences in their diabetes experience, to factors such as affordability and language congruence impacting disease control.

CONCLUSIONS: Results of this study is critical in highlighting the cultural and social factors that influence the disease process and management. The findings from this study will foster future projects aimed at interventions to improve diabetic health outcomes among the Hmong population.

Nordness, Michael — Clinical & Translational Research

T-Helper 17 Cells as a Diagnostic Indicator for Hyper-IgE Syndrome

Authors: Nordness M, Chaimowitz N, Lawrence M, Heul A, Hines B, Zhang J, Simpson P, Bauer C, Cooper M, Borish L, Satter L, Sullivan K, Torgerson T, Routes J, Verbsky J.
Project Mentor: James Verbsky, MD, PhD

INTRODUCTION: Hyper-IgE syndrome (HIES) caused by STAT3 loss-of-function (LOF) variants is characterized by eczema, skin abscesses, fungal infections, life-threatening pulmonary disease, and significantly elevated IgE levels. Small cohort studies demonstrated a decreased percentage of CD4+ T cells expressing IL-17 (Th17) and CD4+ T helper cells expressing IFNg (Th1) in HIES; however, decreases in the percentage of Th17 cells were also seen in atopic disease. Additionally, research suggests that HIES may cause impaired CD8+ T cell function. We hypothesized that a low percentage of both Th17 and Th1 cells would be predictive of HIES and would differentiate HIES from atopic disorders. To evaluate this hypothesis, we examined the percentage of Th17, Th1, and IFNg+CD8+ T cells, laboratory parameters, and genetic diagnoses from a large cohort of patients to determine which parameters distinguish patients with STAT3 LOF variants.
METHODS: We conducted a retrospective, multi-institutional chart review of over 200 patients who received a Th17 assay at the Medical College of Wisconsin Clinical Immunology Research Laboratory. We reviewed the following parameters: the percentage of Th17, Th1, and CD8+IFNg+ cells, immunoglobulin levels, atopy scores, infectious history, and genetic diagnoses.
RESULTS: We found that the percentage of Th17 and Th1 cells were decreased in both atopic disease and HIES, with HIES having the lowest values. We also determined that IgE levels were inversely correlated with the percentage of Th17, CD8+IFNg+, and Th1 cells, while IgA and IgM were positively correlated with the percentage of Th17 cells.
CONCLUSIONS: We confirmed that the percentage of Th17 cells is low in both HIES and atopy in a large cohort of subjects, and that the percentage of Th1 cells may be helpful in distinguishing HIES from atopic disease. The inverse correlation between IgE levels with Th1 and Th17 responses suggests that similar pathway(s) may drive both HIES and at

Obaoye, Joanna — Urban & Community Health

Does Allostatic Load Mediate the Link between Mortality and Perceived Discrimination in Older US Adults?

Authors: Obaoye J, Thorgerson A, Ikonte C, Dawson AZ, Williams JS, Egede LE.
Project Mentor: Leonard E. Egede, MD, MS

INTRODUCTION: Individuals who have experienced discrimination have an increased risk of mortality. Studies show associations between allostatic load (AL), a measure of chronic stress, and mortality. While the independent relationships between perceived discrimination (PD) and mortality, and AL and mortality are well understood, the role of AL in the relationship between PD and mortality remains unclear. The aim of this study was to assess whether AL is a mediator of the relationship between PD and mortality among older US adults.
METHODS: Data from 19,861 adults aged 51 and older in the Health and Retirement Study (2006–2014) were analyzed. The dependent variable was mortality, and independent variables were PD and AL. PD was assessed using a 5-item scale, while AL was measured using a combination of cardiovascular (blood pressure, cholesterol, etc.), metabolic (hemoglobin A1c, body mass index, etc.), and immune (c-reactive protein) factors. First, cox regression models were used to assess the relationship between mortality and PD, and mortality and AL. A linear regression model was then used to assess the relationship between AL and PD. Third, mediation was assessed by using a cox regression model for the relationship between mortality, PD, and AL.
RESULTS: Findings showed PD was associated with an increased risk of mortality (HR: 1.12, p=0.010); PD was associated with AL (HR: 0.14, p<0.0001), and AL was associated with an increased risk of mortality (HR: 1.11, p<0.0001). The final model with PD (HR: 1.09, p=0.13) and AL (HR: 1.17, p<0.0001) showed AL as a mediator in the relationship between PD and mortality.
CONCLUSION: In this sample of adults, AL mediated the relationship between PD and mortality and may explain the mechanism underlying this relationship. These findings implicate the importance of identifying patients who have experienced discrimination and ensuring adequate control of biological factors included in AL to decrease mortality in older US adults.

Olson, Brooke

Clinical & Translational Research

Idiopathic Congenital Talipes Equinovarus in Wisconsin Newborns: Incidence and Associated Risk Factors

Authors: Olson BJ, Van Valin S, Liu XC.

Project Mentor: Scott Van Valin, MD

OBJECTIVES: To provide the first analysis of incidence of clubfoot diagnoses in the most populous region of Wisconsin and to provide an analysis of risk factors associated with the deformity.

METHODS: We performed a retrospective study on children treated for clubfoot at Children's Wisconsin from January 1, 2004 to December 31, 2018. We performed a linear trend of annual clubfoot births for each county covered and for the southeastern region of Wisconsin to examine trends. We also analyzed common risk factors associated with clubfoot.

RESULTS: This study included a population of 760 clubfoot patients with the southeastern region of Wisconsin containing the largest patient population of 523 patients. Milwaukee was the county with the largest population of 269 patients. Linear trends of Milwaukee county and the southeastern region of Wisconsin showed a statistically significant increase in clubfoot births over the time period of 2004-2017 ($P < 0.001$). Our population had a total of 497 males and 263 females. A majority of our population was Non-Hispanic/Latino (76.8%) and white (72.2%). A total of 414 patients (54.4%) had no family history of clubfoot, 130 patients (17.1%) had a positive family history of clubfoot, and 216 patient's (28.4%) family history was unknown.

CONCLUSIONS: In this large study of children diagnosed with clubfoot, areas with high population showed a statistically significant increase in the number of children affected over time with a low evidence of family history. This study provides further insight into the possible etiology of clubfoot being influenced by an exogenous, environmental factor.

O'Toole, Sean

Quality Improvement and Patient Safety

Understanding the Intersection of Race and Sex on Disparities in Progression through Cognitive Impairment

Authors: O'Toole SM, Walker RJ, Garacci E, Dawson AZ, Mendez C, Thao MS, Egede LE.

Project Mentor: Rebekah Walker, PhD

INTRODUCTION: Sex and racial/ethnic differences in cognitive impairment is a pressing concern in the United States. This paper investigated the explanatory role of demographic, clinical/behavioral, social/environmental, and access to healthcare factors on race-sex differences in cognitive decline.

METHODS: Health and Retirement Study (HRS) data was analyzed for adults over age 50. 18,006 participants were included that self-reported race/ethnicity and had available cognitive function measures. Cognitive function was categorized into "normal", "mild", and "dementia". Generalized estimating equation (GEE) logistic regression models accounting for multiple comparisons assessed differences across cognitive status. The primary independent variable was race-sex. Covariates were added in blocks to identify what factors help explain race-sex differences in cognitive decline.

RESULTS: Across all cognitive function outcomes, female-NHW were not significantly different from male-NHW. Differences in the progression from normal cognition to dementia persisted for all groups after adjustment except male-Hispanic which lost significance after clinical/behavioral variables were added. Differences persisted between all groups despite adjusting for all covariates in the progression from normal cognition to mild cognitive decline. From mild cognitive decline to dementia, after adjusting for demographics, female-Hispanic were no longer significantly different and after adjusting for healthcare access variables female-NHB were no longer significantly different from male-NHW.

CONCLUSION: By taking an explanatory approach to investigate race-sex differences in cognitive impairment two areas of possible intervention were identified. Focusing on modifiable clinical/behavioral risk factors may help address disparities between Hispanic- and NHW-males, and future research should assess how access/utilization of healthcare services can delay worsening cognitive impairment for NHB-females.

Parks, Michellai | Urban & Community Health

Housing Instability among Families and Caregivers of Children in Foster Care

Authors: Parks M, Zetley L.

Project Mentor: Lisa Zetley, MD

Community Partner: Care4Kids Foster Care Medical Home Program

BACKGROUND: Housing instability is defined by experiencing at least one of four circumstances in the past 12 months: two or more moves, inability to pay rent/mortgage/utilities, needing to stay with others due to difficulty paying bills, or a history of homelessness. Children subjected to housing instability are more likely to have poorer physical health, exacerbated chronic conditions, behavioral problems, and increased hospitalizations. Children entering foster care also tend to have poorer mental and physical health.

OBJECTIVE: Assess the rate of housing instability of families/caregivers of foster children enrolled in Care4Kids Foster Care Medical Home Program in Milwaukee.

METHODS: Triweekly review of the Care4Kids database to identify eligible children enrolled in the C4K program. Study included children that entered foster care, changed placement, or re-enrolled in C4K between July and December 2019. Caregivers of identified children were interviewed regarding housing instability circumstances. Caregivers found to have housing instability were offered referrals to the Children's Community Health Plan housing navigator. Caregivers without housing instability were also able to request a housing referral.

RESULTS: From July-December 2019, 134 caregivers consented to housing questions. 23% of respondents (31/134) were found to have a possible housing need. 19 caregivers confirmed housing instability and 12 requested a housing referral without disclosing housing instability. Kinship caregivers were disproportionately more likely to acknowledge housing instability.

CONCLUSION: Unmet housing needs are notable among caregivers of children in the Care4Kids foster care program. Since a significant number of caregivers requesting a housing referral had a negative screen for housing instability, the screening tool may not be optimal for identifying all families desiring housing support.

Patel, Kishan | Clinical & Translational Research

Role of hemopexin in secondary damage after spinal cord injury

Authors: Patel K, Pelisch N, Rosas J, Aperi B, Stehlik K, Kroner-Milsch A.

Project Mentor: Antje Kroner-Milsch MD, PhD

INTRODUCTION: Hemorrhage following spinal cord injury (SCI) can be cytotoxic/pro-inflammatory by degradation of hemoglobin. Hemopexin (Hx) sequesters heme and has protective effects after CNS hemorrhage. We aim to better understand the mechanisms of hemorrhage-induced secondary damage after SCI and to modify these effects using Hx. Hypothesis: Hemopexin is beneficial after SCI in reducing inflammation, tissue damage and improve functional recovery after SCI.

METHODS: Contusive SCI was induced in female C57BL/6 wt and Hx-/-mice. Alternatively, wt mice were treated with gel foam containing Hx or a vehicle control. Locomotor recovery was assessed using the Basso Mouse Scale (BMS), and spinal cords were processed for histological analysis. At day 3 and 7 after injury, inflammatory factors were assessed using Q-RT PCR.

RESULTS: Hx-/-mice showed impaired recovery compared to wt mice, and significantly fewer Hx-/-mice were able to support their body weight on day 3 and 7 post injury compared to wt mice. Hx treated mice showed better weight support at day 3, while the BMS did not show any differences. mRNA expression of IL-1b and IL-6 was significantly reduced in the early phase post SCI following treatment with a significant reduction in TNF at a later phase. No significant difference in lesion size was detected.

CONCLUSIONS: Hx-/-mice showed significant behavioral and locomotor deficits compared to wt mice. Treatment with Hx showed a potential effect on reducing pro-inflammatory cytokine expression with a small effect on behavioral recovery.

FUTURE DIRECTIONS: Intrathecal injection of Hx will be administered at specific time points after SCI.

Petrassi, Alana | Urban & Community Health

Caring for Refugee Patients: An Interprofessional Course in Resettlement, Medical Intake, and Culture

Authors: Petrassi A, Chiu M, Porada K, Johnston B, Toppe M, Oldani M, Kaeppler C.

Project Mentor: Caitlin Kaeppler, MD

Community Partner: Lutheran Social Services Refugee Resettlement; Catholic Charities Refugee and Immigration Services

INTRODUCTION: Refugees are eligible for the same healthcare options as US citizens and access healthcare at similar rates. Many students, however, do not feel that they have received adequate instruction in caring for this unique population. The objective of this study was to evaluate whether an interprofessional 2-hour presentation could improve knowledge of refugee health topics and comfort with cross-cultural interaction.

METHODS: Presentation topics were determined by a team of healthcare providers, medical educators, and refugee resettlement workers based on literature review and expert opinion. The session consisted of an introductory didactic lecture, followed by three small group sessions, two of which were didactic lectures and one of which was a panel discussion. One hundred and sixty-one students enrolled in various healthcare degree programs attended the presentation via Zoom. Participants were asked to complete pre- and post-surveys that assessed comfort in cross-cultural interaction and knowledge of refugee health. Pre-post analysis of Likert scale questions was performed with Wilcoxon Signed Rank and Mann Whitney U testing.

RESULTS: Of the 161 attendees, 63 completed the pre-survey (39% response rate) and 49 completed the post-survey (30% response rate). Of the knowledge-based questions, statistically significant improvements were seen for all 9. Of the questions assessing comfort in cross-cultural interaction, all 3 showed improvement, but only 1 was statistically significant.

DISCUSSION: The 2-hour session demonstrated improvement of knowledge of refugee health. Changes in comfort in cross-cultural interaction, however, did not demonstrate the same improvement, indicating that further interventions focusing on improving cross-cultural comfort are needed.

Pinney, Kevin | Quality Improvement and Patient Safety

Single Center Experience of Patients with Interrupted Aortic Arch and VSD Based on Surgical Intervention

Authors: Pinney K, Moehlmann M, Kuhn E, Goot BH.

Project Mentor: Benjamin Goot, MD

BACKGROUND: When considering intervention for interrupted aortic arch (IAA) with ventricular septal defect (VSD), the choice depends upon the morphologic substrate. Initial repair options include a standard anatomic repair and a left ventricular outflow tract bypass procedure (LVOTBP). Our objective was to investigate our experience with this lesion associated with the initial repair strategy.

METHODS: Retrospective single center review of 47 patients between 1999 and 2019 with diagnosis of IAA with VSD. Demographics, initial surgery, and rates and types of re-intervention were recorded. Patients were placed into groups based upon the type of initial intervention including standard repair or LVOTBP. Chi-square tests, Fisher's exact test, and Mann-Whitney tests were utilized for comparison between groups.

RESULTS: Nearly half of the patients had re-intervention (22/47, 47%) and most of these (18/22, 82%) were surgical. All of the LVOTBP patients had a surgical or catheter based re-intervention while less than half of the standard repair group required either one (17/42, 40%). Although most re-interventions involved multiple procedures, arch reconstruction (10/18, 56%) was a common component and this was not significantly different between groups. Ten standard repair patients (10/42, 24%) required repeat surgery upon their LVOT including three patients who had a Ross procedure (3/47, 7%). Overall mortality was low.

CONCLUSION: When the anatomy permits it, a standard repair has been our preferred method of initial repair for IAA with VSD. Although the overall incidence of re-intervention in both groups is high, a majority of the standard repair patients retained their native left ventricular outflow tract. Future investigations should focus on predictive anatomic and baseline features for those patients who achieve long term successful standard repair.

Plachinski, Sarah | Urban & Community Health

Comparative Analysis of Prepectoral and Subpectoral Implant-Based Breast Reconstruction

Authors: Plachinski S, Boehm L, Adamson K, Hettinger P, LoGiudice J, Doren EL.

Project Mentor: Erin Doren, MD

The use of acellular dermal matrices (ADM) has allowed for an evolution in implant-based breast reconstruction to a muscle-sparing, prepectoral approach. Advantages may include reductions in postoperative pain, shorter hospital stays, less narcotic usage and improved aesthetics. Post-operative complication rates are described as comparable to subpectoral techniques, but little comparative data exists. This study aims to examine these techniques through a multi-faceted consideration of the reconstructive process.

We performed a retrospective review of 186 (83 prepectoral, 103 subpectoral) immediate breast reconstructions. Standard markers of reconstructive success were collected and included surgical complications, length of hospital stay, pain scores, cost of ADM, expander fill volumes and reconstructive revisions.

The two groups were similar with respect to demographics, cancer stage, and radiation therapy. The average length of follow up was 10 months and 19 months for prepectoral and subpectoral groups respectively. Prepectoral patients demonstrated an overall higher seroma rate ($p=.002$), with all other postoperative complications being insignificant. Prepectoral and subpectoral patients were found to have similar pain scores ($p=.65$) and similar needs for narcotics ($p=0.8$). Prepectoral cases had higher intraoperative tissue expander fill volumes ($p<.001$), shorter hospital stays ($p=.007$), and fewer clinic visits for tissue expansion ($p<.001$).

These findings highlight key differences and similarities between prepectoral and subpectoral breast reconstruction. Patients undergoing prepectoral reconstruction were able to reach goal expansion volume in a shorter time but were more likely to develop seromas. Similar rates of major complications were observed. Future studies evaluating patient reported outcomes and financial differences will allow for a more complete comparison of the two techniques and ultimately a more patient-centered reconstructive process.

Pleuhs, Benedikt | Clinical & Translational Research

Healthcare provider barriers to HIV pre-exposure prophylaxis (PrEP) in the US: A systematic review

Authors: Pleuhs B, Quinn KG, Walsh JL, Petroll AE, John SA.

Project Mentor: Steven A. John, PhD, MPH

Increasing prescription of pre-exposure prophylaxis (PrEP) is imperative to ending the HIV epidemic in the US. The objective of this review was to identify healthcare provider barriers to PrEP implementation. A systematic review was conducted in February 2019 using PubMed to identify barriers to PrEP prescribing practices in the US. Targeted search terms surrounding PrEP and providers resulted in 222 original studies, 28 of which were ultimately included in our review, with data collected between 2011-2018. Six themes were identified across reviewed studies: (1) a lack of PrEP knowledge, (2) the presence of the Purview Paradox, which refers to discordance in beliefs between HIV specialists and primary care providers on who should prescribe PrEP, (3) concerns about PrEP costs, (4) negative attitudes and misinformation regarding PrEP, (5) interpersonal stigma, and (6) concerns about patient adherence. A majority of providers were lacking knowledge regarding PrEP, resulting in discomfort in prescribing PrEP, or limited awareness and understanding of PrEP clinical guidelines. Discrepant opinions were identified regarding whether PrEP was best managed within primary care or specialty clinics. Other barriers included concerns about cost, patient adherence, and follow-up maintenance care. Finally, concerns about risk compensation and discomfort discussing sexual activities with patients who would benefit most from PrEP were apparent. Additional work is needed to prepare providers to prescribe and manage patients on PrEP, optimize PrEP delivery, and reduce provider bias. Future research is needed to identify providers' attitudes and beliefs regarding innovations in PrEP dosing, task-shifting, and novel strategies for PrEP care.

Pohlman, Ashley — Global Health

Revising screening METHODS for social determinants of health in a student-run free clinic

Authors: Pohlman A, Lundh R, Young S.
Project Mentor: Rebecca Lundh, MD

BACKGROUND: According to the World Health Organization, social determinants of health (SDOH) are environmental conditions that can lead to health inequities between different populations as well as negative health outcomes. In efforts to decrease health disparities, the MCW student-run free clinic (SCU) screens and addresses SDOH at patient visits. Paper surveys are administered to each patient seen at SCU and utilized by student volunteers to provide resources. Survey's are de-identified prior to data analysis by the research team. De-identification of survey's limits the ability to track patient's longitudinally and confounds data as a single patient may take multiple surveys over time. Previous SDOH data collected at SCU has shown discrepancies between patient answers and resources provided.
STUDY METHODS: Feedback regarding current survey utilization and suggestions to improve screening and accuracy of data collection was gathered from clinical team members, social work, and clinical advisors.
RESULTS: Additional SDOH needs to those on the current survey are identified and addressed during clinical interactions. A more robust data collection system would improve assessment of SDOH needs in SCU patients and effectiveness of resources.
CONCLUSION: The survey was revised to include additional SDOH needs and impact of COVID-19. Survey administration was changed; surveys will be verbally confirmed by trained volunteers and REDCap will be used for data collection of patient responses and resources provided. WE anticipate these changes will (1) lead to more accurate and effective screening to address SDOH and (2) allow for tracking patients longitudinally to assess resource utilization and efficacy.

Radzin, Alexandra — Urban & Community Health

Building a healthy caregiver system through early identification and right time support

Authors: Radzin A, Ruffalo L.
Project Mentor: Leslie Ruffalo, PhD, MS
Community Partner: Eras Senior Network, Aging and Disability Resource Center of Waukesha County

INTRODUCTION: As the senior population in the United States grows substantially, a corresponding number of caregivers will be expected to provide support for longer periods of time to seniors who live longer. Caregiving impacts not only the health and wellbeing of the care receivers, but of the caregivers themselves. Due to the strains of providing care, caregivers often experience physical, social, emotional, and financial stress.
Specific Aims: To identify gaps and opportunities in the current system of care. By gaining a greater understanding of the current system, a framework can be implemented to better support caregivers/care receiver pairs.
STUDY METHODS: Secondary data from five focus groups conducted in 2017 composed of unpaid caregivers in Waukesha County were analyzed to generate themes related to systemic changes needed in the current system of care. Focus group transcripts were analyzed using open coding techniques and grounded theory.
RESULTS: Four distinct themes related to system assets/barriers emerged: (1) Defining the role of the caregiver (2) Addressing the emotional component of caregiving (3) Seeking support from family members (4) Navigating multiple systems
CONCLUSIONS: The development of a coordinated system that gives timely, relevant, and appropriate support can help caregivers be better equipped to continue providing the care needed by the growing aging population. Early identification of the caregiver and the intersection of the currently disjointed systems involved in caregiving, including the healthcare system and community organizations, are needed to provide and increase access to consistent, right-time resources and support.

Ramamurthi, Aishu — Global Health

Risk factors for pressure ulcer development beyond index hospitalization in spinal cord injury patients

Authors: Ramamurthi A, Cameron H, Peschman J, Megal C.

Project Mentor: Marc Anthony de Moya, MD

Pressure ulcers (PUs) are both a common and devastating complication following spinal cord injury (SCI), posing a significant health and economic burden. Recommended prevention strategies include targeting the highest risk patients with the most intensive interventions. Thus, immediate identification of these populations is critical. The aim of this study was to examine variables predictive of PU development beyond index hospitalization in the SCI population, specifically investigating mechanism of injury and sociodemographic factors.

A retrospective chart review was conducted in patients ≥18 years of age who suffered a traumatic SCI and were treated at our Level One Trauma Center between January 2, 2002 and December 31, 2018 with ≥1 year follow up. Sociodemographic data, injury characteristics and outcome variables were collected. SPSS was utilized to conduct descriptive statistics and bivariate logistic regression analyses.

448 patients were identified who met inclusion criteria (79% male, 59% white, 34% Black or African American, 6% Hispanic, mean age 44 ± 18y, 32% unmarried). Average MHI by zip code was $56,075 ± 20,743. 162 (36%) patients developed one or more PUs. Violent mechanism of SCI was a significant predictor of PU development (56% v 31%, $p<0.001$), recurrence (83% v 61%, $p<0.01$), and higher severity PU ($p<0.05$). Sociodemographic predictors of PU development included male gender (OR 2.38, $p<0.01$) and unmarried status (OR 1.83, $p<0.01$), while age (OR 1.006, $p=0.348$) and ethnicity (OR 0.879 , $p=0.101$) were not predictive.

Male gender, being unmarried, and violent mechanism of injury were found to be significant predictors of long-term PU development in SCI patients. Furthermore, violent mechanism of SCI is an independent predictor of PU recurrence and higher severity PUs. Gender, marital status, and mechanism of SCI may be useful indicators to rapidly identify high-risk patients that would benefit from intensive PU prevention initiatives.

Reuter, Thomas — Clinician Educator

Positive Play: Medical Improvisation for Wellness

Authors: Reuter T, Lauck S, Chou E.

Project Mentor: Erica Chou, MD

Improvisational theater (improv) has been studied within the medical education field as a tool to teach communication skills. Active listening, spontaneity, and preparedness for the unknown have resonated within medical curricula. The exercises found in medical improv also give the participants a chance to play in a judgement-free environment with such benefits as stress relief, self-esteem building, group bonding, and laughter. These positive emotions are crucial in an environment like medical school where stress and negative emotions can be common. This study aims to identify and observe the emotional impact participating in medical improv workshops has on medical students. Workshops composed of improv exercises and debriefs connecting the skills to medical practice were run for medical students. The participant's reported their emotional states both before and after the sessions, and these responses were given anonymous identifiers to track the responses from workshop to worksop. The survey used listed out positive and negative emotions. The participants were asked to rate how much they aligned with the emotion at the time, both immediately before and after the workshop. The results demonstrated that these workshops both increased self-reported positive emotions while decreasing negative emotions. Medical improv has already been shown to be an effective method to teach communication skills, these results suggests that there may be the added benefit of simultaneously promoting emotional wellness.

Ritter, Thomas — Quality Improvement and Patient Safety

Synchronizing and Standardizing Inpatient Asthma Education to Increase Families Receiving Education

Authors: Ritter T, Dave M, Castenada L, Armellani M, Gibson C, Miranda MB, Soung P, Morrison A.
Project Mentor: Andrea Morrison, MD

OBJECTIVE: The aim of this project was to increase the proportion of parents of children with asthma receiving education while hospitalized to 90% receiving verbal, 75% handouts, and 60% video education over 12 months.
METHODS: Using the Plan-Do-Study-Act method of quality improvement, the team planned interventions after workflow diagramming, failure modes assessment, and key driver diagram development. Nurse champions piloted the workflow to provide written and video education and performed peer-to-peer education with bedside nurses. A skills station was created to inform bedside nurses of the new workflow. EMR documentation was improved to ease documentation and provide accuracy. The percent of parents receiving verbal, written, teach-back, or video education was followed on statistical process control charts (p-charts). Balancing measures included: length of stay, time from admission to the start of teaching, and time from discharge order to discharge. All balancing measures were followed on statistical process control charts.
RESULTS: The percentage of patients receiving verbal education and handouts did not change (86%, and 61%, respectively). The percent of patients receiving video education increased from 0% to 42% with special cause variation noted after the pilot of RN champions and staff education. No special cause was observed in balancing measures. Readmission rates remained unchanged with a decreasing trend noted for 365-day and 30-day readmissions after the pilot of RN champions and staff education.
CONCLUSIONS: Workflow assessment of the primary role involved in delivery, nursing, and utilizing nurse peer-to-peer education resulted in effective improvement in the proportion of parents receiving standardized low literacy asthma videos.

Robertson, Christian — Quality Improvement and Patient Safety

Tension bands for the correction of genu valgum in pediatric patients.

Authors: Van Valin SE, Liu XC, Robertson CM, Okoro SU.
Project Mentor: Xue-Cheng Liu, MD, PhD and Scott Van Valin, MD

BACKGROUND: Genu valgum is commonly encountered in pediatric orthopedics, and surgical correction may be indicated to prevent associated functional problems and pain. In adolescence, more invasive surgery may be avoided by employing 8-plates for hemiepiphysiodesis. The aim of this retrospective review is to analyze our patient population with genu valgum who were treated with 8-plates.
METHODS: Between January 1st, 2004 and December 31st, 2018, 8-Plates were implanted near the knee of 55 total children suffering from genu valgum. 100 limbs in total were treated, with 44 patients requiring bilateral limb placement and 12 requiring unilateral treatment. Evaluation was carried out radiographically on standing whole leg X-rays, which included the determination of various joint angles and bone widths. Information about the children, the procedure, hospital stay, and follow-up time was also collected.
RESULTS: Of the 55 patients, 58% (n=32) were female, and 42% (n=23) were male. The median chronological age at implantation was 10.9 years, whereas the average skeletal age was 12.5. The mean BMI ranged from 22.5 to 24.9. 86% of the children had no reported complications. Otherwise, complications included rebound genu valgum deformity in 6% of limbs, overcorrection in 1%, limited motion of the knee in 1%, and knee pain in 6%. 93% of children required no additional corrective procedures. The intermalleolar distance was corrected by a mean of 1.5 cm while the tibiofemoral angle changed by an average of 7.1 degrees. Mechanical lateral distal femoral angle changed an average of 2.4 degrees. The medial proximal tibial angle changed an average of 2.9 degrees.
CONCLUSION: Hemiepiphysiodesis with 8-Plates is an effective procedure used to treat genu valgum. The comparison of several radiographic measurements from pre and post-op time points showed statistically significant improvements and good correction rates (see Tables 2 and 3).

Rose, Shannon — Urban & Community Health

Patient perceptions of weight cycling and weight stability in a primary care population.

Authors: Rose S, Ruffalo L.

Project Mentor: Leslie Ruffalo, PhD

Obesity continues to be a major public health concern in the United States. Despite concerted efforts on multiple fronts, the prevalence of overweight and obesity in adults exceeds 30% in most sex-age groups. Cycles of weight loss followed by weight gain (termed weight cycling), are associated with significant cardiovascular disease risk factors independent of overweight/obesity. Upon regaining weight, visceral fat is deposited around the midline, leading to a higher waist-to-hip ratio (WHR) and an associated increase in risk of all-cause mortality. Cancer risks for breast and endometrial cancer also increase with weight cycling. This project seeks to determine the factors leading to weight cycling versus weight stability. Using principles of grounded theory, we analyzed secondary data from previous interviews with five participants and conducted additional interviews. Descriptors are also attached. Weight cycling versus weight stable patient data are compared and analyzed. Preliminary analysis shows that patients in both weight cycling and weight stable groups have similar amounts of health literacy, suggesting that this is not the distinguishing factor between groups. The weight stable group more often endorsed trusting themselves around food and eating intuitively. The weight cycling group more often coded for increased stress, mental health concerns, and lack of social support. These results can help clinicians know how to help patients end weight cycling and encourage weight stability. By promoting weight stability, health professionals can assist patients in avoiding the detrimental health outcomes accompanying weight cycling, thereby practicing better evidence-based medicine that will improve patients' health and lives.

Russell, Sarah — Quality Improvement and Patient Safety

Improving Patient Understanding of Emergency Department Discharge Instructions

Authors: Russell S, Pavlic A.

Project Mentor: Ashley Pavlic, MD, MA

BACKGROUND: Previous studies have shown that patients in the emergency department (ED) are frequently given incomplete discharge instructions that are written at a reading level that is too advanced, leading to poor understanding. This pilot aimed to improve patient understanding through implementation of standardized discharge instructions. This study was conducted in a 20-bed ED at an urban Veteran's Administration hospital.
METHODS: Provider and patient groups were interviewed in-person regarding the 6 critical elements when provider-initiated and post-standardized discharge instructions were used. Patient responses were compared to their own provider responses and scored by the study team and a third independent physician. One-tailed independent T-tests were performed on the total interview scores in the provider-initiated and post-standardized groups, and on the individual scores for each of the six critical elements.
INTERVENTION: Discharge instruction were standardized on 6 critical elements: diagnosis, new medications, at-home care, duration of illness, reasons to return, and follow-up. These standardized instructions were implemented among a small group of emergency department providers.
RESULTS: The patients in the post-standardized group demonstrated a statistically significant increase in patient-provider concordance when compared to the patients in the provider-initiated group (3.9 to 5.15, $P < 0.05$). 4 of the 6 standardized critical elements had significant increases in patient-provider concordance in the provider-initiated vs. post-standardized group, including: diagnosis (0.76 to 0.95, $P < 0.05$), at-home care (0.52 to 0.775, $P < 0.05$), duration of illness (0.52 to 0.9, $P < 0.05$), and reasons to return (0.28 to 0.75, $P < 0.05$).
CONCLUSIONS: Implementation of the standardized discharge instructions resulted in improved patient understanding of their discharge instructions.

Russell, Rachel | Clinical & Translational Research

Crossing the communication chasm: examining handoff practices between multidisciplinary teams.

Authors: Russell RM, Villa DN, Spahr C.
Project Mentor: Christopher Spahr, MD

Over 160,000 Americans die yearly from diagnostic error. Since communication errors during patient handoffs being one of the primary drivers of diagnostic error, many hospitals have implemented the use of standard handoff tools to lower the incidence of diagnostic error. The Milwaukee Children's Hospital (CHW) has not adopted any standard handoff process. The goal of this study was to identify the handoff practices used by physicians in the Emergency Department (ED) and Hospital Medicine Service (HOSPE) and to describe the frequency in which clinically significant information is omitted from handoffs in these departments in order to determine the utility of introducing a standard handoff tool. Patients being admitted from the ED into the HOSPE were identified and followed throughout the day until night team sign-out. Investigators assessed each physician handoff that occurred within this time period using a data collection form that had been designed to evaluate the presence of clinically significant variables, including elements of the diagnostic decision-making process. 15 participants were followed with a combined 37 handoffs (ED n=17, HOSPE n=20). During handoffs, information regarding the diagnostic decision-making process such as the diagnostic certainty and the contingency plan were among the most frequently dropped in both departments (ED 64.7%, HOSPE 30%; ED 94%, HOSPE 50%). Considering the extensive variability seen among the handoff practices at CHW, there is reason to believe that the ED and HOSPE service may benefit from the introduction of a standard handoff tool.

Sachs, Jessica | Quality Improvement and Patient Safety

Building a Program of Expanded Peer Support for the Entire Healthcare Team: No One Left Behind

Authors: Pilarski AM, Sachs JF, Huang C, Klatt TE.
Project Mentor: Timothy Klatt, MD

INTRODUCTION: Medical errors can lead to Second Victim Syndrome (SVS) in healthcare providers. Data suggests peer support programs can enhance provider well-being following these events, but literature describing effective programs is limited. In this study, we develop and evaluate our own peer support program to address the needs of second victims.
METHODS: Baseline levels of second victim distress and perceived levels of support were measured using the Second Victim Experience and Support Tool (SVEST) questionnaire. Descriptive statistics summarized demographic characteristics and proportions of responses to categorical questions. A pre and post questionnaire was used during peer support trainings to measure success of training. After the initial 5-hour session, training was condensed into 2.5 hours. Baseline and outcome data were collected. Frequency counts and types of peer support encounters documented by peer supporters were tracked overtime.
RESULTS: At baseline, non-work and supervisor support rated highest, followed by colleague support. Institution support rated lowest. Both versions of the training sessions generated developed or advanced knowledge of SVS and prepared those trained to teach others ($p<0.001$). We initially trained 52 supporters representing all clinical areas throughout an urban academic quaternary care campus. By 18 months, 149 supporters were trained. A blended program was achieved with 52.6% of peer supporters recruited from MCW and 47.4% from Froedtert hospital personnel. Providers received 44.7% of support efforts and hospital personnel 55.3%. The most common event supported was inability to stop the progression of medical conditions (24.5%).
CONCLUSIONS: Initial evaluation of our peer support program demonstrates the success and feasibility of an intervention aimed to reduce the consequences of second victim experiences. Other institutions can adapt similar programs that address the unique needs of their organization.

Samant, Samira

Clinical & Translational Research

Prognosticating ALS: The Predictive Value of C9orf72 Mutations and FVC in Disease Progression

Authors: Samant S, Fee D.

Project Mentor: Dominic Fee, MD

INTRODUCTION: Amyotrophic lateral sclerosis (ALS) is a progressive, ultimately fatal neurodegenerative disease. Prior research identified a constellation of risk factors that potentially inform a predictive model for disease prognosis, including a C9orf72 repeat expansion and forced vital capacity (FVC).

METHODS: We conducted a retrospective chart review on 356 ALS patients. Each patient's FVC and their ALS Functional Rating Scale (ALSFRS) were obtained from their first visit in our ALS Multidisciplinary Clinic (MDC) as well as at their six-month follow-up visit. Monthly changes in FVC and ALSFRS were compared, assessing whether FVC data in the initial phase of post-diagnosis disease progression may be predictive of disease severity and progression.

RESULTS: The Mann-Whitney test comparing ALSFRS scores in patients positive vs. negative for the C9orf72 mutation resulted a p-value of 0.057. The Spearman correlation coefficient comparing monthly changes in FVC to monthly ALSFRS changes was -0.0443, with a p-value of 0.6317. When analyzing only patients with a negative change in FVC, the Spearman coefficient was 0.0204 with a p-value of 0.9286.

CONCLUSIONS: Our data suggests there may be a relationship between the presence and absence of the C9orf72 mutation with regards to disease progression, given a nearly-significant p-value when assessing disease progression between patients with and without the C9orf72 mutation. However, our hypothesis that a monthly change in FVC might be predictive of the monthly change in ALSFRS, allowing the use of FVC measurements to provide patients with a more accurate understanding of expected progression, was not well-substantiated.

Schaefer, Emily

Quality Improvement and Patient Safety

Information Chaos in the Electronic Health Record as a Threat to Patient Safety

Authors: Schaefer EJ, Scanlon MC, Werner NE.

Project Mentor: Matthew Scanlon, MD

INTRODUCTION: Safe, quality patient care requires information intake and processing. Therefore, anything that interrupts this system may confound patient diagnosis, management, and overall care. Information chaos refers to the chaotic presentation and suboptimal reception of information in the electronic health record (EHR). Prior work in ambulatory adult primary care and pharmacy settings identified a group of hazards which caused information chaos. These include information overload, information underload, information conflict, information scatter, and erroneous information. The objectives of this study were to identify whether information chaos exists in a pediatric inpatient setting, and whether the previously identified types of information chaos accurately reveal any inpatient phenomenon.

METHODS: A convenience sample of thirteen patients recently discharged from a pediatric intensive care unit (PICU) were selected at random for chart review. The authors reviewed documentation associated with the most recent PICU encounter for previously identified hazards that represent information chaos.

RESULTS: Information chaos was identified in all thirteen PICU patient charts. The majority of charts seemed to contain roughly similar amounts of information chaos. In addition to known hazards contributing to information chaos, we identified four novel hazards. These include non-intuitive abbreviations, non-intuitive access of information, copy & paste, and mislabeled information.

CONCLUSIONS: Information chaos was found in 100% of studied PICU charts. Mental Workload (MW) and Situation Awareness (SA) are two functions of cognitive capacity that impact a physician's ability to cope with high cognitive demands and information processing. Information chaos confounds this system, which raises mental workload and lowers situation awareness. Thus, PICU physicians may be at heightened risk for impaired performance of clinical tasks, which may jeopardize patient safety.

Semons-Booker, Kia | Urban & Community Health

An Examination of the Access and Utility of Student Mental Health and Wellness Resources

Authors: Semons-Booker K, Hall S, Young S.
Project Mentor: Staci Young, PhD

BACKGROUND: Suicide is becoming a prominent issue as the second leading cause of death among young adults in the U.S. according to the CDC (1). As such, the disparity of depression and suicide ideation among medical students has become increasingly recognized in the medical education community (2). Providing medical students with mental health services and wellness resources are crucial factors to reducing preventable deaths in the medical student population (3). Nevertheless, eliminating potential barriers to utility of the resources available in both sectors will foster a healthy learning environment (4). Many national and local initiatives have been instituted in an attempt to address these concerns. However, a fuller examination directly involving the medical students' perspective would further expand the literature.
METHODS: This study was guided by community engagement principles and used a focus group strategy with second- and third-year medical students to assess ways to improve mental health services and wellness programming at the Medical College of Wisconsin (MCW). Prior to focus group participation, individuals completed a pre-group questionnaire. For analysis, authors applied a deductive coding qualitative strategy.
RESULTS: Major themes were identified such as stressors unique to medical training, mixed utility of mental health resources, limited opportunities for wellness, and utility barriers. For all themes, solutions were proposed to improve the areas of concern.
CONCLUSION: MCW has made great gains to address the access and utility of student mental health and wellness resources; however, there are areas of opportunity to improve these efforts. Study results have contributed to discussions of proposed solutions.

Sendaydiego, Xavier | Health Systems Management & Policy

ML385, a Nrf2 Inhibitor, Rescues Bardoxolone Methyl-Induced Cytotoxicity in Rodent Heart Cells

Authors: Sendaydiego X, Dai Q, Uche N, Lai S, Schibly E, Benjamin I.
Project Mentor: Ivor Benjamin, MD

The Nrf2-Keap1 pathway, a master regulator of antioxidant genes, has been targeted for therapeutic development to combat oxidative stress in type 2 diabetes mellitus (T2DM) and chronic kidney disease (CKD). A recent phase III trial testing bardoxolone methyl (bard), a Nrf2 activator, in 2185 patients with T2DM and CKD was terminated due to increased rates of major adverse cardiac events. We hypothesize that bard induces cellular toxicity via upregulation of Nrf2. ML385, a Nrf2 inhibitor, can mitigate this toxicity and increase cell viability. H9C2 rat cardiomyocytes were assigned to 4 treatment groups: DMSO (control), bard, ML385, and bard + ML385. We performed immunocytochemistry (ICC) to observe subcellular localization of Nrf2 protein expression, MitoSOX assays to assess mitochondrial oxidative stress, and immunoblotting of whole cell lysates to determine Nrf2 and NQO1 expression levels. Lastly, we assessed cellular viability via AlamarBlue assay after 48 hrs by treating cells with increasing concentrations of bard in combination with different ML385 concentrations. Results: Cells pretreated with ML385—alone or with bard—showed increased survival after 48 hrs, decreased nuclear Nrf2 on ICC, and decreased Nrf2 signaling on Westerns, compared with bard alone. Interestingly, MitoSOX showed increased mitochondrial oxidative stress after treatment with ML385—alone or with bard—compared with bard alone. Evidence that Nrf2 inhibition by ML385 mitigates cardiac cell death suggests an approach for achieving organ-specific preservation and defined clinical benefits. Therefore, coadministration of bard and ML385 as a treatment option warrants further preclinical study using in vivo models.

Shen, Christine — Health Systems Management & Policy

Assessing Health Care Utilization After Implementation of a Digital Mental Health Program at Scale

Authors: Shen C, Wong W, Sharif-Sidi Z, Hanson R, Somai M, Crotty B.
Project Mentor: Bradley H. Crotty, MPH, MD

INTRODUCTION: Depression and anxiety are two of the most common presenting problems seen within our healthcare system. Both are associated with significant morbidity and mortality, leading to more frequent primary care visits and hospitalizations.
HYPOTHESIS: From our previous manuscript, internet-based cognitive behavioral therapy (iCBT) usage was shown to clinically improve PHQ-9 scores within a large academic health system. The goal of this study is to examine the outcomes of healthcare utilization between iCBT users and non-users. Given that there was improvement of PHQ-9 scores in individuals who used iCBT, the hypothesis is that iCBT enrollees will utilize healthcare resources less compared to non-enrollees.
RESULTS: 2,365 patients were prescribed within our study period with 1,160 (49.0%) users and 1,205 (51.0%) non-users. Users and non-users were predominantly healthier, younger, Caucasian females with mild (5-9) to moderate (10-14) initial PHQ-9 scores. Overall, there was no significant improvement in healthcare utilization for iCBT users. However, for iCBT individuals, there was an increase in office visits with their PCP and behavioral health specialists ($p<0.05$) status post iCBT intervention.
DISCUSSION: Ultimately, there is a positive effect from the iCBT intervention; albeit, not decreasing overall healthcare utilization like originally hypothesized. For enrollees, iCBT appeared to help patients meet their mental health needs by engaging users in more appropriate care (i.e. increased primary care and behavioral office visits). Future steps include conducting a double-blind randomized controlled trial to examine if iCBT implementation reduces health care costs.

Shepherd, John — Global Health

The Impact of Race on Length of Stay and Readmission Rates in Heart Failure Patients

Authors: Shepherd JF III, Smith NJ, Kotlo S, Canales B, Szabo B, Joyce DL.
Project Mentor: David Joyce, MD, MBA

INTRODUCTION: Historically, our healthcare system has seen discrepancies in patient outcomes based on race. In patients with chronic diseases discrepancies in the healthcare systems can lead to longer hospitalizations and increased readmission rates. We sought to determine the role race plays in hospital length of stay (LOS) and readmission rates in heart failure patients.
METHODS: The medical records of 455 patients seen in Advanced Heart Failure clinic between February 2017 and December 2018 were screened for subsequent heart failure related admissions. Patients who had hospitalizations were stratified into three groups based on LOS: LOS A (index LOS 1-3 days), LOS B (index LOS 4-7 days), and LOS C (index LOS >7days). The primary endpoint was heart failure related readmission following index admission.
RESULTS: The study was composed of 173 patients with 70 patients in LOS A, 52 in LOS B and 51 in LOS C. The baseline characteristics and demographics of patients in each group were not significantly different apart from race ($p=0.049$) and heart failure stage ($p=0.007$). A total of 97 patients were categorized as White, 72 as Black, and 4 as Other. LOS A's patients were 61.4% White, 34.3% Black and 2.3% Other. LOS B's patients were 43.3% White, 57.77% Black and 0% Other. LOS C's patients were 62.7% White, 35.3% Black and 2.0% Other. The primary endpoint was met 59 times during the study interval. Cox Proportional Cause-Specific Hazards Model demonstrated race, Black vs. White (HR 1.52 [1.00, 2.31] $p=0.051$) and Other vs. White (HR 2.51 [0.86, 7.31], $p=0.091$), was not a statistically significant factor for readmission.
CONCLUSION: Index LOS in heart failure patients is impacted by race, particularly when comparing White vs. Black patients. While differences in readmission rates were not statistically significant, the results trended towards significance in Black vs. White patients and would likely show increased readmission rates in Black patients in a larger study.

Shuford, Diwante

Quality Improvement and Patient Safety

Identifying barriers/facilitators to timely EM pain treatment for children with sickle cell disease

Authors: Shuford D, Brousseau D.

Project Mentor: David Brousseau, MD, MS

BACKGROUND: Acute pain crises are the most frequent reasons why children with sickle cell disease (SCD) seek care in the Emergency Department (ED). The National Heart, Lung and Blood Institute (NHLBI) has evidence-based guidelines regarding timeliness of opioid administration to ensure high quality SCD care. However, these guidelines are infrequently met in pediatric EDs. The goal of this project is to identify the barriers and facilitators leading to decreased adherence to these evidence-based guidelines.

METHODS: The process of providing ED care for patients with SCD was mapped based on input from members of the care team. Following map completion, 5 interviews of care team members and 5 interviews with patients/families with SCD were completed to assess knowledge of the guideline and steps in the care process that act as barriers or facilitators to guideline adherent care.

RESULTS: All interviewees agreed that timely treatment, initial dose within 60 minutes and subsequent dosing within 30 minutes was very important, although most patients/families were unaware of the guideline. Barriers that were identified included: difficult IV access, inadequate utilization of order sets by physicians, lack of understanding of the guidelines and orders by newer healthcare providers when treating the patient, and a disconnect in communication between the patient and provider resulting from inadequate reassessment of pain. Care providers agreed that utilizing a triage level of 2 and the use of intranasal fentanyl for initial pain treatment were strong facilitators to timely care.

CONCLUSION: Barriers and facilitators to guideline adherent care for SCD pain in children from a single site were identified. Similar data from six other Children's hospitals will be obtained to improve care at multiple sites.

Shukla, Neehal

Quality Improvement and Patient Safety

Team Agreement and Diagnostic Error in Intensive Care Unit Teams – A Prospective Observational Study

Authors: Shukla N, Bergl P, Nanchal R, Patel J.

Project Mentor: Paul Bergl, MD

Diagnostic errors are a major source of morbidity and mortality among the critically ill, occurring in approximately 5-20% of ICU patients. Poor communication among team members may contribute to such errors. The aims of this study were to measure communication amongst ICU team members via agreement on their patients' primary diagnoses and determine the frequency of diagnostic errors through a mix of prospective and retrospective methods. We conducted an observational cohort study in a medical ICU from June to August 2019. Subjects included attending physicians, trainees, advanced practice providers (APPs), and nurses. For the first three days of their patients' ICU admissions, we asked subjects about patients' primary diagnoses, perceived complexity, confidence level, and predictions on patients' prognosis. We collected diagnoses as open-ended responses and all other variables on ordinal 5-point Likert scales. Two investigators independently reviewed team members' diagnoses and scored agreement, specificity, and accuracy of diagnoses for a given patient on a given day (patient-day) on a 5-point scale. Descriptive statistical analyses were performed on both ordinal and dichotomized data. We reviewed 480 unique patient-days and found good team agreement about the primary diagnosis in 72% of patient-days. Team agreement about the diagnosis positively associated with APPs' and trainees' level of diagnostic confidence (APP/resident: Spearman rho = 0.36, $p<0.0001$; fellows: rho = 0.34, $p<0.0001$) and negatively correlated with perceived patient complexity (rho = -0.23, $p<0.0001$). Team agreement also correlated with APPs' or trainees' predictions of likelihood of patient survival (rho = 0.24, $p<0.0001$). ICU clinicians generally agree about their patients' leading diagnoses, particularly when confident. Perceived patient complexity negatively correlated with team agreement, a finding that may have implications for how ICU teams communicate about complex patients' diagnoses.

Sirinit, Jitsupa — Quality Improvement and Patient Safety

Is Preterm Birth a Risk Factor for Malnutrition?

Authors: Sirinit J, Kuhn E, Ochoa Ramirez A, Mikhailov TA.
Project Mentor: Theresa Mikhailov, MD, PhD

Children that are born preterm are at increased risk for long-term adverse effects. There is associated adverse long-term outcomes involving metabolic, growth, cognitive and physical development of children born preterm, however it is unknown if children born preterm are at increased risk for malnutrition. Our study would like to determine if children that were born preterm are at an increased risk for malnutrition by tracking preterm status for children admitted to the PICU from age of 1 month to up to 18 years. We hypothesize that children that were born preterm will have an increased risk of malnutrition than children that were born term, and that with fewer completed weeks of gestation there will be greater risk of malnutrition.
A total of 583 patients were analyzed and 13.9% of patients were found to be malnourished. Only 531 could be analyzed for preterm birth, and of the 531 patients 37.4% were born premature. Preterm birth was not associated with increased risk for malnutrition compared to children that were born at term (p =0.227). Children who had fewer weeks of completed gestation at birth did not have a greater likelihood of being malnourished.
The results of this study indicate that preterm birth is not associated with malnutrition. However, our study may be limited by a small sample size. Determination of prematurity as a risk factor for malnutrition is important especially for the purposes of screening and early intervention, which can lead to better outcomes.

Slimovitch, Jonathan — Quality Improvement and Patient Safety

Maturational Characteristics of the Host Response to Group B Streptococcus Intestinal Colonization

Authors: Slimovitch J, Vaz M, Randis T.
Project Mentor: Tara Randis, MD and Michelle Vaz, MD

Group B Streptococcus (GBS) is a major human pathogen responsible for neonatal sepsis, meningitis, and death. The implementation of maternal screenings and the use of intrapartum antibiotics have decreased rates of Early Onset GBS which develops during the first week of life. Unfortunately, rates of Late Onset GBS, which occurs from the first week of life to three months, remain unaffected. Although GBS can infect individuals of any age, adults rarely experience the devastating disease processes seen in neonates. Prior research has indicated that immature neonatal innate immunity, including levels of cytokines and antimicrobial peptides, may play a role in the increased susceptibility to GBS infection. In the first phase of the experiment, populations of juvenile and adult mice were grown and infected with GBS or control solution. After 18 hours, mice were euthanized, nucleic acid was isolated from small intestine samples, and Real Time PCR was performed to quantify nucleic acid levels. In the second phase of the experiment, human CaCO2 cell lines were grown and exposed to GBS inoculum or control. At 30, 60, and 120 minutes, cells were collected, nucleic acid was extracted, and Real Time PCR was performed. Results revealed statistically significant differences in levels of pro-inflammatory cytokines, anti-inflammatory cytokines, and antimicrobial peptides between adult and juvenile mice infected with GBS. These findings demonstrate fundamental differences in the innate immune response of adults & juvenile mice, which may contribute to differing rates of complications and mortality.

Smoko, Jessica

Urban & Community Health

Addressing Educational Needs of Milwaukee's LGBTQ+ Youth with Insecure Housing

Authors: Smoko J, Diehr S.

Project Mentor: Sabina Diehr, MD

Community Partner: Walker's Point Youth & Family Center

LGBTQ+ youth represent a disproportionate percentage of the homeless population and experience disproportionately poor health outcomes. The Homeless Outreach in Medical Education (HOME) Project at the Medical College of Wisconsin has fostered a collaboration between medical students and local community partners to address health disparities among local homeless persons via education outreach. A mini-needs assessment was conducted among young residents at the Walker's Point Youth and Family Center to discern additional topics relevant to LGBTQ+ homeless youth. The assessment revealed interest in discussing themes including healthy romantic relationships and mental health. An additional educational module was developed to supplement the current outreach curriculum and provide resources to participants.

Sobczak, Andrew

Health Systems Management & Policy

Consequence of VDAC Modulation on Cardiac Mitochondrial Respiration

Authors: Sobczak A, Camara AKS, Kwok WM.

Project Mentor: Amadou K. S. Camara, PhD

INTRODUCTION:
The voltage-dependent anion channel (VDAC) is the main conduit that allows for the transport of metabolites, solutes, and ions across the outer mitochondrial membrane (OMM). Calcium, a modulator of mitochondrial function/dysfunction, enters and exits mitochondria through VDAC. Hexokinase (HK) is known to interact with VDAC and promote cell survival. However, the impact of HK-bound VDAC on mitochondrial bioenergetics and Ca^{2+} uptake has not been established. We hypothesized that HK-VDAC interaction increases mitochondrial respiration (O_2 consumption and membrane potential) and reduce Ca^{2+} uptake to preserve mitochondrial integrity.

METHODS:
Isolated rat heart mitochondria were studied using a high-resolution respirometer. Oxygen consumption and membrane potential (MP) were monitored in the presence or absence of HK (yeast or human-based), with the substrate pyruvate-malate (PM) followed by addition of ADP. Respiratory control index (RCI) was determined as a ratio of states 3 and 4 respiration rates. In separate mitochondrial suspensions, calcium retention capacity (CRC) and MP were assessed during state 2 respiration.

RESULTS:
HK (yeast or human-based) had no significant impact ($p<0.05$) on the rates of state 3 or state 4 respiration and no effect on mitochondrial RCI (n=3-4/group). The rate of Ca^{2+} influx and the capacity of mitochondria to buffer Ca^{2+} were not significantly impacted by HK (n=3-4/group). In addition, HK did not induce any significant changes in the duration of ADP-induced depolarization and repolarization.

CONCLUSION:
Our results suggest that the HK-VDAC interaction does not significantly impact Ca^{2+} transport across the OMM. This interaction had no impact on mitochondrial respiration. Additional experiments will need to be conducted to determine whether the effects of HK on mitochondrial function is dependent on glucose and whether the translocation of HK to the OMM is dependent on the phosphorylation state of the kinase.

Specht, Julia — Clinical & Translational Research

Outcomes in the Morbidly Obese Seeking Total Joint Arthroplasty

Authors: Specht J, Lu M, Edelstein A.

Project Mentor: Adam Edelstein, MD

BACKGROUND:
Total hip arthroplasty (THA) and total knee arthroplasty (TKA) surgery are the most successful and cost-effective treatments used to combat osteoarthritis. However, studies in morbidly obese individuals (BMI>40 kg/m2) have consistently shown increased risk for complications, specifically infection and mechanical problems. We sought to characterize baseline characteristics among morbidly obese patients seeking elective joint replacement and identify barriers to weight loss.

METHODS:
Any patient aged 18-85 with end-stage hip or knee degenerative joint disease who presented for consultation seeking hip or knee arthroplasty in the Froedtert system and had a BMI>40 kg/m2 at the time of presentation was eligible for enrollment. Patient-reported outcomes, measured using the Veteran's RAND 12 item survey (VR-12), HOOS, JR. hip survey, and KOOS, JR knee survey, were administered upon enrollment and at 3-month intervals until the time of surgery or 2 years after enrollment.

RESULTS:
Fifty eight patients met eligibility criteria for the study, 21 of whom enrolled. Of these, 16 have knee degenerative disease and 8 have hip degenerative disease. Mean patient age was 59 years (range 38-82) and 62% were female. Average BMI at enrollment was 43.5 (42.5 for knee, 45 for hip).
The average physical component score (PCS) of the VR- 12 was 27.33 (population standard 39.82) and the mental component (MCS) of the VR-12 was 42.15 (population standard 50.08).

CONCLUSIONS:
Filling this gap in understanding will help to effectively target risk mitigation efforts for the morbidly obese seeking arthroplasty and appropriately adjust current constraints on this group's access to joint replacement care.

Spellman, Cordell — Clinical & Translational Research

Comparison of two types of casting in early-onset scoliosis

Authors: Tassone C, Thometz J, Escott BG, Spellman C, Liu XC.

Project Mentor: Xue-Cheng Liu, MD, PhD

INTRODUCTION: Two types of casting techniques are used in our institution for early-onset scoliosis (EOS): Elongation-derotation-flexion (EDF) casting and Body Casting (BC). Although EDF and BC utilize a similar Mehta's principle, EDF casting requires an AMIL frame while BC is applied with a hip spica table. These variations may affect outcomes. OBJECTIVE: 1) compare changes in Cobb angle, rib-vertebral-angle difference (RVAD) and vertebral rotation (VR) by Nash-Moe, thoracic height (TH) and width (TW) between EDF and BC 2) compare these changes from pre- to post-casting within EDF or BC group; 3) determine EOS improvement.

METHODS: Sixteen children with EOS were treated by EDF at a mean age of 23 months (10 to 36). Seventeen children with the same diagnosis were applied by BC at a mean age of 20 months (6 to 38). All had x-ray measurements pre- and post-casting. Casts were changed every 2-4 months. Independent two sample t-test (Pooled or Satterthwaite), Wilcoxon rank-sum test and Chi-square test were performed.

RESULTS: Mean follow-up was 15 months (2.5 to 36). There were no significant differences at the initial treatment for age, classification of EOS, RVAD, VR, kyphosis, TH, and TW between EDF and BC. There were no significant differences for RVAD, VR, kyphosis, TH and TW from pre- to post-casting status between two casting techniques (P>0.05). Children with EDF tended to receive 3.5 more castings than those with BC (7.5 vs.4 casts) (P=0.007) and achieved better outcomes in success (25% vs.20%) and improvement (50% vs.10%) (P=0.03).

CONCLUSION AND SIGNIFICANCE: Although BC also achieves reduction for major Cobb, RVAD, and vertebral rotation as well as increases of thoracic width and height for post-casting, EDF has better outcomes with EOS improvement when there is treatment of longer duration.

Sporleder, Justin — Quality Improvement and Patient Safety

Early venous thromboembolism (VTE) prophylaxis in trauma patients with solid organ injury

Authors: Sporleder J, Carver T, Dodgion C, Losh J.
Project Mentor: Chris Dodgion, MD, MSPH, MBA

In hemodynamically stable trauma patients, the risk of non-operative management (NOM) failure must be balanced with the known risk of venous thromboembolism. Studies have shown that the hypercoagulability of trauma develops within 48-hours and initiation of prophylaxis within two days is a common quality benchmark; however, some feel that DVT prophylaxis does not affect NOM failure rates and should be initiated on admission. We undertook this study to determine if VTE prophylaxis within 24 hours was associated with NOM failure.
625 patients presenting with solid organ injury. 171 patients did not receive VTE prophylaxis. 73 individuals were treated surgically prior to initiation of VTE prophylaxis. The study population was 66.8% male with mean age of 37.6±16.9 years, 81.3% suffered from blunt trauma, and 45.2% had ISS greater than 25. Patients had an average of 1.41 organ injuries and more than 50% had a liver injury. Liver, spleen and kidney injuries were present in 59%, 41% and 41% of patients respectively. Patients had 1.41 solid organ injuries on average with mean AAST injury grade of 3.56±0.701. Low molecular weight heparin was used in 53% of patients and unfractionated heparin in 47%. Prophylaxis was initiated in <24 hours in 34% of patients. The overall failure rate of NOM was 1.0%. Grade 3 injuries accounted for 50% of NOM failures and grade 4 injuries accounted for 50% of failures. All patients that failed NOM had initially received unfractionated heparin prophylaxis. Patients who failed NOM had an average time to prophylaxis of 13 hours and failed NOM an average of 22.8 hours after initiation of prophylaxis.
Despite the higher rates of NOM failure in early prophylaxis groups, our overall VTE prophylaxis rate is superior to previously cited rates of NOM failure (2%). Given the mean time to prophylaxis for individuals failing NOM, an important next step is to determine if there is a disadvantage to receiving very early prophylaxis (>12h)

Sridhar, Nithya — Quality Improvement and Patient Safety

The Impact of Hemoglobin A1c on Post-operative Outcomes in Bariatric Surgery Patients

Authors: Sridhar N, Hetzel E, Kindel TL, Gould JC, Higgins RM.
Project Mentor: Rana M. Higgins, MD

INTRODUCTION: Pre-operative hemoglobin (Hb) A1c levels ≥ 8% can lead to increased post-operative complications. In bariatric surgery patients, attaining a pre-operative HbA1c < 8% can be a challenge. The purpose of this study was to identify the association of pre-operative HbA1c on post-operative outcomes in bariatric surgery patients.
MATERIAL AND METHODS: A retrospective chart review was conducted on diabetic patients (HbA1c ≥ 6.5%) who underwent primary bariatric surgery at a single institution between the years 2013 and 2019. Patients were divided into two groups based on their pre-operative HbA1c levels of < 8% and ≥ 8%. Univariate analyses were performed to determine an association between pre-operative HbA1c levels and post-operative outcomes.
RESULTS: There were 351 primary diabetic bariatric surgery patients, 270 HbA1c <8%, and 81 HbA1c ≥ 8%. Procedure selection was significantly different between the HbA1c < 8% and HbA1c ≥ 8% group (49.3% sleeve, 50.4% bypass and 0.4% band versus 43.2% sleeve, 53.1% bypass and 3.7% band respectively, $p < 0.04$). There was no statistically significant difference in any 30-day post-operative outcome between the two groups. Post-operative HbA1c was significantly less in the HbA1c < 8% group at 3-6 month (6.0% ± 0.9 vs 7.4% ± 1.4, $p<0.001$) and 6-12 month (6.0% ± 1.1 vs 7.2% ± 1.4, $p<0.001$) follow-up.
CONCLUSIONS: This study demonstrated no difference in post-operative outcomes of primary bariatric surgery patients based on a HbA1c cut-off of 8%. This highlights that bariatric surgery can be considered and safely performed in patients with a pre-operative HbA1c ≥ 8%.

Srivastava, Sonali

Clinical & Translational Research

IL-23 Involvement in Indirect Alloantigen Presentation in the Gastrointestinal Tract during GVHD

Authors: Srivastava S, Drobyski W.

Project Mentor: William Drobyski, MD

Graft-versus host disease (GVHD) is an inflammatory complication associated with hematopoietic stem cell transplantation (HSCT), occurs when donor T-cells also recognize recipient cells as non-self- leading to acute inflammatory responses, typically amplified at mucosal tissues, such as the gastrointestinal tract. IL-23, a proinflammatory cytokine produced by antigen-presenting cells, has been shown to bind to CD4+ T cells, inducing the production of inflammatory cytokines which elicits the tissue damage in the colon during GVHD. Thus, understanding how the blockade of donor APC-derived IL-23 impacts indirect alloantigen presentation in the gastrointestinal tract, will further elucidate the role of IL-23 in GVHD pathophysiology. Indirect alloantigen presentation is significantly decreased in p19 deficient mice (mice lacking a subunit of IL-23), as the frequency of CD4+ and absolute number of TEa+ in Balb/c mice receiving p19 -/- grafts is statistically significantly lower than mice receiving B6 wild type grafts. This suggests that IL-23 promotes indirect antigen presentation to donor CD4+. However, the mechanism through which IL-23 contributes to inflammation in the colon during GVHD, remains unknown since key inflammatory cytokines (GM-CSF, IFN- γ, or TNF- α) involved in GVHD pathophysiology are not significantly decreased in mice receiving p19 deficient grafts.

Stasik, Amy

Quality Improvement and Patient Safety

Utilizing clinical documentation specialists to improve CMI in the Neuro-ICU

Authors: Sinson GP, Kolinski JM.

Project Mentor: Grant P. Sinson, MD

INTRODUCTION: Case-mix index (CMI) is a quality metric that measures complications and comorbidities of a hospital's inpatient population and is used in allocation of financial resources. This project aimed to utilize Clinical Documentation Integrity (CDI) specialists and providers in a focused capacity to improve documentation accuracy and better capture quality metrics in the Neuro-ICU at Froedtert and MCW.

METHODS: Education was given to Neuro-ICU providers on proper documentation required to capture specific patient diagnoses present on admission. This included education on diagnoses related to the 2018 AMC Risk Model's Top 10 Mortality Risk Variables for Neurology/Neurosurgery, such as breaking down the Glasgow Coma Scale into individual components. Two CDI specialists were assigned to review medical records from the Neuro-ICU, a change from nine CDI specialists who originally reviewed these patients along with patients on other units. Total queries, provider response rate (measured by the number of "Agreed and Documented' queries), and CMI were calculated to compare effects of the interventions.

RESULTS: Total queries increased 2-fold. Provider response rate increased by 1.4%. Analysis of CMI showed that before interventions, CMI increased by 0.1685 as a result of CDI queries. After interventions, queries sent by CDI increased CMI by 0.2559. This is a 1.5-fold increase in CMI.

CONCLUSION: The increase in total queries combined with provider response rate shows that providers remained engaged and involved despite being queried more. The CMI increase shows that illness severity was found to be higher with the more specific documentation identified by the CDI specialist-provider interaction. Focused CDI specialists allowed for a more efficient documentation review specific to the common errors made in that unit. Continued CDI and unit-based physician relationships are anticipated to sustain improvements as providers will understand the 'why' behind queries.

Stehula, Forrest

Clinical & Translational Research

Optimization of CytoCam Technology to Assess in vivo Human Microvascular Function

Authors: Stehula FJ, Katunaric B, Schulz ME, Gutterman DD, Freed JK.

Project Mentor: Julie Freed, MD, PhD

INTRODUCTION: Microvascular dysfunction, defined as the inability to vasodilate to endothelial-derived nitric oxide, precedes the formation of coronary artery disease (CAD). Currently, strategies to diagnose microvascular dysfunction rely on invasive techniques, for instance by measuring coronary flow reserve during cardiac catheterization. Recent advancements in handheld vital microscopy allows for non-invasive imaging of the peripheral microcirculation, most commonly in the oral mucosa. Adapting this technology to assess microvascular function in vivo may allow for early warning and prevention of CAD.

HYPOTHESIS: Adaptation of CytoCam technology will allow for in vivo assessment of human microvascular function.

STUDY METHODS: CytoCam-IDF imaging was used in vivo to measure human sublingual microcirculatory total vessel density (TVD) and buccal diameter changes in response to sublingual nitroglycerin (0.3mg). In 5 healthy participants, baseline TVD was measured by De Backer score from 5 random sites of sublingual microcirculation. Microvessel diameter was measured from buccal mucosa, before and 2 minutes after nitroglycerin administration. Lastly, TVD was measured again from 5 random sites of sublingual microcirculation.

RESULTS: TVD significantly increased following nitroglycerin administration (9.06 mm/mm2 vs. 11.20 mm/mm2, P<.01). However, there was no significant increase in buccal vessel diameter 2 minutes after nitroglycerin administration (42.49 μm vs. 45.10 μm, P=0.60).

CONCLUSIONS: The CytoCam produces high-resolution videos and is capable of measuring alterations in microvessel diameter. Sublingual nitroglycerin increased TVD and therefore overall perfusion, however nitroglycerin did not reliably increase microvessel diameter.

Future Direction: This method will be repeated with sublingual administration of acetylcholine to determine endothelium-dependent contribution to TVD.

Strong, Stephanie

Quality Improvement and Patient Safety

Superficial Surgical Site Infection Score for Operative Abdominal Trauma Patients

Authors: Strong S, Peschman J, Durbin S, Milia D, Carver T, Banerjee A, Dodgion C.

Project Mentor: Christopher Dodgion, MD

INTRODUCTION: Superficial surgical site infections (sSSIs) have placed a significant burden on health care systems. Trauma patients are at an increased risk and abdominal trauma comprises 7-10% of all admission. We aimed to validate a sSSI risk calculator for operative abdominal traumas using the Trauma Quality Improvement Program (TQIP).

METHODS: We divided patients into a derivation (2013-2015) and a validation population (2016). Apriori variables were included in a multivariate logistic regression model to determine the rates of contracting a sSSI within 30 days of surgery. Statistical computations were performed using R version 3 and the discriminative ability of the model was assessed using the c-statistic.

RESULTS: The derivation (n = 18,650) and validation (n = 11,711) patients were similar for all characteristics. Of the 11,711 patients analyzed in the validation group, 3.7% were diagnosed with sSSIs. The mean age was 37 years, 77.7% were male, and 54.2% were white; 26.3% had an ISS>15 and 28.3% had an ISS>25. The model provided a c-statistic of 0.68. The covariates with the greatest predictive power included BMI>30 (OR 1.28), blood transfusion (OR 1.83), small bowel injury (OR 1.53), duodenal injury (OR 2.05), colon injury (OR 2.93), and stomach injury (OR 1.40).

CONCLUSION: The sSSI risk score provides a modest prediction of the occurrence of postoperative sSSIs in patients with abdominal trauma and should be used as a tool for determining use of risk-adapted wound management techniques to reduce occurrence of sSSIs and improve quality of care.

Sweeney, Clayton | Health Systems Management & Policy

Observational analysis of online symptom checker use by age, sex, and concern.

Authors: Sweeney CP, Crotty BH, Somai M, Winn AN.
Project Mentor: Aaron N. Winn, PhD

BACKGROUND: Data suggests people are attempting to self-triage/diagnose using the internet. There has been a proliferation of symptom checkers to meet this demand, using computerized algorithms. Research exists to determine the accuracy of symptom checkers, but little research exists determining who is using symptom checkers and for what concerns. This study aims to understand what sort of people are using symptom checkers and the types of symptoms and conditions the users are checking. This analysis can prioritize the development of these symptom checkers to improve efficiency and accuracy.
METHODS: We used data from Buoy Health encounters, a freely available online symptom checking chatbot. Users provided age, sex, and complaint data. The chatbot asks additional questions to provide three possible diagnoses. We matched the output diagnoses to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) codes, allowing for categorization.
RESULTS: The data set includes 158,083 encounters yielding 397,864 possible diagnoses. Females conducted 77.8% of the encounters. The users' ages ranged from .038 years to 89 years of age, and 91.2% of all users were less than 65. The most frequent ICD-10 categories determined were "Diseases of the Genitourinary System" and "Diseases of the musculoskeletal system and connective tissue."
CONCLUSION: Prioritizing the development of online symptom checkers for females with these concerns will be most efficient. Further research should determine why these encounter trends exist; to expand online resources and engage these patients more efficiently in other healthcare settings.

Tallmadge, Maggie | Quality Improvement and Patient Safety

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

Authors: Tallmadge M, Livergood MC, Tvina A, Evans S, McIntosh J, Palatnik A.
Project Mentor: Anna Palatnik, MD

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

Thelen, Megan — Global Health

Patient-reported barriers to use of sequential compression devices in inpatient pregnant women.

Authors: Thelen M, Palatnik A, Flynn F.
Project Mentor: Anna Palatnik, MD

INTRODUCTION: Sequential compression device (SCD) is recommended for antepartum venous thromboembolism (VTE) prophylaxis. Based on a prior study by our group, women's compliance with SCD on antepartum floor is low. The objective of this study was to design and validate a patient survey to identify barriers to SCD use and to administer that survey to antepartum women admitted to our institution.
METHODS: SCD survey was designed and assessed for validity and interpretation of each question by face-to-face cognitive interviews with providers and patients admitted to the antepartum floor and prescribed SCD. The survey was then administered to pregnant women admitted to antepartum floor. Patient-reported understanding of SCD purpose, bother, and reasons for non-compliance were included in the survey. Demographic information was collected through review of the EMR.
RESULTS: All women reported they understood the purpose of SCD. Across 12 categories of bothersome aspects of SCD, the average total bother score was 23.3 (range 12-60). The most common reasons women identified as why SCDs were not worn at all times were: 1) discomfort; 2) too hot/sweaty; and 3) they wake me up. The most common responses to what women believe would make SCD easier to use were to have a wireless/cordless device, lighter weight/cooler material, and to have a better availability of nurses to assist with SCD placement.
CONCLUSION: In study we validated and utilized a survey to identify self-reported barriers to SCD use among antepartum pregnant women. Self-identified barriers to use centered around discomfort and restrictive nature of the device. Women identified fixing these barriers as well as needing more assistance with the device as important in increasing its use.

Tittle, Benjamin — Clinical & Translational Research

MRI features of isolated periventricular heterotopia in pediatric epilepsy: A comparative study

Authors: Tittle BJ, Maheshwari M, Marashly A.
Project Mentor: Mohit Maheshwari, MD

PURPOSE: Periventricular nodular heterotopia (PNH) is a neurodevelopmental disorder in which neurons fail to migrate to the cortical surface, forming discrete areas of grey matter adjacent to the lateral ventricles. Given that PNH is seen as an incidental finding in patients without epilepsy, causality between PNH and epilepsy cannot be assumed. Furthermore, the structural characteristics of PNH in patients with epilepsy are poorly defined and can be misleading. In this article, we investigate whether structural radiological characteristics of PNH can predict epileptogenicity in pediatric patients.
METHODS: Pediatric patients with PNH, but no other epilepsy-associated cortical abnormalities, on magnetic resonance imaging were identified and divided into two groups, with epilepsy and without epilepsy. PNH radiological characteristics of laterality, regionalization, largest dimension and number of nodules were compared between the two groups.
RESULTS: Only PNH spreading across several regions was associated with a statistically higher chance of epilepsy. Other features including laterality, individual region, number and largest dimension did not reliably predict epileptogenicity.
CONCLUSION: Most radiological characteristics of PNH are similar in patients with and without epilepsy. The involvement of multiple periventricular regions with PNH was the only feature that inferred a higher risk of epilepsy. PNH requires a comprehensive work-up and should be interpreted in the context of each individual patient and not assumed to be directly causative of epilepsy, nor unrelated to it. Therefore, further studies using additional structural and functional imaging modalities are needed to determine the radiological features of epileptogenic PNH.

Tolo, Hallie

Quality Improvement and Patient Safety

Birth Center experience across maternal age groups: A qualitative exploration

Authors: Tolo H, Francis J.

Project Mentor: Jessica Francis, MD

BACKGROUND: In FY2020, the Froedtert Hospital Birth Center was observed to have a below average rolling HCAHPS score in the overall institutional performance. This study sought to identify possible causes using qualitative analysis of the free response comments of individuals who completed their post-Birth Center HCAHPS survey.

METHODS: 292 free-response comments from women ages 18-49 who had given birth at FMLH Birth Center in FY2020 underwent iterative coding to identify themes around satisfaction or dissatisfaction with their Birth Center experience. Major themes and subcategories within themes arose, and proportion of comment tags within each subcategory were compared between maternal age groups (18-34 and 35-49) using x2 and Fischer exact tests.

RESULTS: Four major themes emerged: 1) staff interaction 2) psychological safety 3) the physical environment 4) procedure experience. Comments on staff interactions and psychological safety were most frequent and lengthiest. Women age 18-34 had a higher proportion of comments related to positive experiences with nursing staff (28% versus 11% of comment tags, p=0.0004). Women age 35-49 had a higher proportion of negative comments related to obstetrician interactions (7% versus 1%, p=0.007) and the experience in a teaching hospital (8% versus 1%, p=0.0005).

CONCLUSIONS: Across all age groups, Birth Center experience was highly influenced by staff interactions and feelings of safety and control. However, in the younger age group, women's comments were focused on connections with nursing staff, while women of advanced maternal age were more likely to write about the gestalt of their experience.

Tongpalad, Francis

Urban & Community Health

The Borderlands of Physical Activity: Hmong, Somali, and Latinx Caregivers Experiences

Authors: Thao MS, Tongpalad F, Culhane-Pera K.

Project Mentor: Mai See Thao, PhD

Childhood obesity is a pervasive issue in the United States. For children and adolescents aged 2-19 years in 2017-2018, obesity prevalence was 25.6% among Hispanic children, 24.2% among non-Hispanic Black children, and 8.7% among non-Hispanic Asian children. Despite these figures, research remains limited on the influence of migration and experiences of living in the U.S. on physical activity. In addition, research remains limited on immigrant and refugee children's family-based physical activity, specifically with Latinx, Somali, and Hmong communities.

This paper utilizes Interpretative Phenomenological Analysis to analyze qualitative interview data from Family Matters, an NIH-funded longitudinal study that investigated the home environment of low-income and minority households to examine the multiple protective and risk factors in childhood obesity. Study participants included 25 child-caregiver dyads each from African American, Native American, Latino, Hmong, Somali, and White families. We employ Gloria Anzaldúa's, "Borderlands" as an analytical framework to examine caregiver interview responses about diet, physical activity, and weight in the household. These experiences and perceptions of immigrant/refugee caregivers reveal the social and cultural borderlands of physical activity in the U.S. and can better inform future physical activity interventions. Our paper examines the following questions:

How do immigrant caregivers talk about physical activity? What influences does post-migration have on immigrant perspectives of PA? How have immigrants incorporated their experiences post-migration in fostering PA in their children? In using a more nuanced socio-cultural analysis of child's play, our findings illustrate that physical activity is a deeply racialized, cultural, and situated practice.

Torres, Sarah

Health Systems Management & Policy

Midwestern medical students crave nutrition education: Findings from a cross-sectional survey

Authors: Torres S, Osborn B, Hueston WJ.

Project Mentor: William J. Hueston, MD

BACKGROUND: Physicians are expected to provide credible nutritional counseling (NC) to patients. However, NC is insufficiently incorporated into medical education. Identifying medical students' beliefs towards NC and what year of medical school they report the lowest self-efficacy(SE) may inform future curriculum reform.
Objective: To examine 1) students' beliefs towards NC, 2) the relationship between year in medical school and SE to provide NC to patients, and 3) students' satisfaction with their nutrition education.
METHODS: We surveyed a convenience sample (n=130) of medical students from the Medical College of Wisconsin(MCW). We conducted descriptive statistics, bivariate (chi-squared) tests, and a series of adjusted logistic regressions to examine the relationship between year in medical school and 6 measures of SE.
RESULTS: Most students believe: that advice on dietary modifications can help improve patients' eating habits (90.8%), that NC should be included in routine appointments (77.7%), and that physicians can have an effect on a patient's dietary behavior (86.9%). MS4s were more confident to educate patients on calculating body mass index compared to MS1s (AOR=1.50, 95%CI: 1.09-2.08, p=0.01). MS2s were more confident to educate patients on the role of dietary cholesterol and saturated fat compared to MS1s (AOR=6.62, 95%CI: 1.47-29.81, p=0.01). There were no statistical differences in the associations between year in school and SE to educate patients on serving sizes, weight-loss, assessing food labels, and dietary patterns to prevent/treat type II diabetes. 90.8% of students reported dissatisfaction with the quality and quantity of nutrition education in medical school.
CONCLUSION:
While a majority of students had strong beliefs towards nutritional counseling (NC), there were no differences by year for most measures of self-efficacy. Most students were dissatisfied with their nutrition education, indicating their eagerness to learn about NC.

Torres, Alejandro

Urban & Community Health

Secondary Trauma Prevention: A Qualitative Analysis of Hospital-based Violence Intervention Programs

Authors: Torres A, deRoon-Cassini TA.

Project Mentor: Terri A. deRoon-Cassini, PhD, MS

Community Partner: 414Life

Hospital-based Violence Intervention Programs (HVIPs) serve a growing role in preventing violent trauma by extending support that treats not only violent injuries, but socioeconomic risks as well. Violence is often perceived as solely a societal issue with no ties or parallels to health. When explored in more depth, however, one can see how violence emulates the concept of a contagion as evidenced by its designation as the 5th leading cause of death in the United States. This paper reviewed the literature on HVIP impact to date and explored the characteristics of 29 HVIPs to compare program functionality. Variables such as mechanism of injury, qualifying age, services offered, time length of services, and community involvement were reviewed and summarized to determine if a common framework could be identified and implemented to improve existing programs and aid in developing future ones. The resulting comparison showed a time frame of 6-12 months as the most common period for program service usage. Concerning mechanism of injury, 100% of programs included individuals injured by gunshot wounds and 82.7% of programs extended their screening to stab wounds and other violent blunt injuries. Employment and mental health were the two services represented most among several other forms of assistance, offered by 82.7% and 79.3% of programs, respectively. Investigating the variability among these programs helped identify common characteristics that should be considered when assessing program progress and goals for emerging and established HVIPs while underscoring important questions with respect to optimizing program outcomes.

Ulschmid, Caden

Clinical & Translational Research

Racial Disparities in Hidradenitis Suppurativa

Authors: Ulschmid CM, Serrano L, Roth GM, Sokumbi O.
Project Mentor: Gretchen Roth

Hidradenitis suppurativa (HS) is an inflammatory skin condition that disproportionately affects black patients. In this study we assessed delay in diagnosis, severity/stage of disease, and management of HS by a dermatologist in both black and white HS patient populations in an urban midwestern population.
We searched the Medical College of Wisconsin and Froedtert Health i2b2 electronic data warehouse, including over 1.3 million patients in Southeast Wisconsin, for patients with an HS diagnosis and ≥3 encounters for HS using ICD9 705.83 and ICD10 L73.2 codes. We characterized 1,190 patients by retrospective chart review, excluding patients without an encounter for HS treatment.
443 patients were White or Caucasian (47.7%), 467 Black or African American (50.3%), 5 American Indian or Alaskan Native (0.5%), 12 Asian (0.3%), and 3 Other (0.3%). The mean delay in diagnosis was 3.29 years for White patients and 4.79 years for Black patients (P=.01). 153 White and 200 Black patients had Hurley stage data available. The worst documented Hurley stages in White patients were Stage 1 (78, 51.0%), Stage 2 (41, 26.8%), and Stage 3 (34, 22.2%). The worst documented Hurley stages in Black patients were Stage 1 (51, 25.5%), Stage 2 (57, 28.5%), and Stage 3 (92, 46.0%). A greater percentage of White patients (264, 59.6%) than Black patients (224, 48.0%) had seen a dermatologist for treatment or diagnosis of HS.
Our data suggest that black patients may face greater delay in diagnosis, more severe disease, and be less likely to receive care from a dermatologist for treatment of HS than their white counterparts. These differences, likely due to a combination of socioeconomic and biologic factors, must be further assessed and their underlying causes explored.

Uner, Ismet

Global Health

The effects of a loss in funding to Birth to 3 program, HEAR Wisconsin, for children with hearing loss

Authors: Uner I, Runge C.
Project Mentor: Christina Runge, PhD
Community Partner: HEAR Wisconsin

Early interventional care is critical for children with hearing loss to achieve language development. Wisconsin is fortunate to have HEAR Wisconsin (WI), a Birth to 3 program, that provides essential aural rehabilitation and auditory-verbal therapy, speech pathology, and educational and family support. In the U.S., Birth to 3 is a federally-mandated early intervention program. HEAR WI is also a partner with the local nonprofit, United Way. HEAR WI had a roughly $90,000 loss of funding in 2019 by Milwaukee County Department of Health & Human Services (DHHS). We investigated subsequent challenges faced by HEAR WI, as well as barriers encountered by children with hearing loss. We conducted interviews with HEAR WI staff leaders Jill Van Calster and Amy Lalios and analyzed data collected from HEAR WI 990 forms, annual reports, Milwaukee DHHS contracts, data provided by Ms. Lalios, and United Way 990 Forms. In 2018, eight agencies received Birth to 3 funding, however three providers did not have funding renewed in 2019, one of which was HEAR WI. Families with deaf/hard of hearing children faced extra layers of bureaucracy which increased the potential for missing specialty service referrals for hearing loss. Milwaukee DHSS also proposed a new coaching model where the "primary coach" may not be trained to meet the child's specific disability needs. HEAR WI increased outreach efforts and maintained the number of referrals in 2019. For every referral that was received, the child subsequently enrolled for services, resulting in a 15% increase in early intervention services provided in 2019. Ultimately, it was HEAR WI's tenacity, exemplary reputation as a Birth to 3 provider, community contacts, relationship with United Way, fundraising abilities and self-advocacy that allowed them to hold steady with the number of referrals and continue providing services to children with hearing loss.

Uyemura, Bradley

Molecular & Cellular Research

The novel immune checkpoint inhibitor GI101 restricts tumor growth and promotes survivorship

Authors: Uyemura B, Holzhauer S, Malarkannan S, Riese MJ.

Project Mentor: Subramaniam Malarkannan, PhD

While the recent development of immune checkpoint inhibitors has revolutionized modern cancer treatment, only a minority of patients achieve remission. Treatment failure is often due to inherent or acquired resistance mechanisms, overall encouraging the development of new therapies. In this study, we aimed to characterize the in vivo anti-tumor effects of GI101, a novel triple-targeting bispecific CD80-IL2variant fusion protein that produces dual-immune checkpoint blockade as well as direct stimulation of lymphocyte proliferation. In addition, it has been shown that the depletion of negative regulators of T cell receptor (TCR) signaling, such as diacylglycerol kinase zeta (DGKζ), can improve T-cell-mediated cancer therapies. As such, we also aimed to enhance GI101 anti-tumor effects in combination with DGKζ depletion. We found that GI101 treatment restricts tumor growth while also enhancing survival. When combined with DGKζ depletion, we observed complete clearance of tumor burden. Using flow cytometry of splenocytes from treated animals, GI101 treatment was shown to promote a CD8+ T cell effector memory phenotype. Similarly, GI101 treatment was associated with increased natural killer (NK) cell numbers with a predominance towards a secretory/activated phenotype. While we also observed expansion of neutrophils and dendritic cells with GI101 treatment, it is likely that GI101 readily restricts tumor growth by enhancing lymphocyte numbers and function. This study is the first to demonstrate the anti-tumor effects of GI101 treatment in vivo, as well as its enhancement with DGKζ depletion. In addition to highlighting the efficacy of this specific regimen, we hope to promote further research exploring the manipulation of negative regulators of TCR signaling such as DGKζ to enhance the activity of immune checkpoint inhibitors.

Villa, Danielle

Quality Improvement and Patient Safety

Observations of Communication during Handoffs and Rounds at CHW

Authors: Villa DN , Russell RM.

Project Mentor: Christopher Spahr, MD

PURPOSE

Quality communication and handoffs between physicians is a key component in reducing medical errors. The purpose of this study is to identify common handoff communication errors and omissions in the emergency department and hospitalist teams that can lead to diagnostic error or delay in diagnosis. This study aims to follow patients longitudinally during their stay until morning rounds the following day.

STUDY METHODS:

Two medical students observed handoffs between the emergency department and the accepting hospitalist, the emergency department and the admitting resident, patient staffing on the hospitalist floor, and rounds on the patient the following morning. During each handoff, one student used a checklist to identify pieces of information that were stated while the other scribed the conversation. These checklist items were then crosschecked against Epic records to determine whether omissions checklist items were correctly omitted or whether they were mistakes.

RESULTS:

37 total handoffs were observed. 17 handoffs were from the ED to the hospitalist unit and 20 handoffs occurred on the hospitalist floors. The most notable results include: in 73% of handoffs there was no contingency plan discussed, in 54% of handoffs there was no rationale for differential diagnoses given, and in 43% of handoffs there was no differential diagnoses stated for a patient.

CONCLUSIONS:

Handoffs often times omitted important information that could be found in the electronic health records that were key to treating the patients. Every handoff differed for a variety of reasons including method of communication, type of supporting information, and number of interruptions.

Voter, Jay

Bioethics & Medical Humanities

Synovial Measurements and Analysis Near Hip Arthroplasty

Authors: Voter JE, Koch K, Karr R, Mannem R.

Project Mentor: Kevin Koch, PhD

Hip arthroplasty (HA) is the standard treatment for end-stage hip disease, allowing pain relief, improvement of activity level, and patient satisfaction in as many as 90% of patients. The number of primary HA procedures performed per year is expected to increase from 208,600 in 2005 to about 572,000 in 2030. Despite this standard treatment, 40% of patients encounter groin and thigh pain which is often manifested as inflamed synovium. Soft tissue changes near symptomatic total hip replacements are best assessed using MRI, which increases the visibility of many important pathologies commonly found near implanted orthopedic hardware, including host-mediated adverse local tissue reactions, infection, osteolysis, and osteonecrosis. MRI identification of these pathologies aids in planning for surgical revision and has been shown capable of predicting tissue destruction in symptomatic HA. Identification of these features is difficult, even for the interpreting radiologist or clinician with substantial specialized training and experience. Post-processing and analysis can be used to automate analyses and assessments of synovial tissue health near HA. 200 MRI HA datasets were extracted from clinical archives utilizing a registered imaging chart review project approved by the MCW IRB. On the extracted MRI datasets, the synovium was manually segmented for training and testing. The encoder decoder network architecture successfully utilized for synovitis detection in our preliminary data was deployed to train this segmentation model. Preliminary network training has shown success. ROC curve analysis yields an area under the curve of 0.92, meaning the network distinguishes diseased from normal synovial tissue with 92% accuracy. The encoder decoder network may provide utility to radiologists interpreting synovial pathology near total hip replacement.

Waldman, Rebecca

Urban & Community Health

Development and implementation of a mental health curriculum for adolescents

Authors: Waldman R, Rotherham B, Schaefer J, Stevens JM.

Project Mentor: James Stevens, MD, PhD

Community Partner: Longfellow Middle School

Mental health topics are often underrepresented in the standard school curriculum for adolescents. With the incidence of mental illness rising and the stress caused by the covid-19 pandemic, there is need for more comprehensive mental health education in schools. Prior to the isolation experienced during the pandemic, a gap already existed between prevalence of mental illness and help-seeking behaviors in adolescents. The goal of this curriculum is to provide learning opportunities aimed at increasing awareness around key mental health topics, while attempting to reduce stigma. This is accomplished through designing a curriculum that utilizes social-emotional learning strategies to connect with students and provide a safe learning environment with peers. In partnership with Longfellow Middle School in Wauwatosa, WI, around 250 seventh grade students, across seven class periods were provided educational materials. First through third year medical student volunteers provided time to assist with curriculum implementation. Initial curriculum was designed and implemented for in person teaching during 2019, with quantitative data suggesting need for further curriculum enhancement. Due to the shift of educational environment to virtual learning this past year, adaptation of curriculum to distance learning was necessary. Curriculum design included recorded presentations with correlating reflection exercises. Educational materials were provided to teachers, allowing for medical student involvement while maintaining safety precautions during the time of covid-19. Qualitative results from implementation of virtual curriculum demonstrate the continued need for mental health education for adolescents.

Walsh, Richard — Quality Improvement and Patient Safety

Percutaneous Dual Right and Left Ventricle Support Avoids Limb Ischemia Compared to Peripheral VA ECMO

Authors: Walsh RW, Smith NJ, Durham LA, Joyce LD, Turbati MS, Joyce DL, Rossi PJ.
Project Mentor: David L. Joyce, MD, MBA

OBJECTIVE: Mechanical Circulatory Support (MCS) is a mainstay in the treatment of adult cardiogenic shock and associated with increased risk of limb ischemia. While cardiogenic shock confers high mortality, limb ischemia is a severe form of morbidity resultant from MCS. We compared peripheral methods of MCS and a novel approach in their rates of limb ischemia.
METHODS: This was a retrospective cohort study of patients treated for cardiogenic shock or given cardiac protection between January 1, 2015-December 5, 2021 at our institution. Incidence of limb ischemia between a novel MCS strategy with percutaneous right and left ventricular assist devices compared to femoral VA ECMO was completed. Baseline characteristics and hemodynamic data were also collected. A Fischer's Exact test comparison was used to determine the incidence of limb ischemia among the approaches
RESULTS: 55 patients underwent the studied peripheral MCS modalities at our institution with 13 patients in the novel MCS group and 42 in the peripheral VA ECMO group. Baseline characteristics including patient organ function, degree of cardiogenic shock, and medical history were similar among the groups. Fischer's Exact testing demonstrated a p value of 0.025 regarding the rates of limb ischemia comparing this new approach to traditional peripheral therapy.
CONCLUSION: Peripheral VA ECMO confers risk of limb ischemia with the most severe complications resulting in above the knee amputations. Utilizing this percutaneous approach with concomitant RVAD and LVAD has far lower risk of limb complications while avoiding associated complications with sternotomy and central VA ECMO.

Welhouse, Kyle — Urban & Community Health

Application of a Novel Glucocorticoid Receptor Antagonist (CORT113176) to the study of Neonatal Stress

Authors: Welhouse K, Gehrand A, Phillips J, Siddiqui H, Schulgit M, Raff H.
Project Mentor: Hershel Raff, PhD

Premature birth is a major public health problem worldwide. The stress of premature birth includes the inability to control blood glucose and maintain quality oxygenation leading to hypoxia. Corticosteroid administration enhances surfactant production improving oxygenation in preterm humans. However, corticosteroids can also have negative consequences. We have validated a rat model of separation and hypoxia on post-natal day (PD) 2 emulating the stress and treatment of hypoxia in preterm infants. We hypothesized the role of endogenous glucocorticoids in our preterm birth model can be evaluated using the novel selective glucocorticoid receptor (GR) antagonist CORT113176 (Corcept). Pups (PD 2, 8, or 15; N=6-8 per treatment/timepoint) were given CORT113176 (60 mg/kg IP) or vehicle, then placed into chambers in room air with mild warming to prevent hypothermia. 60-min later, one group of pups was euthanized, and trunk blood collected (baseline). Remaining pups were exposed to hypoxia (8% O2) or normoxia (time control) for 30- or 60-min. Trunk blood was collected to measure plasma glucose, insulin, ACTH, and corticosterone. In PD2 rats, basal and hypoxia-stimulated plasma ACTH and corticosterone were lower and basal HOMA-IR greater with CORT113176 pretreatment suggesting (unexpectedly) agonist activity. In PD8 and PD15 rats, basal and hypoxia-stimulated plasma ACTH and corticosterone were augmented after CORT113176 pretreatment demonstrating antagonist activity. However, in PD8 rats, effects were tissue-specific: HPA-axis antagonist, agonist on whole-body insulin resistance. The differential effects of CORT113176 based on age and target tissue indicates GR regulation changes in early development in our animal model of human prematurity.

Wendt, Lisa — Quality Improvement and Patient Safety

A Hospital Education Program to Improve Care for Children with Challenging Behaviors

Authors: Wendt LM, Conley C, Schindler C.
Project Mentor: Christine Schindler, APNP

INTRODUCTION: This quality improvement (QI) project was created to implement an educational program for care providers and nurses regarding the creation and use of visual schedules for children at risk for challenging behaviors. The QI project was performed on a 24-bed acute care pediatric unit at a local Midwestern children's hospital.
METHODS: The plan, do, study, act method was used, and the intervention was evaluated via pre- and post-implementation surveys. Education was provided through in-person teaching and handouts.
RESULTS: A sample of 46 care providers and nurses received the education, with 23 participants completing the pre-implementation survey and 6 participants completing the post-implementation survey. Post-implementation survey collection was cut short due to the COVID pandemic.
CONCLUSION: Initially poor understanding of visual schedules was noted, which improved following education. Evaluation of utilization of visual schedules for patients in this population was limited due to lack of patients present on the unit. Positive feedback was received following implementation, with a greater understanding about use of visual schedules for children at risk for challenging behaviors noted. The participants learned how to identify patients that could benefit from the use of a visual schedule and how to work with families to create a schedule that could benefit these patients.

Wiese, Dylan — Clinical & Translational Research

Functional Assessment of Total Ankle Arthroplasty: Systematic Review

Authors: Wiese D, Fritz J, Canseco K, Law B.
Project Mentor: Brian Law, MD

INTRODUCTION
Total Ankle Arthroplasty (TAA) is becoming the standard of care for the treatment of advanced degenerative joint disease of the ankle because it reduces pain, while preserving ankle motion. Assessment of ankle function after replacement is necessary to determine treatment success and continue progression of the field. The aim of this study is to review methods used in the past 10 years to assess ankle function and biomechanics following TAA, discussing each method's strengths and weaknesses, determining which method is best.
METHODS
Pubmed was searched for articles from January 2010 to September 2020 using key terms including: "gait analysis", "fluoroscopy", "segmented", or "multi-segment", as well as either "total ankle arthroplasty" or "total ankle replacement". Many searches of TAA included "finite element analysis" so these studies were included. Twenty-seven articles met criteria. They were separated by method of analysis and compared within and between methods.
RESULTS
Most studies characterized general TAA mechanics during gait and some compared TAA to arthrodesis. Twelve used a single-segment foot model for gait analysis and six used a multi-segment model. Five used fluoroscopic assessment to investigate function and kinematics. Four finite element studies described implant design anatomical interactions.
CONCLUSIONS
Following review, it was determined that video fluoroscopy was superior to gait analysis, with multi-segment being preferred over single-segment. Overall, the greatest drawback for the field is inconsistent methodologies, making comparison between studies difficult. To allow for appropriate comparison, future investigations must directly compare these different methodologies.

Williams, Taylor — Clinician Educator

The Military Academic Enrichment Elective: Improving Veteran Healthcare One Student At a Time

Authors: Williams T, Hayes M, Lee K.
Project Mentor: Kenneth Lee, MD

GOAL: To provide confidence in care and improved healthcare interactions of veteran patients by promoting awareness of veteran culture and increasing knowledge of learners.
NEED/RATIONALE: The Joining Forces Initiative (JFI) indicated a national need for increased awareness and education surrounding veteran healthcare. The National Board of Medical Examiners has recognized and addressed this need by including veteran health related questions on board exams; subsequently, the Medical College of Wisconsin acknowledged and signed on to the JFI, which inspired the Military Academic Enrichment Elective (MAEE). The curriculum included didactic and interactive components, juxtaposing experience- and knowledge-based lectures with discussions with veterans and current service members.
METHODS: The course was offered to M1 and M2 students and included weekly 2-hour sessions with didactics enhanced by panels of veterans. At each session, students completed a pre-test to determine baseline knowledge of the subject material and an identical post-test to measure knowledge gained. At the end of the course, a comprehensive final exam was administered to determine information retention. An attitudes assessment was delivered prior to the start and at the conclusion of the course.
RESULTS: Key indicators for class success were student self-assessed confidence in working with the veteran population and subject knowledge increase; an increase in overall confidence was found at course completion. Content quizzes demonstrated a knowledge increase in all students. Course evaluations indicated instructional methods could be improved during the next course iteration and encouraged expanded perspectives from groups such as women veterans and families of deployed personnel.

Wong, William — Health Systems Management & Policy

Assessing Health Care Utilization After Implementation of a Digital Mental Health Program at Scale

Authors: Wong, W, Shen, C, Sharif-Sidi, Z, Hanson, R, Somai, M, Crotty, BH.
Project Mentor: Bradley H. Crotty, MD, MPH

INTRO: Depression and anxiety are two of the most common presenting problems seen within our healthcare system. Both are associated with significant morbidity and mortality, leading to greater primary care visits and more frequent hospitalizations.
HYPOTHESIS: From our previous manuscript, iCBT usage was shown to clinically improve PHQ-9 scores within a large academic health system. The goal of this study is to examine the outcomes of healthcare utilization between iCBT users and non-users. Given that there was improvement of PHQ-9 scores in iCBT enrollees, the hypothesis is that iCBT individuals will utilize healthcare resources less compared to non-enrollees.
RESULTS: 2,365 patients were prescribed within our study period with 1,160 (49.0%) users and 1,205 (51.0%) non-users. Users and non-users were predominantly healthier, younger, Caucasian females with mild (5-9) to moderate (10-14) initial PHQ-9 scores. Overall, there was not a significant improvement in healthcare utilization for iCBT users. However, iCBT users did have an increase in their office visits with their PCP and behavioral health specialists post-iCBT ($p<0.05$).
DISCUSSION: Ultimately, there is a positive effect from this intervention; albeit, not decreasing overall healthcare utilization like originally hypothesized. For enrollees, iCBT appeared to help patients meet their mental health needs by engaging users in more appropriate care (i.e. increased primary care and behavioral office visits). Future steps include conducting a double-blind randomized controlled trial to examine if iCBT implementation reduces health care costs.

Wright, Christian — Clinical & Translational Research

Trapeziectomy and wrist salvage procedures: functional and radiographic outcomes

Authors: Wright C, Hoben G.

Project Mentor: Gwendolyn Hoben, MD, PhD

HYPOTHESIS: For cases in which thumb carpometacarpal arthritis and radiocarpal arthritis are present in the same hand, ipsilateral trapeziectomy with ligament reconstruction and tendon interposition (LRTI) and four-corner fusion (FCF) have been considered relatively high risk to wrist function and thumb stability. We hypothesize that patients who have undergone both, LRTI and FCF, will have improved thumb and wrist function.

METHODS: This study was a retrospective chart review of patients who underwent trapeziectomy with LRTI and FCF in the same hand within the Froedtert Health System. Final operations occurred between April 2009 and April 2019. Six hands met criteria. A control group undergoing only trapeziectomy with LRTI (n=12) and a FCF-only group (n=6) were collected for comparison. Wrist range of motion and grip strength were collected from the combined surgery (CS) group and the LRTI-only group. Post-operative thumb subsidence was collected from all three groups using radiographs. Additionally, any recorded VAS pain scores were collected from patients in the case group. Unpaired t-tests were used for all statistical analyses.

RESULTS: Wrist extension ($p<0.01$) at first follow-up was lower in the CS group (n=5) than in the LRTI group (n=5). Wrist flexion was not significantly different ($p=0.05$). Grip strength ($p=0.17$) was not significantly different between the CS and LRTI groups. There were insufficient ROM/strength measurements in FCF group for comparison. Thumb subsidence was greater ($p<0.01$) in the CS group (n=4) than in the LRTI group (n=9); however, subsidence was not significantly different ($p=0.20$) between the CS group and the FCF group (n=6). Two patients in the CS group reported VAS scores after completion of both surgeries, and both reported improved pain after the second operation. Of the 6 patients in the CS group, 2 patients underwent both operations in a single stage. The other 4 underwent LRTI before developing a need for FCF.

Yu, Jay — Clinical & Translational Research

Long-term outcome of absorbable synthetic mesh in clean ventral hernia repairs

Authors: Yu J, Goldblatt H, Alter-Troilo K, Hetzel E, Goldblatt M.

Project Mentor: Matthew Goldblatt, MD

BACKGROUND: No studies have reported the long-term outcome of absorbable synthetic mesh beyond 5 years in ventral hernia repair. We hypothesized that the use of absorbable synthetic mesh in clean wounds would yield favorable long-term outcomes. Method: Patients who underwent open complex ventral hernia repair with clean wounds (CDC class 1) using absorbable synthetic mesh (Bio-A, Gore, Flagstaff, AZ) in the retro-rectus position were retrospectively reviewed. Chart review and a validated telephone questionnaire to screen for recurrence were utilized to evaluate and document hernia recurrence.

RESULTS: A total of 49 patients were included in this study. Patients were followed for recurrent events between 0.7 to 105 months, with a mean follow-up time of 62.4 months (5.2 years). The total number of midline hernia recurrence was 7 out of the original 49 patients (14%). The mean and median recurrence time is 37.4 and 38.8 months, respectively. Kaplan-Meier survival analysis estimated hernia recurrence rate as 2%, 4.6%, 7.1%, 12%, 15%, and 18% at 12, 24, 36, 48, 60, and 72 months, respectively.

CONCLUSION: The use of absorbable synthetic mesh in clean wound ventral hernia repair resulted in favorable long-term recurrence rates. The recurrence rate of absorbable synthetic mesh is similar to that of permanent mesh, which gives a viable option for patients in whom permanent mesh is not an option.

Zaré, Armaan | Molecular & Cellular Research

Mitochondrial Dysfunction and Adaptations: An Etiology of the Sequalae of Mild Traumatic Brain Injury

Authors: Zaré A, Li K, Mishra J, Kwok WM, Malas KM, Camara AKS.

Project Mentor: Amadou KS Camara, PhD

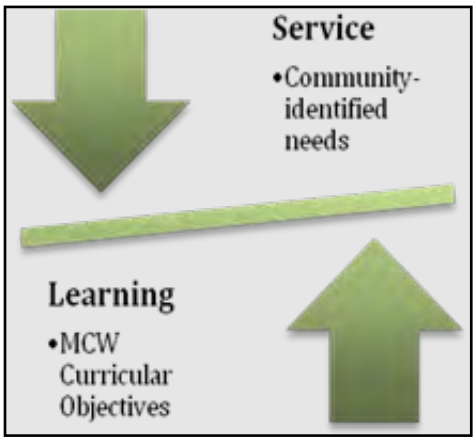
The brief disruption of normal brain function caused by an external force in the absence of cerebrovascular damage and prolonged loss of consciousness is a mild traumatic brain injury (mTBI). Short and long-term sequelae may develop from mTBI, the most common brain injury. Although mitochondrial calcium accumulation has been identified in TBI, the etiology of the increased susceptibility to repeated injury remains undefined in mTBI. Mitochondria are essential regulators of neuronal signaling and calcium homeostasis. We hypothesize that repeated mTBI (rmTBI) will lead to time-dependent altered bioenergetics and calcium homeostasis, signifying neuronal vulnerability following injury. Respiratory control index (RCI) depicts bioenergetics. Calcium retention capacity (CRC) and membrane potential (MP) both characterize calcium homeostasis. Mitochondria were isolated from the cerebral cortex of sham and rmTBI rats at 1-day, 1-week, 1-month, 2-months, and 3-4 months post-injury ($n \geq 4$/group). Mitochondria were energized with complex I or II substrates glutamate/malate (GM) and succinate (SUC), respectively. rmTBI rats at 2- and 3-4-months post-injury demonstrated a diminished CRC compared to their sham counterparts with GM (both $p < 0.01$) and at 3-4-months with SUC ($p < 0.01$). However, the RCI and MP were similar between all sham and rmTBI rats per post-injury group and substrate ($p > 0.05$). The diminished mitochondrial CRC of rmTBI rats at 2- and 3-4-months post-injury indicates that mitochondrial vulnerability to calcium stress is a manifestation of delayed pathologies. Furthermore, the compromised CRC and preserved MP of rmTBI rats suggest that mitochondria following rmTBI likely have an improved calcium efflux mechanism.

Thank you, Scholarly Project Community Partners!

414Life
Autism Society of Southeastern Wisconsin
Bright Horizons Preschool (Watertown Plank)
Catholic Charities Refugee and Immigration Services
Center for Urban Population Health
Down Syndrome Association of Wisconsin
HEAR Wisconsin
Hmong Wisconsin Chamber of Commerce
James Madison Academic Campus
Longfellow Middle School, Wauwatosa
Lutheran Social Services Refugee Resettlement
Milwaukee Area Health Education Center Youth Health Service Corps
Milwaukee Health Care Partnership
Racine Kenosha Community Action Agency
Research Triangle Institute International
St. Augustine Preparatory Academy
StreetLife Communities
United Hmong of Wisconsin Outreach
Walker's Point Youth & Family Center

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

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