Variation in Ultrasound Probe Use in the Ambulatory Setting: Disinfection Status and Supplies During Use
Angela C. Ai

Background: Ultrasound use has become more common in clinic settings and expanded to invasive and semi-invasive procedures, meaning that probes could contact blood and other sterile tissues. Improper technique and contaminated ultrasound probes can lead to potentially serious infections.

Objective: To improve infection control practices surrounding ultrasound probe use in ambulatory settings by investigating how ultrasound probes are disinfected and reprocessed, what supplies are used when the probe is in contact with the patient, and perceived barriers and facilitators to increased sterile practice.

Methods: Direct observations of patient encounters using ultrasound probes were conducted by convenience sampling UW Health clinics from June 15, 2018 – July 27, 2018. We determined the disinfection status of the ultrasound probe before and after the procedure and what protective equipment was used with the probe. We conducted informal, semi-structured interviews by convenience sampling healthcare workers using and/or cleaning the ultrasound probe. Interview excerpts were coded into themes and analyzed using the Systems Engineering Initiative for Patient Safety (SEIPS) model to identify barriers and facilitators to increased sterile practice.

Results: We observed 55 patient encounters at 24 clinics and 65 ultrasound probe uses. Probes with the potential to contact sterile tissue generally underwent low-level disinfection (LLD) (43%) or no disinfection (43%) before use and most underwent only LLD (67%) after use. Probes with the potential to contact mucous membranes underwent high-level disinfection (100%) and those contacting intact skin were usually underwent LLD before (80%) and after (63%) use. There was wide variability in the use of gloves/sterile gloves and sterile ultrasound gel and covers, even within the same procedure. We conducted 29 semi-structured interviews, coded to multiple themes. Major themes that were determined to be barriers included procedure complexities that made the process of maintaining sterility difficult or unnecessary.

Conclusions: There is lack of standardization in ultrasound probe cleaning and in the use of supplies during the procedure. The processes when probes contact intact skin or mucous membranes are more standardized and improvements will focus on proper glove and gel use. Procedures with potential for the probe to contact sterile tissues are the most varied and therefore more difficult to standardize. Themes suggest that improvements can be made through education and guideline formulation.
Factors Impacting the Development of Post-Heart Transplantation Malignancy in the Veteran Population

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Support: Shapiro Summer Research Program, Department of Medicine

Background: Heart transplantation is a well-established intervention for end-stage heart failure. Due to chronic immunosuppression, heart transplant recipients are at risk for developing malignancy, which compromises long-term survival. A subset of our heart transplant recipients at the VA hospital have been exposed to Agent Orange, a herbicide linked to the development of hematologic malignancies and soft tissue sarcoma. The objective of our study is to evaluate the relative influence of Agent Orange exposure and other factors on the development of post-transplant malignancy.

Methods: We conducted a retrospective chart review of all 188 heart transplant patients who received their longitudinal care at the William S. Middleton Memorial Veterans Hospital since the program’s inception on Oct. 1, 1993. Demographic, clinical, and laboratory data were collected for each patient. Univariate analysis was conducted to identify demographic variables linked to the incidence of cancer. Multivariate analysis using a Cox Proportional Hazard Model was used to assess the influence of Agent Orange on the development of malignancy and post-transplant survival. Kaplan Meier analyses were used to assess survival and the incidence of cancer, stratified on the basis of Agent Orange exposure.

Results: Of the 188 patients, 113 have died. Malignancy accounted for 28% of deaths in our veteran heart transplant cohort. Fifty three percent of the patients developed malignancy after transplant (n = 100). Seventy seven developed skin cancer (41%), 46 developed solid organ cancer (24%), and 5 developed hematologic cancer (3%). Thirty four patients developed multiple malignancies (18%). Sixteen percent of our patients were exposed to Agent Orange. Univariate predictors of developing malignancy included older age at time of transplant, Caucasian race (skin cancer only), and pre-transplant ischemic cardiomyopathy. Multivariate analysis demonstrated that age at time of transplant reduced survival and increased the likelihood of developing skin but not solid organ cancer. Of the 5 patients who developed hematologic malignancy, 3 had Agent Orange exposure (p = 0.032).

Conclusion: Age at time of transplant and Caucasian race increased the risk of developing skin malignancy but not solid organ cancer. Mortality and risk of developing non-skin related cancer were not increased in patients subjected to Agent Orange. While the incidence of hematologic malignancy post-transplant was low, Agent Orange exposure may have contributed.
The Utility of Urinalysis Prior to In Office Procedures: A Randomized Clinical Trial
Kate M. Backhaus

**Background**: All Bacille Calmette Guerin (BCG) patients undergo urinalysis (UA) before their procedures in order to reduce rates of UTI. Retrospective studies have suggested that there is no difference in the rates of UTI in people who were administered UA tests before BCG treatments versus people who were not administered UA tests before treatment. Additionally, a study found that the risk of symptomatic UTI is 4.5% in patients, therefore most patients do not benefit from UA or preventative antibiotics. Additionally, the cost of every UA is around $4.24, which for the course of our study alone would amount to over $1300. Furthermore, results of UA tests can lead to delays in procedures. Delays are cumbersome and can cause a delay in a more serious diagnosis.

**Objective**: We hypothesize that eliminating UA before in-office procedures will not significantly affect the number of UTI cases reported post-procedure, but it will increase the efficiency of care provided. Additionally, in the case of BCG treatment an immunomodulatory effect will reduce the bacterial load and potentially reduce the risk for UTI by comparing the outcomes between delayed and non-delayed procedures.

**Methods**: A total of 664 patients will be enrolled in a randomized clinical trial over the course of a year. Patients will be blindly randomized. There will be two primary cohorts in the study. The control cohort will receive a UA prior to their scheduled in-office urological procedure and will be treated with current standard of care. For the experimental cohort, a UA will be obtained and a UC as needed. The treating physician will not have access to the results of the UA/UC and will proceed with the treatment as planned. The UC will be monitored by research staff so that if a patient develops a UTI, treatment can be initiated immediately. The primary outcome of the study is to assess the number of UTI occurrences within the study period.

**Results**: Enrolling patients.

**Conclusions**: The current guidelines for in-office urological procedures may be hindering patient care instead of improving it. Nearly, 2.5% of patients who receive UA/ UC prior to their procedures have their treatments delayed. Despite delay of treatment, there is no improvement in rates of UTI development. Additionally, current practice may promote antibiotic resistance, as positive results prompt the use of antibiotics even though use of UA/UC have not been shown to improve outcomes.
Radiographic Alignment Following Reduction and Fixation of Tibia Shaft Fractures
Richard J. Behlmer

BACKGROUND:
Intramedullary nail (IMN) fixation is the standard of care for most tibia fractures. The goals of this technique are to restore proper length and alignment and to achieve fracture union. However, recent literature has demonstrated high rates of malalignment with IMN fixation of tibia shaft fractures, particularly those involving the distal third, where reported malalignment rates are as high as 23%. The reasons for malalignment remain unclear, but several factors may contribute, including the technique(s) used to achieve reduction intra-operatively.

OBJECTIVE:
The purpose of this study was to assess how various adjunctive reduction techniques used during IMN fixation, including traveling traction (TT), percutaneous clamps (PC), provisional plating, and blocking screws impact post-operative alignment of the tibia compared to manual reduction (MR) alone.

METHODS:
A retrospective review was performed on all skeletally mature patients from 2008-2017 with a tibia fracture who underwent IMN fixation (n=428). Coronal and sagittal plane alignment of the tibia were measured from immediate post-operative anteroposterior (AP) and lateral radiographs, respectively. Malalignment was defined as >5° of angular deformity in any plane.

RESULTS:
On AP view, patients who received TT, or a combination of TT and PC, had significantly better post-operative alignment compared to patients who received MR alone (TT: 3.41° ± 2.49°, TT+PC: 3.24°± 2.18°, MR: 4.50° ± 2.58°) (p = 0.007 and p = 0.01, respectively). Using any adjunctive reduction technique resulted in significantly lower rates of malalignment on AP view compared to MR alone (22% vs. 34%, p = 0.03).

CONCLUSIONS:
We demonstrate that the reduction technique used during IMN fixation has a significant impact on post-operative alignment. Specifically, the use of traveling traction or a combination of traveling traction and percutaneous clamps leads to significantly better alignment on AP view compared to manual reduction alone. Furthermore, using any adjunctive reduction technique leads to a lower rate of malalignment compared to manual reduction alone. Our study addresses factors that may contribute to the high rates of malalignment observed in IMN fixation, and is an important step towards improving patient outcomes following tibia fractures.
Surgeon Engagement in Surgical Health Policy Advocacy

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Background

Health policy decisions influence aspects of patient care including access to health care, physician reimbursement, and scope of practice. Physicians are uniquely equipped to participate in health policy advocacy due to their knowledge of medicine and health systems, their professional title which grants easier access to policymakers, and the trust the public places in physicians. Little is known about physicians’ level of engagement in Health Policy Advocacy.

Objective

We conducted a pilot survey of surgeons to assess current levels of engagement in Surgical Health Policy Advocacy (SHPA) and to identify barriers and benefits of involvement. We hypothesized surgeons have low involvement in SHPA due to time restrictions and perceived inability to participate.

Methods

This is a pilot study based upon a previously published and validated survey. It was modified to assess surgeon engagement in SHPA. The survey consisted of 21 questions administered to 20 surgeons participating in a Wisconsin Surgical Society board meeting. Items included self-reported involvement in public policy and SHPA, barriers to engagement, benefits of SHPA involvement, and demographics. Question types included multiple response items and Likert Scales. Statistical analysis was completed using SAS 9.4.

Results

Thirteen of the twenty surveys (65%) administered were completed. Demographics were: 100% Caucasian, 91% Male, Average Age of 48 years, 91% were General Surgeons, 54% worked in an urban setting, and 54% worked in an academic setting. SHPA items responses were: 54% reported no involvement in SHPA and another 23% reported being only slightly involved. The most common barriers were lack of time (69%) and other priorities (54%). 84% of respondents perceived some benefit in SHPA. The most frequent perceived benefits were improving the surgical health of the public (69%) and improving a situation or issue (62%). 73% of respondents received SHPA
training and the most common sources of training were professional colleagues (46%) and sessions at a conference (46%).

**Conclusions**

This pilot study showed low participation rates in SHPA by surgeons. The identification of barriers presents possibilities to make participation in SHPA feasible. Additional study of a larger and more diverse population is needed.
Enhancing Top-Down Proteomics Data Analysis Tools for Precision Medicine Through Machine Learning
Daniel Belongia

BACKGROUND
By enabling the large-scale analysis of proteins, top-down proteomics with mass spectrometry offers a powerful means of characterizing complex and dynamic disease phenotypes and is therefore a driving force in the development of personalized medicine. An important step in mass spectrometry data analysis is deconvolution, in which individual isotopomer envelopes are identified and then passed on to a search algorithm to predict the proteoform(s) in the sample. Several deconvolution algorithms exist, but each is characterized by limited precision or recall, necessitating time-consuming manual verification of results.

OBJECTIVE
Determine if the accuracy and efficiency of automated deconvolution can be improved by integrating several algorithms into an ensemble method, a specific type of machine learning.

METHODS
A program was written in Python that accepts as input the mass lists produced by two or more deconvolution methods and outputs a single mass list representing the ensemble consensus. The program uses hierarchical clustering to compare mass peaks identified each deconvolution algorithm and then writes a new file containing peaks identified by N or more algorithms.

RESULTS
All results were obtained with the same sample containing known protein(s); a manually annotated mass list was used as the ground truth. With votes from 7 individual deconvolution algorithms, the ensemble method achieved a maximum precision of 0.44 (reflects specificity) and a maximum F1 score of 0.40 (reflects sensitivity and specificity). The best from individual algorithms was 0.24 and 0.32, respectively. Search results with a sample containing many proteins showed that confidence of protein matches with the ensemble was on par with the confidence of those from the leading deconvolution algorithm, as measured by number of identifications (IDs) with P-value less than 0.001 (260 IDs for single algorithm, 280 for ensemble).

CONCLUSIONS
These results suggest that limitations of individual deconvolution algorithms can be mitigated with an ensemble method. Further improvements might be made with a more sophisticated implementation such as random forest. By improving the accuracy of automated deconvolution results, an ensemble method can help researchers save time spent on manual annotation and dedicate energy to less rote aspects of discovery. Ultimately, this will accelerate the ability of precision medicine to understand and treat complex, heterogeneous diseases.
IMPACT OF DIGITAL BREAST TOMOSYNTHESIS GUIDANCE ON PATHOLOGY OUTCOMES AND QUALITY METRICS OF BREAST BIOPSIES

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Background: Image-guided core needle biopsy (CNB) is the standard of care for most image-detected breast findings requiring tissue diagnosis. Prone stereotactic (PS) biopsy has been widely used to guide tissue sampling of mammographic-only findings. Digital breast tomosynthesis (DBT) is a technologic advancement over standard digital mammography. In 2015 UW began performing upright breast biopsies with DBT (UBB-DBT) or with stereotactic guidance (UBB-Stx).

Objective: To compare clinical outcomes and quality metrics of UBB-DBT, UBB-Stx, and PS-guided biopsies.

Methods: Retrospective review was performed on medical charts and quality assurance records for all mammography-guided breast CNB performed at UW Breast Center between January 2012 and June 2018. UBB-DBT and UBB-Stx became available in December 2015, prior to which all were PS-guided. Data collected include a) target type (masses, calcifications, asymmetries, or architectural distortions [AD]); b) clinical outcomes including pathology diagnosis (benign, high risk or malignant), radiology-pathology correlation (concordant, discordant, or insufficient), and upgrades (ductal carcinoma in-situ or invasive carcinoma on surgical excision post-biopsy); and c) quality outcomes including biopsy cancellations, repeat image reasons, minor complications (small hematoma, or self-limiting vasovagal reaction) and major complications (bleeding or infection requiring medical treatment).

Results: Our study cohort consisted of 1063 women (average age 56.5; SD 11.1) with 1204 scheduled biopsies. There was a statistically significant difference in proportions of target types between UBB-DBT, UBB-Stx, and PS-guided biopsies. Calcifications accounted for 55.6%, 93.6%, and 89.3% of biopsies, while ADs accounted for 16.3%, 0%, and 1.5% respectively (p<.001). Malignancies were most commonly found with UBB-Stx (36.8%, [p=.004]). There was a non-significant decrease in cancellation rates with UBB-DBT and UBB-Stx as compared to PS (3.9%, 0.8%, and 4.1% respectively [p=.033]). Image repeats were significantly more commonly due to patient motion in UBB-DBT and UBB-Stx (p=0.001). There was no difference in major complications, while minor complications occurred most commonly with UBB-DBT (5.9% [p=.001]).

Conclusion: UBB-DBT increased the ability in sampling of subtle mammographic findings specifically AD. However, it demonstrated more minor complications and higher image repeat rates for patient motion.
Creating a toolkit to promote affirming healthcare for transgender, non-binary, and gender non-conforming (TNG) youth using iterative design.

Brian Bizub

Introduction:
Transgender, non-binary, and gender non-conforming (TNG) youth experience many health disparities compared to their cisgender peers. Despite numerous recommendations for working with TNG populations in healthcare, many TNG youth are unable to access competent and affirming primary care. Many TNG youth also report having negative experiences in healthcare.

Objective:
To use an iterative design process to design a toolkit for primary care providers to use as a guide to make their clinic environment more affirming for TNG youth.

Methods:
A literature search was performed to inform a preliminary draft of the primary care toolkit. The toolkit was created by the authors using this information. Primary care providers and TNG community members were identified by the authors as possible feedback participants. Primary care providers and TNG community members gave feedback on the toolkit using surveys designed by the authors. Two feedback cycles were conducted as part of the iterative process.

Results:
Of the 10 stakeholders originally contacted to provide feedback, 7 completed feedback surveys. The first feedback cycle yielded five responses. The second feedback generated two responses. Responses generally viewed the toolkit positively and indicated that the toolkit was easy to follow and provided helpful resources. Feedback was incorporated into the toolkit if it was within the scope of the toolkit and preserved the brevity of the toolkit. The feedback results suggested relatively minor changes, many of which were implemented into the toolkit.

Conclusions:
Based on the feedback provided, participants agreed that they would complete or recommend the toolkit to providers if providers were given maintenance of certification (MOC) or continuing medical education (CME) credits. While most of the feedback obtained on the toolkit was positive, the number of stakeholders that provided feedback was smaller than desired, especially among TNG community members. More TNG community members needed to be contacted as potential feedback participants at the beginning of the feedback process. This would have allowed for a greater amount of feedback from TNG community members to be obtained and incorporated into the toolkit. The next steps in the development of the toolkit are to modify the toolkit so that it meets MOC/CME requirements so that physicians can receive educational credits for completing the toolkit.
Evaluating the role of pretreatment renal mass biopsy in large or advanced renal masses

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Background: Historically, percutaneous biopsy was not utilized prior to treatment of renal masses because surgery may provide both diagnosis and treatment. However, as alternative treatment options have expanded for small renal masses, biopsy is often obtained to pathologically identify tumors and to improve informed consent. For patients with larger tumors, biopsy may also provide patients with information to improve shared decision making but few studies have described how often information gained from biopsy of larger masses impacts treatment decision making.

Objective: Determine how often the results of upfront biopsy change the typical treatment plan for ≥ clinical stage 2 renal tumor patients.

Methods: After IRB approval, an institutional database was used to identify patients from 2000-2018 with ≥ clinical stage 2 renal tumors. Comprehensive patient data and outcomes were reviewed.

Results: Of 586 patients identified with ≥ clinical stage 2 renal masses, 38 were excluded because they not surgical candidates. A total of 203 (37%) of patients had renal mass biopsy prior to treatment. When compared to patients treated without biopsy, those receiving biopsy were more likely to have concurrent metastatic disease (35%) or lymphadenopathy (22%), p=0.002, 0.004. Patients receiving biopsy also had higher AJCC clinical stage compare to patients treated with upfront nephrectomy, p<0.0001.

The most common etiology of renal tumors was renal cell carcinoma (RCC), which represented 85% of both the biopsy and upfront surgery groups. Of patients receiving biopsy, 22% were not treated with upfront surgery. Depending on histology, non-surgical patients were treated with systemic therapies, preoperative radiation, or observation (benign tumors).

Conclusion: Biopsy for large or advanced renal masses may be prior to treatment and could change management for 1 in 5 patients.
Perceptions and Practices toward Tuberculosis Screening by Tibetan Health Workers and Students in India: Recommendations for the Zero TB Campaign

Noah Borchardt, Samuel Starke, Sonam Topgyal, Kunchok Dorjee, Richard Chaisson, James Conway, Zorba Paster

BACKGROUND:

The Tibetan Delek Hospital developed the Zero TB in Tibetan Kids campaign with the goal of eradicating TB in Tibetan boarding schools in India. This program provides screening and treatment of latent TB infection (LTBI) in these school children. The Zero TB campaign aims to reach 22,861 students across 61 Tibetan schools. The aim of this project is to evaluate the program during this early stage of initiation.

METHODS:

Knowledge, attitudes, practices, and challenges related to LTBI treatment were assessed using semi-structured, in-depth, individual and group interviews of school nurses (n=8) and students (n=22) from six different schools, along with Delek Hospital staff (n=16) responsible for implementation. A project description was provided during participant recruitment and verbal consent was obtained before each interview. Verbal consent from school administration was provided prior to student interviews. Perceptions, attitudes, and practices regarding LTBI screening and treatment were obtained using a 36 question cross-sectional survey given to Delek Hospital staff (n=42) with 34 surveys completed and consent implied upon completion. This project was exempt from IRB review by designation as a program evaluation.

RESULTS:

Student interviews demonstrated awareness and knowledge of TB symptoms and prevention in the schools. There was little concern about stigma after diagnosis expressed by students. School nurses’ primary concerns regarded information dissemination and education for parents. 60% of the hospital staff responsible for school nurse education reported not knowing their own TB status. If diagnosed with LTBI, only 40% of these staff members would accept treatment while working at Delek. During the interviews, staff expressed concern that their infection would not respond to treatment and concern for reinfection as the main reasons for refusing treatment.

CONCLUSIONS:

Misunderstandings seemed to play a significant role in decisions to reject LTBI treatment for children by their parents. School nurses indicated that parent education materials with accurate, program specific information might increase compliance. Concepts of “preventive therapy” versus “treatment” of LTBI appeared to cause confusion. Addressing provider’s concerns regarding their own LTBI treatment could strengthen their recommendations to school nurses, improving acceptance in school children.
Northeast Clinic Navigator Program Evaluation

Alex B. Bryant

Background: Patient navigation has become a critical part of family medicine clinics across the country. The understanding that social determinants of health, such as income, education level, health insurance and access to food are critically important in determining a person’s health combined with clinical care is now commonplace. Program such as the Community Resource Navigator Program (CRNP) at Northeast Family Medical Center are working to address these pertinent issues and improve population health.

Objective: The goal of this evaluation was to identify how the CRNP impacts patients in the clinical setting and through their experiences accessing and attaining community resources.

Methods: 232 current and past participants of the CRNP were contacted for participation in the evaluation by mail, 26 interviews with 27 participants were conducted. Measures: Interviews were designed to evaluate five categories: general overview of the program, program logistics, connection to the health system, community resource attainment and lasting impact.

Results: Results showed a positive participant perception of the CRNP. Eight interviewees expressed lack of participation in the program, some indicated no contact at all. Those interviewees were analyzed separately to ascertain differences between participants who did not receive resources and those who had received resources. Both groups indicated support for the program and positive experiences, including comments on the congeniality and professionalism on the part of the Navigators themselves.

Conclusions: The CRNP positively impacts patients of Northeast Family Medical Center and provides support that improves the lives of the individuals and improves the relationship they have with the clinic.
Silicosis: Medicolegal Implications of Diagnosis
Brandon Bukoviz

**Background** – Despite well-publicized sources of occupational hazard, silicosis continues to threaten industrial workers in the United States. Although the incidence of hospitalizations and fatalities related to silicosis appear to be declining, recent data suggests that many cases may go unreported. As of July 1, 2018, Wisconsin (WI) reporting statutes were revised to explicitly require reporting of silicosis. It is hoped this will improve silicosis morbidity/mortality reporting, and detailed investigations can advance understanding of the disease.

**Objectives:**
- To better recognize and diagnose silicosis
- To understand of the legal ramifications of diagnosis for the patient and the patient’s family

**Methods** – A retrospective search of UW Hospital and Clinics electronic pathology databases was conducted for autopsy cases in which chronic silicosis was diagnosed. Cases were retrieved from years 2003-2018 utilizing the search term “silicosis.” Additionally, statewide silicosis epidemiologic morbidity/mortality data was provided by the WI Department of Health Services for 2003-2017.

**Results** – Between 2003-2017, 3 cases of silicosis were confirmed via UWHC autopsy. All 3 were men (mean age: 69 years). Comorbidities included hypertension, coronary artery disease, smoking, and pneumonia. Pertinent histologic findings included collagenous anthracotic nodules, interstitial fibrosis, and refractile foreign bodies. In 2 cases, silicosis was found to have caused or contributed significantly to death. Overall in WI, the age-adjusted rate of hospitalizations and mortality attributable to silicosis declined between 2003 and 2017, but remains substantially higher than the national average (e.g. 10.1 hospitalizations per million WI residents in 2010 vs. 1.2 hospitalizations per million residents nationally).

**Conclusion** – Historically, WI has had many foundries, ceramic companies, and industrial complexes where occupational exposure to silica dust is high; this may account for the relatively high silicosis hospitalizations and mortality in WI as compared to national averages. A diagnosis of silicosis should be carefully weighed by the physician in any patient with pulmonary fibrosis and suspicious occupational history, since it carries substantial implications for worker’s compensation, compensatory losses, and employer liability.
Viewpoints of pregnant mothers and community health workers on prenatal care in Lweza Village, Uganda
Mackenzie Carlson

BACKGROUND: Uganda is a low income country with exceptionally high fertility, maternal mortality, and adolescent birth rates. Although the Uganda Ministry of Health has antenatal education guidelines, how these guidelines have been implemented into standardized health education and how pregnant women utilize health facilities remains unclear.

OBJECTIVE: To determine how women obtain education during pregnancy, what guidelines health educators follow, and how traditional herbal medicines are used in pregnancy in the village of Lweza in Uganda.

METHODS: Household surveys were conducted with Ugandan women in Lweza who were either currently pregnant or had previously been pregnant. Focus group discussions were conducted with local community members and Lweza Primary School teachers. Interviews were conducted with 6 key informants; two government employed midwives, one privately employed midwife, a traditional birth attendant, a community leader, and a village health team member. The study was approved by the University of Wisconsin School of Medicine and Public Health IRB.

RESULTS: Of the 100 household surveys conducted in Lweza, 86% of women did not meet the WHO recommendation of 8 antenatal appointments during their pregnancies. Reasons cited for noncompliance included long wait times (>7 h) at the government health facility, getting education from family members or traditional healers, or being told to not come for antenatal until 6 months pregnant. While 44% of women reported receiving health education at government health facilities, informant interviews revealed that no standardized antenatal education program exists for pregnant women. Family planning was a topic that respondents felt least educated on. In addition, none of the women recalled learning about post-partum depression (PPD), although 36% of them reported symptoms consistent with PPD. The majority (60%) of women reported using traditional herbs during pregnancy, typically administered by a traditional birth attendant.

CONCLUSIONS: Most women in Lweza do not receive the WHO recommended 8 antenatal appointments during their pregnancies or any standardized antenatal education. Educational opportunities on family planning, PPD, and the safety of traditional herbs during pregnancy exist. Future studies should focus on ways to overcome barriers to antenatal care, which could include implementing community based education programs to improve health outcomes for Ugandan women in the village of Lweza.
BIOMIMETIC CARDIAC ORGANOID FOR IN VITRO INVESTIGATION OF CARDIAC CELL-TO-CELL INTERACTIONS

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Background: Approximately 6.5 million people are affected by heart failure in the United States1. Contemporary therapies that block maladaptive neurohormonal pathways have contributed to the decline in mortality due to heart failure in the last two decades, but these therapies are aimed only at reducing disease progression, without repair of the damaged myocardium. To this end, many cellular therapies have been developed and tested, with limited success in human trials2,3 despite robust recovery shown in animal models4. Our group has bioengineered a novel cardiac fibroblast-derived extracellular matrix (CF-ECM) from isolated human cardiac fibroblasts for delivering stem cells to the ischemic myocardium. We hypothesized that seeding human iPSC-derived cardiomyocytes on this CF-ECM will promote myocyte maturity, creating a human-like in vitro test environment that can be used to study therapeutic effects and inform clinical trials. Methods: Human iPSC-derived committed cardiomyocyte precursor cells at Day 15 and primary human cardiac fibroblasts in varying ratios were seeded on Synthemax™ coated coverslips and 4 varieties of CF-ECM scaffold. Scaffolds were fixed at Day 7, 14 and 26 and stained with fluorescent antibodies for cardiac troponin, α-actinin, vimentin, fibronectin, and collagen and imaged to determine degree of myocyte maturation, myocyte and fibroblast interaction, and cellular integration into the scaffold. Results: Beating was observed in all samples. Myocytes appeared to be within the folds of the CF-ECM scaffold and elongated with the cardiac fibroblasts along the ridges of CF-ECM. At Day 14, beating was most notable in the control, non-decellularized CF-ECM, and decellularized CF-ECM (non-immobilized). Myocytes formed a syncytium interspersed the cardiac fibroblasts within the decellularized CF-ECM. Myocytes cultured on CF-ECM appeared more elongated and rod-like compared to control. At Day 22, beating was observed in only the Synthemax™, non-decellularized, and decellularized CF-ECM, with decreased beating amplitude across conditions. At Day 26, beating in all culture conditions had ceased. Conclusions: These results suggest that culturing iPSC derived myocytes on CF-ECM promotes maturity. An optimal cell-scaffold construct includes increased myocyte density and potential for myocyte integration. Future work begin experiments to mimic the ischemic myocardium for in vitro therapeutic analysis.

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A Follow up evaluation of Safe Sleep Practices across Wisconsin Maternity Facilities
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Background: In Wisconsin in 2015, 47 infant deaths met Sudden Unexpected Infant Death (SUID) criteria. These cases showed marked disparities in African American infant mortality rates and in more than 85 percent of cases, three or more AAP safe sleep recommendations were unmet. Maternity hospitals play a unique role in educating patients and modeling best practice safe sleep. A previous study found that most Wisconsin hospitals had a written policy on safe sleep environments, however many of these policies were incomplete, staff training was lacking, and formal sleep environment assessments were rare.

Objective: This study aims to assess interval changes in Wisconsin birth hospital safe sleep practice since the previous study and gauge hospitals’ interest in implementing a standardized crib auditing tool.

Methods: A follow-up study of 30 Wisconsin birthing hospitals was done using a structured survey that was administered either by phone or email during July and August 2018. Birth centers surveyed performed >20 deliveries per year and were representative of the overall birth centers in Wisconsin in terms of provider type, geographic distribution, volume, and patient demographics. Hospital responses were assessed using descriptive statistics.

Results: Out of 27 maternity hospitals surveyed, 15 (56%) had an established written policy on safe sleep environments for newborns. Of those, only 9 included all the safe sleep recommendations defined by the APA with the most missed criteria being avoidance of exposure to tobacco smoke (10%). Most (74%) hospitals reported having one time (44%) or yearly (17%) safe sleep training for staff. However, 70% reported that provider training did not address health disparities in SUID outcomes in Wisconsin. 5 (20%) of the maternity hospitals surveyed reported using a formal crib auditing tool. 21 (84%) expressed possible interest in implementing a crib audit tool.

Conclusion: The hospitals surveyed demonstrated that, while most facilities have safe sleep policies in place, they remain incomplete with around 30% reporting all APA recommendations being used. These gaps in hospital policy, provider training, particularly surrounding health disparities, and parent education represent opportunities for improvement. This survey also demonstrated an interest in the implementation of a formal crib audit tool with almost 90% of participants responding positively. Initial development and piloting of a tool will inform protocol development and future statewide collaboratives surrounding safe sleep.
Factors Which Affect the Decision of Family Physicians That Enter Practice in Underserved Communities

Background:
Lenka Craigova

Over the past century, there has been widening disparities in the distribution of graduated physicians across the United States with more graduates attracted to areas that are in less need than others. Despite increases in the number of graduates and training programs, we are seeing a decrease in the percentage of physicians choosing to practice and remain in both rural and medically-underserved counties. While a positive association between rural upbringing and intention to practice in a rural setting has been found in past studies, this does not explain why 74% of rural physicians were not raised in a rural setting. If we can better understand the motivating factors behind the practice location decisions across primary care physicians then we may be able to better decrease healthcare worker distribution disparities via incentive programs, medical school student recruitment, and clinic workplace adjustments.

Objective:
The goal of this project is to qualitatively identify what factors influence primary care physicians to practice and remain in their workplace locations of choice. The identified patterns will be adapted into a survey that can be used to further understand what drives physicians towards some sites over others.

Methods:
Graduates from the University of Wisconsin Family Medicine Residency program were analyzed and categorized by HPSA designation of practice site (yes or no) and by US State of practice site (Wisconsin vs. Non-Wisconsin). A proportionate representation of Wisconsin, Non-Wisconsin, HPSA, and non-HPSA practice site physicians were selected for phone interviews. Interviews were transcribed and underwent qualitative evaluation for emerging themes.

Results:
Interviews with participating physicians revealed that scope of practice, family, community connection, and childhood residence were strong influencers in the decision of location in practice. Education experiences, specialized training, and monetary incentives appear to be insignificant.

Conclusion:
If a future survey is conducted, the features of the scope of practice, family, community connection, and childhood residence could be the focus for specific questions that can allow for quantitative results. For comparison, other factors, such as monetary incentive and education, should be included for comparison. A survey will provide a larger sample size for analysis and thus allow the data to be more generalizable to the studied population.
Development of High Fidelity Training Cases For Independent Radiology Call Exam

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Support: Shapiro Summer Research Program; Department of Radiology

Background: Independent call experience is one of the critical learning opportunities for residents’ training. The ACGME emphasizes the need for conditional independence. However, a structured learning plan has to be put in place to ensure residents have attained the adequate training and knowledge base to take independent call. At the University of Wisconsin Department of Radiology, PGY3 (R2) residents are permitted to sit for independent call after rotating through emergency radiology sections and passing a pre call test in the 6 major radiologic subspecialties (pediatrics, neuroradiology, cardiovascular, thoracic, musculoskeletal, and abdominal). However, most of the current available radiology educational material does not replicate the true clinical experience and present the residents with only few selected images with the pertinent findings.

Objective: Creation of a core set of emergency radiology cases that cover a wide range of traumatic and non-traumatic diagnoses encountered on call which can be reviewed on PACS to simulate true call experience.

Methods: The initial phase of the project was to identify key radiologic diagnoses that are typically encountered in an emergency room setting. For this step, we used the curriculum outlined by the American Society of Emergency Radiology (ASER), and American Board of Radiology (ABR) core study guide. The cases were anonymized and coded with a specific ID; the radiologic diagnoses were categorized into primary and incidental findings, and coded for level of difficulty. After cases were made available, a survey was sent to PGY3 residents to follow up on the effectiveness of the case sets in preparing them for pre-call exam.

Results: A total of 276 multimodality emergency radiology diagnoses were coded. These included 32 US; 75 X-ray; and 168 CT/MRI cases. A twelve-question qualitative survey was sent to PGY3 residents after completing the pre-call test. The survey had a 75% response rate. All (100%) of the residents that reviewed the cases strongly agreed that the cases tested a wide array of modalities and pathologies. Residents agreed that cases helped increase their confidence and efficiency prior to the exam and all agreed that they would recommend this educational resource to colleagues.

Conclusions: Self-testing cases in a high fidelity simulation are an appealing and useful educational tool to prepare residents for pre-call exam, as well as enhance their preparedness for independent call. Additional quantitative data for two consecutive years on the call exam scores/pass rates will be compared before and after deployment of this educational resource for further validation.
Determining B78 melanoma sensitivity to cytotoxic T-cells using IncuCyte
Dang DD, Sondel PM, Rakhmilevich AL

BACKGROUND: Effective treatment for mouse B78 melanoma tumor is radiotherapy and immunocytokine (IC), a tumor specific monoclonal antibody linked to IL2. However, the mechanism underlying treatment is not well understood. B78 expresses no or few MHC I molecules which are needed for T-cell recognition and killing. However, data show that B78 tumors in mice regress after IC and anti-CTLA-4 therapy, activating adaptive immunity and indicating cytotoxic T lymphocyte (CTL) involvement. If B78 cell death \textit{in vivo} is mediated by CTLs, we can further expand on the role of CTLs in cancer treatment.

OBJECTIVE:
1. To determine if B78 are sensitive to CTLs. If B78 exhibits cell death in the presence of activated CTLs, then there is cytotoxicity occurring.
2. To compare accuracy of the IncuCyte S3 Live Cell Analysis System’s data analysis to the chromium release assay, as a measure of cytotoxicity.

METHODS: 8-week-old BALB/c mice were injected IP with 20x10E6 allogeneic EL4 cells (syngeneic to B78 melanoma but expressing high levels of MHC I) on day 0 followed by 100 units of IL2 on day 2 to produce alloreactive-CTLs. Mice were sacrificed on day 10 to collect peritoneal effector cells (PECs). Target cells, B78 and EL4 (positive control), were stained with a fluorescent red dye and plated with PECs for 8 hours. Cell death was marked by fluorescent green caspase release. Target cell death was measured by overlap area of red and green fluorescence as visualized by IncuCyte S3. The chromium release assay was done in parallel.

RESULTS: Early experiments showed promise as EL4 with PECs expectedly showed more cell death compared to B78 with PECs while B78 with PECs showed more cell death than B78 alone. During later experiments, an antibody was added that inhibits MHC I recognition. Data demonstrated more cell death for B78 than EL4, in contrast to our previous results, in the absence of anti-MHC I antibody. In two later assays, only modest cytotoxic activity was shown. When the same assays were done using the chromium release assay, similar results were attained.

CONCLUSION: Since we did not demonstrate a high level of cytotoxicity against EL4 in later experiments, we are considering \textit{in vitro} CTL activation to produce a more robust response. We did successfully produce a working assay using IncuCyte S3 to capture live cell cytotoxicity comparable to that in chromium release assays. More work is needed to definitively determine if cytotoxicity against B78 can be observed.
**Investigating the prognostic value of serum biomarkers for RCC recurrence following surgery**

Emily Davidson, Jay D. Raman, Viraj Master, Brian Sohl, Glenn O. Allen, Dattatraya Patil, David, F. Jarrard, Kyle Richards, Tracy Downs, E Jason Abel

**BACKGROUND:** Approximately 50% of patients with non-metastatic high risk renal cell carcinoma (RCC) recur following attempted curative surgery. Recent studies suggest that certain serum lab values that are associated with inflammation may also be prognostic for RCC recurrence.

**OBJECTIVE:** The purpose of this study was to evaluate inflammatory biomarkers as risk factors for recurrence in a multi-institutional cohort of high risk non-metastatic RCC patients following attempted curative surgery.

**METHODS:** We examined clinical and pathologic data from ≥pT3a RCC patients without evidence of lymph node or distant metastases treated with partial or radical nephrectomy from 2000-2016 at 3 independent centers. In addition to established prognostic factors, preoperative C reactive protein (CRP), platelet count, mean platelet volume (MPV) and neutrophil: lymphocyte ratio (NLR) were evaluated for associations with recurrence using univariate and multivariate Cox proportional hazard models.

**RESULTS:** Of 1,074 patients at three institutions, 278 (25.9%) had RCC recurrence following attempted curative surgery at median of 9.9 months (IQR 4.3-21.1). Median overall follow-up interval was 20.4 months 15.6 months (IQR 4.6-40.9).

MPV and NLR were not identified as significant risk factors for recurrence in any population. CRP was identified as a significant risk factor for recurrence in 1/3 populations (HR 1.004, 95% CI 1.001-1.008, p=0.004).

After univariate analysis, platelet count (continuous) was associated with recurrence independently in all three populations (p=0.006, p=0.003, p=0.015). An optimal cut-point for platelet count was identified above 249 which was associated with recurrence (HR 2.15, 95%CI 1.57, 2.95, p<0.001).

The prognostic value of platelet count was tested using a multivariable model with previously described predictors of recurrence including: tumor grade, tumor diameter, presence of sarcomatoid features, low serum hemoglobin, and presence of tumor thrombus. After analysis, increased platelet count was an independent predictor of recurrence following surgery (HR 1.73, 95%CI 1.17-2.55, p=0.006).

**CONCLUSIONS:** Patients with higher platelet counts have higher risk of RCC recurrence following surgery. Preoperative platelet count may be used to improve postoperative stratification for higher risk patients who may benefit from adjuvant therapy or clinical trial enrollment.
Outcomes of Pre-Transplant, Recurrent and Post-Transplant Malignant Melanoma in Kidney Transplant Recipients
Sarah E. Di Bartolomeo

Background: Kidney transplant recipients (KTRs) have an increased risk of malignancy, especially skin cancer. Patients with pre-transplant melanoma usually wait a longer period before transplantation than their counterparts with non-melanoma skin cancers as there is limited data on risk of recurrence and outcomes of pre, recurrent and post-transplant melanoma.

Methods: We analyzed the outcomes of KTRs transplanted at our center between 01/01/1994 and 12/31/2014 who reported pre-transplant melanoma, recurrence of melanoma after transplant and post-transplant melanoma.

Results: Of 4941 KTRs within the abovementioned time-period, thirty-four had a history of melanoma prior to renal transplant, of which 6 (18%) had recurrence of melanoma post-transplant. Mean wait time from melanoma diagnosis to transplant was 389 ± 311 days for non-recurrent patients and 422 ± 411 days (p=0.32). The mean interval to recurrence of melanoma was 6.2 ± 3.7 years after transplant. Five of the 6 patients with recurrence had end stage renal disease due to diabetes. All KTRs with or without recurrence were Caucasian. The cumulative incidence of biopsy-confirmed rejection was 50% (n=3) in those with recurrence, compared to 4% (n=1) in those without recurrence (p=<0.001). The mean interval from transplant to rejection was 2.9 ± 1.6 and 1.4 years respectively. The cumulative incidence of death censored graft loss was 17% (n=1) among recurrent melanoma patients with an interval from transplant to graft loss of 6.0 years while the incidence among only pre-transplant melanoma was 14% (n=4) with an interval of 5.0 ± 3.1 years. Similarly, there were a total of forty-five KTRs with post-transplant melanoma. The mean interval from transplant to melanoma was 4.4 ± 3.1 years. The incidence of death censored graft loss was 11% (n=5) at last follow-up.

Conclusion: Recurrence of melanoma is common among KTRs with pre-transplant melanoma, especially among KTRs with diabetes. Incidence of biopsy proven rejection and graft failure among recurrent melanoma is high. Proper risk stratification and early diagnosis may improve patient and graft survival.
Title: Differences in Radiographic Measurements on Standing versus Supine Pelvic Radiographs

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BACKGROUND: When considering hip preservation surgery, there is no standard in evaluation of the hip using standing versus supine AP Pelvis radiographs. The measurements obtained from these radiographs can dictate diagnoses, indications for surgery, and also determine the type of surgery offered. However, there are significant differences in the same patient’s measurements depending on whether the radiograph is obtained standing versus supine.

OBJECTIVE: Accurate pelvic radiographic measurements is of clear clinical importance, as these measurements can drive the indications for surgery, the surgical approach utilized, and/or the degree of correction during hip preservation surgery. Yet, there is no standardization of whether these pelvic radiographs are obtained in the standing or supine position. The differences in measurements obtained in these two views has not yet been reported on.

METHODS: All new patients who presented for evaluation of hip pain between September 2016 and July 2018 were retrospectively reviewed. Inclusion criteria included age 18-50, no prior hip surgery/injury, and both standing and supine AP pelvis radiographs dated within 2 years of each other. Measurements were obtained on 26 patients (52 hips), blinded to patient demographics and on both the standing and supine AP pelvis radiographs. Measurements included minimum joint space, lateral center edge angle (LCEA), acetabular depth, acetabular inclination, Tonnis Grade, crossover sign, posterior wall sign, ischial spine sign.

RESULTS: Standing films, when compared to supine films in the same patient, resulted in significantly lower LCEA and acetabular depth measurements, and higher acetabular inclination. Supine measurements, when compared to standing measurements in the same patient, for crossover sign were 5.69 times more likely to be positive than standing measurements. Similarly, supine measurements for ischial spine were 7.93 times more likely to be positive.

CONCLUSION: Based on our study, supine films are almost 6 times more likely to give a positive crossover sign and almost 8 times more likely to give a positive ischial spine sign than a standing film in the same patient. Additionally, LCEA, acetabular depth will be lower and acetabular inclination will be higher on standing films. As such, our recommendation is to obtain standing AP pelvis radiographs to obtain the most accurate pelvic radiographic measurements in hip preservation patients.
Physician Preferred Transthoracic Echo Acoustic Windows for Evaluating Aortic and Mitral Valves in Anticipation of Transcatheter Valve Interventions.

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BACKGROUND: Transesophageal echocardiography (TEE) is commonly used to guide transcatheter valve repair and replacement interventions. However, TEE is invasive and usually requires general anesthesia. Recently, transthoracic echocardiography (TTE) is being used for transcatheter aortic valve replacement to identify complications after the valve is deployed. TTE is appealing because it is non-invasive and permits procedures with only minimal or no sedation. TTE is not currently used for real-time evaluation of device positioning and deployment during the intervention because it is widely perceived that image quality in the supine interventional patient will be poor. Substantial improvements in echo probe design, acquisition and image reconstruction methods may now overcome these past limitations.

HYPOTHESIS: TTE imaging of the aortic and mitral valve is associated with clinically acceptable image quality to guide hypothetical transcatheter aortic and mitral valve interventions in a realistic cardiovascular disease patient population.

METHODS: Supine patients undergoing a transcatheter procedure in the cardiac cath-lab underwent detailed 2D and 3D TTE imaging of the aortic and mitral valves. Using a four-point scale (1-excellent, 2-good, 3-sufficient, 4-insufficient) interventional echo-cardiologists graded the images on clinically acceptability for a hypothetical transcatheter aortic or mitral valve intervention.

RESULTS: This study follows a similar protocol performed in healthy volunteers (manuscript in progress). 12 cardiovascular disease patients with varying levels of aortic and mitral valve disease were enrolled in this study. The subjects exhibited the following characteristics: Mean age 61 ± 14.5 years, mean weight 221± 69.5 lbs, and mean chest circumference 111.7 ± 18.2 cm. Presence of lung disease was in 3/12. Presence of any aortic disease was 8/12, and any mitral disease was 8/12 respectively. Physician grading of the echo imaging is in progress and is anticipated to be completed and analyzed by presentation day.

CONCLUSIONS: TTE is an appealing alternative to TEE to guide transcatheter valve interventions. This study is the first to define clinical acceptability and optimal acoustic windows in a realistic cardiovascular disease population.
Statin Efficacy Related to Adherence and Follow-Up in a Pediatric Population

Connor J. Enright

**Background:** Statin medications have demonstrated efficacy and safety in children with primary dyslipidemias such as heterozygous familial hypercholesterolemia (FH) over the short term, but more data are needed on long term efficacy and safety. Medication adherence is an important determinant of efficacy. Historically, statins have been associated with low adherence rates in adults. This has been noted in the pediatric statin population as well, possibly due either to concerns about medication safety or the lack of immediate cause-and-effect in treating an asymptomatic disease process.

**Objective:** The objective of this study is to characterize the safety and efficacy of statin medications for the treatment of primary and secondary pediatric dyslipidemias over a long treatment duration, and to examine whether medication adherence plays an important role in modulating statin medication efficacy.

**Methods:** Retrospective review of a pediatric preventive cardiology database identified all patients prescribed a statin medication and determined medication dosing and adjustments, side effect profile, pre and post LDL-C levels, medication adherence, and family history of atherosclerotic cardiovascular disease (ASCVD) for 161 patients age 1-22 years.

**Results:** There were no reported adverse events, which were defined as elevated liver enzymes, muscle pain, rhabdomyolysis, abdominal pain, elevated creatine kinase, or other patient-reported adverse events. Of the 131 patients with data available for pre- and post-treatment LDL-C, 94% had an LDL-C greater than 130 mg/dL before beginning the statin medication. Post treatment, 76% of these patients met the LDL-C target of < 130 mg/dL. 84% of patients met the adherence threshold of ≥ 80% self-reported doses taken in the 14 day period prior to lowest post-treatment LDL-C value, and the adherent group had a significantly greater mean reduction in LDL-C compared to the non-adherent group: 91 mg/dL versus 20 mg/dL, respectively (p=0.0001).

**Conclusions:** Statin medications represent a safe and effective means of lowering LDL-C in pediatric populations over a long treatment duration. The large reductions in LDL-C and high levels of adherence seen in this particular patient population may be attributed to a system of routine follow-up and family education on the importance of lipid-lowering therapy to decrease a child’s atherosclerotic burden. Utilizing a model of early intervention, family education, and intensive follow-up may improve clinical outcomes and reduce future ASCVD events in children with primary and secondary dyslipidemias that require lipid lowering therapy.
Improving Function After Peripheral Nerve Injury with Mineral Coated Microparticles

Releasing Growth Factors

Elliot Franczek

BACKGROUND: Peripheral nerve injury (PNI) occurs in approximately 2.8% of trauma patients and typically leads to a loss in sensory functions and/or motor functions. Autologous nerve grafts are the gold standard for repair of PNI. However, functional nerve recovery is generally partial and unsatisfactory.

Overexpression of glial derived neurotrophic factor (GDNF) increases motor axon growth and autografts overexpressing nerve growth factor (NGF) have an increase in sensory axon growth. The overall goal and significance of the proposed research is to promote more axonal growth and increase the rate of axon growth through an autologous graft via sustained delivery of biologically active GDNF and NGF at the distal end of the graft.

OBJECTIVE: Calcium phosphate coated micro-sutures will give a sustained growth factor release at the distal end of a peripheral nerve graft, causing more axons to grow through the graft at an accelerated rate and an increase in functional recovery.

METHODS: There were 2 groups: uninjured and injured. The treatment group received mineral coating created a continuous nano-porous structure that covered the entire microparticle. NGF sustained release for 21 days, with a total release of 8 ng/mg microparticle. GDF sustained release for 21 days, with 9.5ng/mg nanoparticle. In both groups electrophysiological recordings of compound action potentials were taken of the sciatic nerve, functional recovery over 12 weeks via ankle contracture recorded, grafts harvested, and osmium tetroxide myelin stained for axon counting, and Chlorotoxin subunit B injections distal of sciatic nerve were performed to count labeled neurons in the dorsal root ganglion (DRG), lumbar spinal cord and sciatic nerve graft.

RESULTS: The in vivo portion is finished but the data analysis is still ongoing. Our expected results for the treated group are as follows: a more obtuse angle for the functional ankle contracture data, a larger area under the curve for electrophysiology (a small sample size was finished and this was the case), increased myelinated axons in the harvested grafts, and increased neuron counts in the DRG, lumbar spinal cord and sciatic nerve graft.

CONCLUSIONS: A sustained growth release was attained using the mineral coated microparticles and this was expected to increase the rate and number of axon growth leading to improved functional recovery. This implication can hopefully translate to the clinical setting one day with improved peripheral nerve recovery following injury by utilizing specific growth factors with sustained release.
Incidence and Risk Factors of Acute Kidney Injury in Pediatric Acute Myeloid Leukemia

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Support: Shapiro Summer Research Program; Department of Pediatrics

Background/Objective: Pediatric acute myeloid leukemia (AML) is a rare form of leukemia and has the poorest acute leukemia outcome. Knowledge regarding acute kidney injury (AKI) in pediatric AML is limited. Previous research has shown the incidence of any AKI in pediatric AML to be 64% with severe AKI occurring in 43.3% of all patients. The purpose of this study is to identify the incidence of AKI in pediatric AML patients as defined by the pRIFLE criteria and the associated risk factors.

Methods: A retrospective chart review was performed on 35 patients (<18 years old at time of diagnosis) with de novo AML, who were identified by ICD-9 code. Patients with secondary AML were excluded. For patients who received a bone marrow transplant (BMT) as part of their treatment, data were collected up until the day of the BMT. A simple regression analysis was completed to analyze risk factors for first episode of AKI. In the 16 patients for whom we had complete data about high NTMx exposure, we compared the number of days of exposure between the overall mild and severe AKI groups. Information about the cause of death was collected for the 5 patients who died.

Results: We found the overall incidence rate for any episode of AKI to be 97.1%. The mild and severe incidence rates for a patient’s first episode of AKI are 77% and 20% respectively, while the incidence for any mild AKI is 37.1% and any severe AKI is 60%. There was no difference in the mean number of days of high NTMx exposure in the mild vs. severe AKI groups (p-value 0.9435).

Conclusions: This study found a very high overall incidence of AKI as well as a high overall incidence of severe AKI in children being treated for AML, both of which are higher than previously reported. While we are not able to identify any statistically significant risk factors for severe AKI in this population, we did note that the median number of days of NTMx exposure is higher in the severe group and that there was a higher percentage of severe AKI in the 1mo-10y age range, suggestive of potential associations to investigate in a larger cohort. Given the high incidence of AKI in children with AML, future studies should focus on identifying modifiable risk factors as well as long term outcomes of these patients.
Safety and Efficacy of Moderate Sedation in Obese Patients Undergoing Endoscopic Retrograde Cholangiopancreatography and Endoscopic Ultrasound

Genti A. Gjyzeli

BACKGROUND: As the prevalence of obesity (Body Mass Index [BMI] ≥30 kg/m²) continues to increase, a greater proportion of advanced endoscopies such as endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic ultrasound (EUS) are performed in bariatric populations. There is increasing interest in obesity related risks for sedation-related complications in anesthesia assisted endoscopic procedures, as some evidence indicates that obese patients are at increased risk of complications. The aim of this study was to evaluate the safety of moderate sedation and endoscopic procedural outcomes for obese patients undergoing ERCP and EUS versus matched controls.

OBJECTIVE: We hypothesized that there will be an increase in the rate of intra-operative and post-operative complications associated with either ERCP or EUS in obese patients under conscious sedation.

METHODS: A retrospective cohort study was performed comparing the rate of intraoperative events, length of procedure and amount of conscious sedative medication administered in obese versus non-obese patients undergoing either ERCP or EUS procedures that took place from June 2017 through June 2018.

RESULTS: Initial results indicate that obese patients required higher doses of midazolam, diphenhydramine and fentanyl for both ERCP and EUS procedures. Instances of intra-operative hypoxia were more prevalent in both obese men and women. There was no significant difference in procedure duration between obese and non-obese populations.

CONCLUSIONS: Our results suggest that obese patients undergoing advanced endoscopic procedures require a greater amount of sedative medication and may be at greater risk of experiencing intra-operative hypoxic events. By better determining the risk of adverse events stratified by BMI, we may be able to better reduce the risk of post-operative complications in obese patients undergoing endoscopic procedures.
BACKGROUND
Women’s healthcare is uniquely subject to contentious policy debates and complex funding structures. In the United States broadly and Wisconsin in particular, numerous laws are on the books that affect core women’s health services. These policies directly impact access to care, allocating funds for the care of un- and underinsured patients and even explicitly regulating the care that can be provided. Due to this complicated and evolving policy landscape, many Wisconsinites, including experienced clinicians, have a limited grasp on the policies that affect a woman’s ability to afford and locate women’s health services, from contraception to gynecologic cancer screenings. Further, there is a dearth of comprehensive resources that explain these policies, especially those that are current, clinician-focused, and specific to Wisconsin.

OBJECTIVE
The objective was to create a health policy review that provides a contextualized overview of the chief policies and programs that affect women’s healthcare in Wisconsin, including pregnancy care, well- woman care, and other reproductive health services. The goal in outlining this information is twofold: first, it provides useful context for providers in their day-to-day clinical practice, regardless of specialty; and second, it provides actionable background for future policy debates, allowing clinicians to be more effective patient advocates as additional legislation is proposed.

METHODS
Given the nature of this policy review, research was accomplished by using articles and policy guides found via PubMed, Google Scholar, Google, and recommendations from Dr. Deborah Ehrenthal. Additionally, interviews were conducted with local experts, including faculty from UWSMPH and staff from women’s health organizations, during which detailed notes were kept.

RESULTS
Based on the research conducted, a thorough overview of women’s health in Wisconsin was developed into a review article. The research is organized into three chief domains: pregnancy care, including prenatal and perinatal services; well-woman care, including contraception, screenings, and preventative care; and abortion services.

CONCLUSIONS
Women’s health is frequently a target of legislative action at a state and federal level, in ways that both contribute to and detract from the ability to care for patients effectively. While not often the focus of political rhetoric and public attention, many recent policy changes revolve around well-woman care, limiting Wisconsin women’s access to contraception and health screenings.
Characterizing the inflammation response in burn tissue

Chris Glover, BS
Aos Karim, MD
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Background:
The processes governing apoptosis, necrosis, inflammation, and regeneration in human burn wounds are not well understood. One cell type that we hypothesized could be a key regulator in the inflammatory/regenerative process is macrophages (MΦ). MΦ can undergo a change in phenotype between M1 (inflammatory) and M2 (anti-inflammatory), depending on cytokine and chemokine stimuli. How these two classes of MΦ behave in different burn depths has not been well studied. We hypothesized that the MΦ phenotype in deep partial thickness (DPT) and full thickness (FT) burns are different.

Objective:
The aim of this project was to characterize the MΦ response in DPT and FT burns using RNA Sequencing (RNA Seq).

Methods:
Biopsies from DPT and FT human burn tissue were obtained 5-10 days post burn at the time of excision, and control tissue samples (NRL) were collected from abdominoplasty procedures. These samples were submitted for RNA Seq, and differentially expressed (DE) genes were identified. Lists of genes associated with the M1 or M2 phenotype were constructed from the literature, and then compared to the list of DE genes from the RNA Seq data for DPT and FT sample types.

Results:
Thirty-nine M1 phenotype genes were identified in the literature, and 19 were DE and upregulated (UR) in total from NRL in either DPT, FT or both (50%). UR genes were mostly involved in proinflammatory pathways resembling MΦ stimulated by lipopolysaccharide (LPS). There were 9 DE/UR genes expressed in DPT (27%), and 2 were uniquely expressed genes (IL-6 and TLR3). There were 17 DE/UR genes expressed in FT (44%), and 9 were uniquely expressed in FT, of which 5 are involved in INFγ pathway activation.

Fifty-nine M2 phenotype genes were identified from the literature, and 21 were DE/UR in total from NRL in either DPT, FT or both (35%). UR genes were mostly associated with tissue repair and inflammatory resolving MΦ induced by IgG and IL-4. There were 15 DE/UR genes expressed in DPT (25%), 2 of which were uniquely expressed genes (ARG1 and VEGFA). There were 21 DE/UR genes in FT (35%), and 10 uniquely expressed genes, of which 6 are M2 cell surface markers.

Conclusions:
Our data suggests there is a greater M1 and M2 response in FT compared to DPT up to 10 days post burn. These results also suggest that INFγ MΦ stimulation may be upregulated in FT compared to DPT burns.
Changing Patients with Type 2 Diabetes Mellitus From Insulin to DPP-4 Inhibitors
Matthew Goblirsch and Irene Hamrick, MD

Background
Dipeptidyl-peptidase 4 inhibitors (DPP-4) are a relatively new treatment regimen for Type II Diabetes Mellitus (DM) with less hypoglycemia than insulin. There is no published data regarding the effects of these drugs on insulin therapy. This case series presents findings from a cohort of older adults on insulin, who received DPP-4 treatment.

Objective
Our goal was to examine insulin therapy changes in elderly diabetes patients who added a DPP-4 inhibitor to their treatment regimen. We also examined treatment outcomes in this patient group.

Methods
Using data from the Electronic Health Records, we selected patients who were on insulin and started on DPP-4. We tracked the days when patients started the DPP-4, when their PCPs began tapering the insulin dosages: when FSBS levels were <200, and when their PCPs stopped insulin treatment altogether.

Results
Out of 34 patients aged 73.7 (59-95), who received DPP-4 treatment for DM, 20 (59%) were able to stop insulin completely and 8 were able to reduce their insulin dose. The remaining 6 patients were unable to reduce their insulin and DPP-4 was ultimately stopped. Among the 20 who stopped insulin, 12 patients were successfully switched from insulin to DPP-4 on one day because of low insulin dose or low HgA1c. Four patients took 2-154 days before taper was begun. Tapering duration ranged from 10-727 days until insulin was stopped. The dose of insulin for those tapered ranged from 28 to 84 units daily. HgA1c improved in 11 of the 20 patients and weight decreased in 11 of the 20. The average weight loss in this group was 2.8 pounds, 4.1 pounds (p=0.66). HgA1c decreased 0.5% in all, 1% in those who stopped insulin (p=0.02).

Conclusions
These findings suggest that DPP-4 can be used to transition patients off insulin therapy with improvement in weight and HgA1c. Larger studies are needed to confirm our findings and develop a protocol for transitioning patients.
Enhancing detection sensitivity of humanized therapeutic antibody in patient samples for improved pharmacokinetic evaluation

Megan Gokey

Introduction: Immunocytokine (IC) is a fusion of an anti-GD2 antibody and IL-2 currently under investigation as an immunotherapy agent. A common means of measuring the amount of active drug is the Enzyme-Linked Immunosorbent Assay (ELISA). Current ELISA methods require multiple wash steps, and have narrow dynamic ranges that can make accurately quantifying analytes difficult and prone to error propagation. AlphaLISA is a bead-based immunoassay technique designed to reduce experimental time, reagent use, and background noise. It also has an increased dynamic range allowing for improved sensitivity. Signal is generated when donor and acceptor beads are in close proximity, which is directly proportional to the amount of analyte.

Objective: Our goal is to develop and optimize an AlphaLISA assay to quantify the level of IC in a variety of immunotherapy settings.

Methods: Streptavidin donor beads, biotinylated human anti-IL2 antibody and human anti-IgG1 coated acceptor beads (Perkin-Elmer, MA) were used to detect IC in AlphaLISA buffer, 1% mouse, and 1% human serum. For detection of IC in mouse and human serum, 1A7 (anti-GD2 specific antibody) was chemically conjugated to acceptor beads according the protocol established by PerkinElmer. This system was tested in mouse and human serum containing samples. Reactions were performed in 384-well plates with a total reaction volume of 5μL. Plates were read on a ClarioStar plate reader with an excitation wavelength of 680 nm and read at 615 nm. Dose response curves were generated using Graphpad Prism 7 and fitted with a sigmoidal 4PL curve. Unknowns and percent error were calculated.

Results: Assays containing anti-IgG1 Acceptor beads were able to detect IC contained in buffer and mouse serum, but were not able to detect IC in samples containing human serum. Assays containing 1A7 acceptor beads were able to detect samples contained in buffer, mouse serum, and human serum. Both variations of the assay were able to detect IC concentrations ranging from 10-1,000 ng/mL, which is a significantly larger dynamic range than current ELISA methods. Both methods were also able to determine the concentration of IC with more accuracy than ELISA assays.

Conclusions: We have shown that AlphaLISA is a quick and reliable method for detecting IC in both serum-free and serum-containing solutions. It allows for accurate quantitation of sample concentrations at a small volume, and allows for a multitude of samples to be run.
Timing Is Everything: Decreasing Mortality Associated with Severe Hyperkalemia in Hospitalized End Stage Renal Disease Patients
Andrew J. Gregory

Background:
Hyperkalemia is a modifiable risk factor for sudden cardiac death; a leading cause of mortality in hemodialysis patients. There is lack of data in literature guiding the treatment of hyperkalemia in hospitalized end stage renal disease (ESRD) patients.

Objective:
The goal of this study was to determine if timing of dialysis after serum potassium result influences mortality in hospitalized ESRD patients with severe hyperkalemia defined as serum potassium > 6.5 mEq/L.

Methods:
We conducted a retrospective study of all adult ESRD patients admitted to the hospital who had hemodialysis for severe hyperkalemia between January 2011-August 2016.

Results:
346 ESRD patients on hemodialysis admitted at our center had severe hyperkalemia during the study period. Patient characteristics described in table 1. Mean serum potassium was 7mEq/L. In-hospital mortality in ESRD patients with severe hyperkalemia was 6.9%. Median time to dialysis after serum potassium result was 2.13 hours (25, 75 IQR 0.98, 4.9 hours). Time to dialysis after serum potassium result was associated with a significantly increased risk of mortality in this population (HR 1.007, 95% CI 1.002-1.012, p <0.0045) (Table 2). Logistic regression analyses also determined age, length of stay, serum creatinine and serum albumin level as significant predictors of in-hospital mortality (Table 2). Sex, race, history of diabetes and hypertension, serum potassium level and serum CO2 level did not influence in-hospital mortality in this cohort.

Conclusions:
We conclude that early dialysis after serum potassium result in hospitalized ESRD patients with severe hyperkalemia is associated with decreased in hospital mortality.
Shock Expectancy as a Measure of Fear Learning in Youth with PTSD

Julia H. Harari

Background
Fear extinction processes in youth may be mediated both by the child and through transmission of fear and safety associations from the child’s parents. A fear conditioning protocol was used to probe possible deficits in direct (child-mediated) and vicarious (parent-child) extinction learning in a pilot sample of youth with Post-Traumatic Stress Disorder (PTSD) and controls. Fear responses were induced and extinguished by the presence or absence of a mild finger shock paired with stimuli. Self-reported shock expectancy and anxiety ratings were taken after each phase.

Objectives: 1) Assess the relationship between shock expectancy ratings and fear learning; 2) Explore within- and between-group differences in shock expectancy ratings in a sample of PTSD and non-trauma control (NTC) youth.

Methods
Task design: A sample of 12 PTSD and 16 NTC parent-child dyads completed fear acquisition and extinction tasks to color stimuli. Two conditioned stimuli (CS+) and one neutral stimulus (CS-) were generated during the conditioning phase. During the direct (DE) and vicarious extinction (VE) phases, one CS+ was directly extinguished (CS+D) and the other was vicariously extinguished (CS+V) by the child observing their mother complete DE. Recall and reinstatement phases tested for recall of safety learning and renewal of the conditioned fear response, respectively.

Shock expectancy ratings were analyzed with linear mixed effects models to test for:
1) Changes in expectancy with experimental manipulation (phase, stimulus type (stim), order [first vs last stimulus presentation])
2) Group differences in fear learning
3) Within-group differences in DE vs VE

Results
Whole-group: There were stim-phase-order interactions for shock expectancy across each phase. Between-group: No differences.
Within-group: In the PTSD group, there was a stim-phase-order interaction for CS+D during recall (p=0.0223) and CS+V during VE (p=0.0367).
In the NTC group, there was a stim-phase-order interaction for CS+D in DE (p=0.0021) and recall (p=0.0040) phases, and for CS+V during VE (p=0.0143) and recall (p=0.0151) phases.

Conclusions
Our whole-group analysis showed that changes in shock expectancy corresponded to experimental manipulations, suggesting shock expectancy can be used as a measure of fear learning. Within-group analyses suggested effective VE but possible deficits in DE learning in the PTSD group. In contrast, both DE and VE learning processes appeared intact in the NTC group. Analysis of larger samples will further elucidate differences in fear learning processes in PTSD compared to NTC youth.
Decreasing Patient Distress During Minor Procedures in a Pediatric Emergency Department as Assessed Using Pediatric Sedation State Scale

Jenna M. Hatab

**Background:** Emergency department (ED) procedures can be very distressing to children and their families. For anxiolysis during these procedures, nitrous oxide (N2O), midazolam, and distraction techniques can be used. In the ED, it is difficult to assess the pain or distress associated with common procedures such as IV placement, laceration repair or incision and drainage. The Pediatric Sedation State Scale (PSSS) is a scale from 0-5 that has been validated to be used for procedural sedation in children.

**Objective:** Evaluate if the PSSS could be used to assess a patient’s level of distress for minor procedures in a pediatric ED. If the PSSS could be calculated in these procedures, the secondary objective was to evaluate level of appropriate anxiolysis, measured by change in PSSS during procedure.

**Methods:** A cohort study of patients age 0-17 undergoing a minor procedure was conducted. Each patient was given a baseline PSSS score prior to procedure and given a PSSS score every 15 seconds during the procedure. The mode of PSSS scores during the procedure, methods of anxiolysis, and procedure length were recorded after procedure completion. Family satisfaction with the overall procedure experience was then assessed with a scale of 1 to 10. PSSS scores, satisfaction and procedure length were analyzed with comparative t-tests.

**Results:** 26 patients were enrolled. PSSS scores were able to be obtained on patients >12 months of age and with no developmental delay. 16 patients underwent IV placement, 4 patients had laceration repairs, 6 patients had other minor procedures. PSSS before and after scores were calculated for patients that received only 1 method of anxiolysis: 2.2, 2.4 (N2O only) 2.5, 3.0 (midazolam only) 2.7, 3.1 (distraction only). Procedure length was 5.6 (N2O), 6.6 (midazolam), and 3.7 (distraction). Average family satisfaction was 10 for both N2O and midazolam, and 9.2 for distraction only. P-values for average change in PSSS were > 0.05.

**Conclusions:** The PSSS is feasible to use in the ED to assess procedural distress for children older than age 1, with no developmental delay. N2O had the smallest change in PSSS score. Compared to procedures using distraction only, N2O and midazolam had high family satisfaction scores, but longer procedure lengths. Comparative results were not statistically significant as the study was not powered for such. Further assessment of comparisons between anxiolysis options using PSSS will require additional study participants.
PTSD Symptom Severity and Opioid Misuse at 12 weeks Post-Discharge Following Traumatic Injury

Kathryn Henschel, Christopher Nicholas, Bri Deyo, and Randy Brown

**Background:** Opioid misuse and related complications have recently reached the level of epidemic in the United States. Victims of traumatic injuries have higher rates than the general population of substance misuse, including opioid misuse. Post-traumatic stress disorder (PTSD) is a potential psychological consequence of a traumatic injury, and an independent risk factor for opioid misuse. Given this relationship, it is hypothesized that injury-related PTSD symptoms will be positively associated with risk for opioid misuse.

**Methods:** This prospective study included 123 inpatient traumatic injury patients recruited from University of Wisconsin Hospital. The PTSD Checklist for DSM-5 (PCL-5) was used to assess lifetime (assessed during hospital admission) and injury-related PTSD symptoms (assessed at 12 weeks post-discharge). The Current Opioid Misuse Measure (COMM) was used to assess risk for opioid misuse at 12 weeks post-discharge. Multiple regression was used to examine the linear relationship between PTSD symptom severity and risk for opioid misuse.

**Results:** While the mean scores on the PCL-5 (M=12.30; SD=14.96) and COMM (M=4.62; SD=6.72) at 12 weeks post-discharge were substantially below the normative cut-off value for each measure (~30 and ≥9, respectfully), PTSD symptoms at baseline and 12-weeks post discharge, were both positively associated with risk for opioid misuse, with injury-related PTSD symptoms being a stronger predictor.

**Conclusions:** Following a traumatic injury, the presence of PTSD symptoms and some indicators for opioid misuse were associated. Upon continued data collection, these findings could inform future efforts to prevent opioid misuse in trauma patients through the development of an opioid risk screening tool and novel brief interventions.

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Background:
Antibiotic misuse exerts selective pressure towards resistance among bacteria, which has been classified as a global threat to public health. The emergency department (ED) accounts for a substantial proportion of antibiotic prescribing in the US and high rates of inappropriate prescribing are well documented. There is a paucity of data on effective ED antibiotic stewardship interventions. Skin and soft tissue infections (SSTI) comprise ~3% of all ED visits and have been identified as an important target for improved antibiotic prescribing.

Objective: The aim of this project is to identify high impact and potentially intervenable factors that influence antibiotic prescribing decisions for SSTIs in the ED.

Methods: The qualitative phase of this project involved 20 semi-structured interviews with a diverse group of emergency physicians. The interviews were guided by an established framework, Systems Engineering Initiative for Patient Safety. Interviews were coded using an iterative, deductive process. A thematic content analysis was conducted to identify factors which most consistently influenced antibiotic prescribing. These factors were mapped to proposed stewardship interventions which were then integrated into clinical SSTI vignettes. The vignettes will be administered to a national sample of emergency physicians and analyzed using the method-of-judgment approach, which utilizes factorial survey design and regression to infer relative impact of the included elements.

Results: The identified, potentially intervenable factors influencing antibiotic prescribing for SSTIs in the ED included: diagnostic uncertainty, patient expectations, lack of access to care, provider knowledge gaps, and weighing adverse outcomes from non-treatment above potential harm from antibiotics. These translated into the following proposed interventions respectively: thermal imaging/MRSA PCR, patient educational materials, virtual/paramedicine follow-up visits, EHR integrated clinical decision support, and a shared decision making communication facilitation tool.

Conclusions: Using a mixed methods approach, qualitative interviews informing a quantitative survey, we were successfully able to identify potential ED antimicrobial stewardship interventions for SSTIs. Future interventional studies should target elements which most significantly influenced antibiotic decision making in the vignette encounters.
BACKGROUND: Human papillomavirus (HPV) is nearly ubiquitous in the United States; according to the CDC, 90% of people in the U.S. will become infected at some point in their lives. HPV-associated disease accounts for 37,000 cancer cases per year in the U.S. The CDC reports that vaccination could prevent 84% of these cases from ever happening. Despite concrete guidelines, providers inconsistently recommend the vaccine. Researchers have hypothesized this may be related to providers’ own discomfort with difficult topics related to HPV.

OBJECTIVE: Provider-focused interventions to improve HPV vaccination rates have sought to reduce this discomfort through education and training, with mixed results. The goal of the current project is to create a survey that contributes nuance to these previous findings and better understand the nature of healthcare provider discomfort surrounding the HPV vaccine relative to other challenging adolescent health topics.

METHODS: A review of the literature surrounding barriers to adolescent vaccination, healthcare provider behavior, provider-patient/parent communication, and difficult adolescent health topics was conducted. Texts were acquired via the National Institute for Biotechnology Information’s PubMed database. Several survey items were based on literature review. Other items were borrowed or adapted from (1) previous studies on obesity and contraception and (2) validated instruments including the Positive and Negative Affect Schedule, often used in psychology research to assess emotion; and the Mini-Z3, a validated scale related to physician stress and burnout.

Five primary health care providers or providers-in-training were consulted about early iterations of the survey. These participants were qualitatively interviewed while taking the survey, which was further adapted according to their suggestions.

RESULTS: Results of this survey will detail providers’ current knowledge, attitudes, and practices surrounding adolescent HPV vaccination, comparing their comfort with discussions about HPV with other difficult topics. Results may also offer insight into biases related to HPV vaccination of patients based on sex, gender, sexual behaviors, and media exposure.

CONCLUSIONS: This survey will contribute to the body of research regarding providers’ role in the success of HPV vaccination; it also has potential to reveal areas in need of further research.
Feasibility of delivering electronic health record (EHR)-based survivorship care plans and planning to cancer survivors in a community oncology practice

Alexandra Hua

With a growing number of cancer survivors, survivorship care plans (SCPs) are recommended to communicate information about late effects of treatment and follow-up care. Community oncology practices follow 85% of adult cancer survivors but report more difficulty in providing SCPs compared to academic centers. Our objective was to evaluate the impact of delivering SCPs in a community oncology practice by examining awareness of SCP receipt as well as how provision affects survivors’ perception of care quality and of their condition. Survivors who accepted a SCP as standard of care were recruited from a community oncology practice in the Midwest and completed surveys prior to SCP provision (baseline) and 4 weeks later (follow-up). Within-survivor changes in knowledge of SCP receipt, satisfaction and perceived care coordination were assessed. Thirty cancer survivors (breast, colon and prostate) completed the baseline survey, while 24 completed the follow-up survey (80% response rate). Participants reported receiving SCPs and treatment summaries more frequently at follow-up after receiving a SCP. At follow-up, there was a significant increase in survivor activation and involvement in care along with satisfaction of knowledge of care. Communication about and during SCP provision may need to be clearer: 34% of survivors could not correctly identify SCP receipt in this study.

This may place these survivors at a disadvantage, if this leads to less awareness of important information regarding follow-up surveillance and management. Of those aware of SCP receipt, SCP provision had positive impacts in this small, short-term study.
THE EFFECTIVENESS IN SOCCER HEADGEAR TO REDUCE THE INCIDENCE AND SEVERITY OF SPORTS RELATED CONCUSSIONS IN ADOLESCENTS

Joseph Janz, M2
Mentor: Timothy McGuine, PhD, ATC

BACKGROUND: One million athletes play high school soccer each year and an estimated 87,000 Sport Related Concussions (SRC) occur in US high school soccer players. This has caused medical providers and soccer leaders to debate the merits of protective head gear (HG). In recent years HG manufacturers and third-party entities have sought to determine whether HG is effective in reducing the effect of SRCs through laboratory testing. To date there have been no prospective population-based trials to examine the effect of soccer headgear on the incidence and severity of SRCs in high school soccer players.

OBJECTIVE: This prospective study aimed to compare incidence and severity (days lost from soccer) of SRCs for players wearing HG and players not wearing HG during soccer season.

METHODS: Study design: cluster randomized control trial with 3050 high school soccer players (male/female, grades 9-12) from 88 schools, with 50% randomly assigned to wear HG. Subjects were allowed to choose from 5 HG brands. Data was collected from fall 2016 to spring 2018. School athletic trainers recorded injuries, soccer exposures (practice/competition), and incidence/days lost from soccer for SRCs sustained by subjects. Means (SD) and medians [IQR] were used to describe days out of soccer and incidence of SRC, stratified by various demographic variables.

RESULTS: N = 3,050 high school soccer players (66% Female, Age 16.0 ± 1.0, grades 9 - 12) enrolled in the study and participated in 151,511 soccer exposures. 26 males (2.1%) and 106 females (5.2%) sustained SRC. n = 55 (43%) players were wearing HG at the time of their injury. Median days out from soccer was 14.5 [11, 20]. Females (15 [9, 19]) missed more days (p < 0.001) than males (12 [9, 18]). There was no difference (IRR = 1.04 [0.84, 1.29] p = 0.74) in the days missed for subjects wearing HG 14 [12, 19] compared to players not wearing HG 15 [10, 21]. More males in the HG group sustained SRC (2.8%) than controls (1.7%), while more females in the control group (5.8%) sustained SRC than those in HG group (4.6%).

CONCLUSIONS: The severity of SRCs for players with HG was no different than those without HG. HG effect on incidence was stronger for females than males and was different between various HG models worn. Sports medicine providers should remain cautious when advocating the use of HG to reduce the severity of SRCs in high school soccer players and further analysis will be done analyzing differences in sex and HG brands.
Pet Ownership and the Microbial Diversity of the Human Gut Microbiome

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**Background**

We present an assessment of characteristics of the gut microbiota associated with pet ownership. A diverse gut microbial community may offer protection against multidrug-resistant organisms (MDROs). Our study investigates how the gut microbiota of individuals who own pets differs from those who do not.

**Objective**

We hypothesized that pet ownership significantly affects the microbial diversity of the pet owner’s gut microbiota. We predicted that we would find higher abundances of *Lactobacilli* in fecal samples from pet owners than in the fecal samples of individuals who live without companion animals.

**Methods**

332 participants were enrolled into this cross-sectional study from a pre-existing community-based cohort in Wisconsin. 16S rRNA sequencing of stool samples was performed to assess the gut microbiome. Our study included 22 controls. We used R for statistical analysis and microbiome analysis. We describe α and β diversity, as well as the associations between environmental exposures and microbial diversity of the gut found within our study subjects.

**Results**

DESeq2 analysis showed that Verrumicrobia, Firmicutes, and Bacteroidetes differed in composition between pet owners and non-pet owners. Our regression analysis showed that comorbidities, well-water as a drinking source, and antibiotic use within the last year had significant associations with colonization with an MDRO.

**Conclusions**

We conclude that although pet ownership may not hold a significant association with MDRO colonization, pet ownership affects the microbial composition of the gut microbiome. Our findings echo those of previous studies in the literature, and chart the course for future investigations.

*Keywords: Gut Microbiota, Pet Ownership, Microbiome, Verrucomicrobia, Companion Animal*
Barriers to Active Surveillance: A Survey of Endocrinologists and Surgeons

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Background: Active surveillance (AS) is a newer strategy for patients with papillary thyroid microcarcinoma. Data are lacking on use of and barrier to implementation of this nonsurgical option.

Objective: Our goal was to evaluate the use of AS and barriers to implementation.

Methods: We used Qualtrics© to survey members of the American Thyroid Association (ATA), American Association of Endocrine Surgeons, and American Head & Neck Society. We assessed AS use with an established model of barriers to guideline adherence and analyzed data with Chi-square and t-tests as appropriate.

Results: A total of 345 physicians completed the survey (99 endocrinologists and 246 surgeons). 94% of respondents were quite or very familiar with the 2015 ATA guidelines, but 6% were not at all familiar with AS. Overall, 63% of respondents utilized AS, and 81% felt AS is underused. Endocrinologists used AS more frequently than surgeons (7±11 vs. 4±5 patients/yr, p=0.02). Barriers to AS included the belief that patients were not aware of (81%) or interested in AS (52%), which was more common among surgeons (p=0.05). Respondents also agreed the psychological burden of AS is too high (31%) or will not improve patients’ quality of life (26%). When asked, 29% of respondents agreed the 2015 ATA guidelines are too vague, 18% the evidence for AS too weak, and 6% felt AS may lead to poor outcomes. Overall, 19% of respondents had reservations about AS, and 16% were not comfortable offering AS. Other barriers included not knowing how to select appropriate patients or perform AS (9%). Concerns about malpractice (18%) and costs (15%) existed, and surgeons had more concerns about resources (14% vs. 9%, p=0.04), negative impact on referrals (16% vs. 6%, p<0.001) or reimbursement (11% vs. 5%, p<0.001). When asked about how to increase AS use, respondents supported having a standardized consent form (37%) and more information for patients (27%).

Conclusions: Most endocrinologists and surgeons believe AS is underused. Significant barriers to increasing the use of AS appear to be concerns about data supporting AS and clarity of guidelines as well as the belief that patients are not interested in AS, which may affect whether providers discuss or offer AS. Interventions to increase the use of AS should focus on improving patient and provider knowledge and developing a formal consent process.
Primary care teams at the University of Wisconsin (UW)-Madison family medicine residency clinics strive to care for not only individuals but also communities. Complex issues of trust hamper these clinics’ abilities to promote wellness in these communities. According to the American Public Health Association, a community health worker (CHW) is “a frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served”. However, the potential scope of CHW roles is broad, as evidenced by the wide range of CHW job titles including community health advisor, outreach worker, community health representative, promotora de salud, and patient navigator1. A model of community-academic-health system partnership featuring CHWs shows that successful integration of CHW into healthcare systems requires clear delineation of the CHW role by patients and clinic staff2. To effectively integrate CHW into UW primary care teams, we conducted interviews to understand how clinic staff and patients envisioned CHW integration at their clinics. Among a list of 26 different CHW responsibilities ranging from administrative to medical to social, interviewees prioritized “addressing social determinants of health” and “increasing trust”. In addition, interviewees described potential barriers to integrating CHW at their clinic, including cost, safety, training, standardization, and distrust, and potential solutions. The results from this inquiry will inform role delineation and foreseeable barriers in the potential integration of CHW into UW family medicine residency clinics.


The Role of Autoantibodies in Cardiac QTc Prolongation in Patients with Rheumatoid Arthritis

Alexis M. Keefe

BACKGROUND: Patients with rheumatoid arthritis (RA) face an increased risk for cardiovascular disease (CVD), sudden cardiac death, and QT prolongation which one study showed to be an independent predictor of all-cause mortality. Chronic systemic inflammation is hypothesized to increased CVD risk, but other disease mediators may be involved. One disease mediator is the serum markers for RA, rheumatoid factor (anti-RF) and cyclic citrullinated peptide (anti-CCP), which correlate with more severe disease course.

OBJECTIVE: To evaluate the effect of serum markers on cardiac repolarization by differentiating the QT interval of RA patients who are CCP+/RF+ and CCP-/RF-.

METHODS: All clinical data was collected under the UW Rheumatology Biorepository. Inclusion criteria were patients with RA and a 12-lead ECG. Seropositive RA subjects are defined as titers of anti-RF and anti-CCP both \( \geq 2x \) upper limit of normal. Biorepository controls were subjects age-gender matched without systemic inflammatory disease. The most recent ECG was analyzed with the Bazett’s method for QT correction. Recorded medications from the time of ECG included immunosuppressives and drugs of QT-prolongation risk (defined by CredibleMeds\textsuperscript{®}). Analysis utilized multivariate Wilcoxon estimate regression models.

RESULTS: We analyzed 200 RA vs. 69 controls. There were no significant differences in the patient cohorts of age, gender and ethnicity. RA subjects had a 10.3ms increase in QTc compared to controls (\( p=0.014 \)), while CCP+/RF+ (n=128) to CCP-/RF- (n=72) did not yield significantly different QTc (\( p=0.74 \)). QT prolonging drugs were utilized by both RA and controls. Using a multivariate regression model to control for QT-prolonging meds led to the loss of significance of QT prolongation in RA vs. controls. Immunosuppressives may alter disease state due to their anti-inflammatory action. RA subjects taking hydroxychloroquine (HCQ), a common immunosuppressive known to prolong QT intervals, had a 13.5ms increase in QTc compared to RA subjects not on HCQ (\( p=0.015 \)). The combined effect of RA patients taking immunosuppressive medications (152) vs. not (48) showed no significant difference in QTc.

CONCLUSIONS: Serology status of RA subjects does not impact the QTc duration in this cohort. Rather, we found QT prolonging risk medications having a moderate effect on QTc prolongation which may be important to consider regarding arrhythmic risk stratification.
Using 4D DSA to create an in vitro model for analyzing intracranial aneurysms hemodynamics
Aahad N. Khan

**Background:** An intracranial aneurysm is a fairly common form of cerebrovascular disorder where a weakness in the wall of a cerebral artery causes dilation of the vessel. While the exact mechanisms of why intracranial aneurysms form are unknown, it is likely that fluid-induced shear stress on the walls of the vessel contribute to this pathology. The reason why only a small percentage of aneurysms rupture is also not known.

**Objective:** To develop an in vitro model of cerebrovascular anatomy using 4D digital subtraction angiography (DSA) patient data that can be used to assess changes in pulsatility and other hemodynamic parameters.

**Methods:** Rotational angiographic patient data was acquired from an in-house database and then reconstructed as 3D DSA images. These images were then converted into STL files and transferred to 3-matic, a 3D computer-aided design program, where the aneurysm volumes were refined and prepared for 3D printing. The models were 3D printed with polyvinyl alcohol (PVA) which is soluble in water. Once aneurysm models were printed, we constructed an acrylic box that fit each individual 3D printed model and then poured silicon over the model. Once all the bubbles were removed then the silicon model was left to solidify; the last step was removing the PVA aneurysm model with water which left us with a hollow silicon model of the original aneurysm. We connected the silicon model phantoms to a pulsatile pump with plastic tubing. This allowed us to control hemodynamics parameters e.g. flow rate, pressure in a closed loop system that mimicked the systemic circulation. The experiments consisted of connecting our aneurysm phantoms to the pump and acquiring images using a cone beam CT angiographic system. We were then able to obtain data on flow rates and pressure using our in vitro models. The data obtained from the scans was processed in a Siemens proprietary software.

**Results:** We were able to measure flow rates, pressure maximums and minimums within the parent and outlet arteries, pressure within the aneurysm, and pulsatility within the aneurysms. These data revealed that varying heart rates and stroke volumes led to changes in pulsatility and intra-aneurysmal flow.

**Conclusions:** By creating a viable in vitro aneurysm model that we can use to analyze intracranial hemodynamics, we will be able to conduct future experiments that may help isolate specific hemodynamic parameters that increase the risk of aneurysm rupture.
Identification of Predictors of Mortality and Early Interventions for Pediatric Patients in the Acute Care Setting At Mbale Regional Referral Hospital, Uganda

Brandon R. Kim

BACKGROUND: Uganda is a country in sub-Saharan Africa with an under-five mortality rate of 66/1000 live births and limited numbers of trained medical personnel leading to challenges in treating the sickest children. Previous research has suggested that improvements in triage can lead to decreased mortality in low-resource settings by identifying those in need of emergency care and prioritizing allocation of resources (Molyneux). Mbale Regional Referral Hospital (MRRH) has developed its own locally based guidelines, called danger signs, which are adapted to include testing available at that facility. The question remains, which of these variables are most important to predict childhood mortality in patients presenting in an acute care setting.

OBJECTIVE:
This study aims to:
1. Evaluate the lasting influence of the one-time refresher course on identification and documentation of pediatric danger signs
2. Evaluate predictors of mortality based on triage information

METHODS: A retrospective chart review was conducted at MRRH in Mbale, Uganda. Data collection was conducted on all pediatric patients between ages of 0-18 who were triaged through the Acute Care Ward at MMRH and either admitted to the pediatric ward or deceased before admission during a three-week period. An a priori coding scheme was used which included patient demographics, triage vital signs, medical interventions with timing and patient outcome.

RESULTS: Data from 386 patients was collected, and of those, 21 patients died (6%). 15 of the 21 patients who died, died within 24 hours of being triaged. Of those patients who died, 71% had a danger sign recorded, as opposed to 86% of those who lived (p=0.06). 93% of those who died had an abnormal danger sign, as opposed to 72% of those who lived (p=0.07). For those patients that died, there were 1.3±1.3 abnormal danger signs recorded as opposed to 1.1±1.2 of those who survived, compared to 1.8 and 1 respectively pre-intervention of the one-time refresher course. The triage time to first intervention time was 168±229 minutes in patients that lived and 123±175 minutes in patients that died (p=0.46)

CONCLUSIONS: We conclude that there were no clear associations between abnormal danger signs and risk of death. We also conclude that there was no lasting effect of identification and documentation of danger signs from the one-time refresher course. To improve the identification of danger signs, we propose more frequent refresher courses, a more robust triage tool, and protocols for acting on danger signs.
Use of Herbal Medicine to Improve Trust of Amish Communities in Western Health Care
Beth Klein

BACKGROUND: Wisconsin is home to some twenty thousand Amish individuals who live in 150 congregations across the state, primarily in rural counties. The Amish are therefore a significant patient population for rural health care providers, but yet we know so little about their health beliefs. This gap in cultural knowledge has led to a rooted skepticism among Amish people of western health care. We as health care providers ought to put forth effort to determine the roots of that skepticism and what we can do to improve the health care system so that our Amish neighbors receive the best health care possible. One way to do that is by learning about a key aspect of Amish culture—herbal medicine.

OBJECTIVES: The objectives of this study are to determine what herbal remedies the Amish of southwestern Wisconsin frequently use, and for what indications; to describe those herbs based on the insight of the questionnaires, common knowledge, and available literature; and to recommend ways health care providers could improve Amish trust in the western health care system by understanding the herbs that local Amish frequently use.

METHODS: The first objective will be achieved through mailed questionnaires to Amish and non-Amish individuals from southwestern rural Wisconsin. Permission to mail questionnaires will be obtained from community leaders in southwestern Wisconsin. The non-Amish comparison group will be families who live in these rural areas, as well. Questionnaires will also be left with permission at local businesses for customers who wish to participate. If the sample size for the Amish group is not reached, one-on-one interviews will be conducted based on the questionnaire. The second objective involves a qualitative review of the herbs commonly identified by the Amish in the questionnaires. The goal is to examine the reasons and methods by which these herbs are used, and to provide any scientific evidence that supports or does not support these claims. Building on the information gathered in the first two objectives, the third objective will provide actionable recommendations for western health care providers to improve their care for Amish patients.

CONCLUSIONS: The end-goal of this ongoing study is to provide more culturally competent care, so that when an Amish individual brings themselves to the western health care system they have a better experience, better outcomes, and is more likely to return.
Current Practice Patterns for Primary Umbilical Hernia Repair in the United States
Samuel D. Koebe

Background: The approach to repairing a primary umbilical hernia (PUH) can vary depending on hernia size, patient age, sex, BMI, comorbidities, and surgeon technique. Of these, only hernia size has been widely studied. This study evaluates umbilical hernia repair technique with respect to other patient characteristics and comorbidities.

Objective: We hypothesize that the approach to repairing umbilical hernias will vary with BMI, age, and sex.

Methods: A retrospective database study was performed using data from the prospectively maintained Americans Hernia Society Quality Collaborative. All patients undergoing PUH from 2013-2018 were identified. Patients were excluded if they had a recurrent hernia, emergent repair, clean-contaminated or contaminated field, or concurrent myofascial release. Patient characteristics included age, sex, hernia width, BMI, smoking status, and diabetes. The primary outcome was use of mesh for repair. Secondary outcomes included surgical approach and technique. Multivariate logistic regression controlling for patient and hernia characteristics was performed to assess the independent effect of age, BMI, and sex on choice of hernia repair technique.

Results: 3,475 patients were included. Seventy-four percent of patients were male with a mean age of 52 years (SD 13.7), mean BMI of 31.2 (SD 6.69), and mean hernia size of 1.91cm (SD 1.19). An open approach was more common than a laparoscopic/robotic (75% vs 25%). Use of a laparoscopic/robotic approach increased with BMI and with hernia size. Mesh was used in 65% of PUH, and used more commonly in men (67% vs 60%, p<0.001). Mesh was used in 33% of repairs ≤1cm, and 82% of repairs >1cm in size (p<0.001). Younger patients were less likely to receive a mesh repair (54% if age 18-35 vs 67% for age >35, p<0.001). Patients with diabetes were more likely to receive mesh (79% vs 63%, p<0.001). On multivariate analysis, mesh use was associated with increasing hernia width (OR 5.5, CI 4.7-6.3) as well as BMI (OR 1.8, CI 1.5-2.1) but not age or sex.

Conclusion: The majority of PUH are performed open. Despite umbilical hernias being more common in women, the majority of those undergoing repair in our dataset are male. BMI and hernia size influence operative technique including mesh use for PUH, but age and sex do not. Most over 1cm in diameter are repaired with mesh. This suggests an opportunity for development of better guidelines to standardize mesh use for PUH.
An Evaluation of the Impact of Certified Ophthalmic Paramedic Program at a Large Charity Eye Hospital in Delhi, India
Vimal S. Konduri

Background:
Vision loss is a major healthcare issue in India, largely driven by lack of access to care. The Certified Ophthalmic Paramedic (COP) Program based at Dr. Shroff’s Charity Eye Hospital (SCEH) in Delhi began in 2014 to train young women from Delhi and rural North India to become COPs through a free two-year program. Afterwards, COPs work at SCEH facilities in their home communities. The COP program aims to improve the reach and quality of care at SCEH, and to advance the COPs’ socioeconomic mobility and gender equity.

Objective:
This study examined the impact of COP program on COPs, their families, and on delivery of care at SCEH. Socioeconomic and confidence-related impact was given special attention.

Methods:
A mixed-methods approach was employed. COPs from Delhi and 5 SCEH secondary centers in outlying areas who completed training at least 1 year prior were considered, including those not currently employed by SCEH. All answered a “before” and after” questionnaire, which reflected their previous and current thoughts and circumstances. Questionnaires addressed socioeconomic status, gender equity, healthcare choices, and confidence. Qualitative interviews were administered to some subjects and their family members.

Hospital data on the annual number of procedures and screenings conducted was used to assess the impact of the COP program on delivery of care.

Results:
53 of 69 eligible COP subjects were included in the study. Additionally, 18 family members of 16 COP subjects were interviewed. Preliminary analysis showed significant (p<0.05) increases between before/after questionnaires in ownership of several asset classes, including mobile phones (p=0.00014), computers (p=0.01), cooling appliances (p=0.016), scooters, and refrigerators. At secondary centers, surgery volume increased by 164% and outpatient visits increased by 109% between 2013-14 and 2016-17. Overall surgery volume at SCEH increased by 62% and number of patients screened increased by 64% over same period. Additional analyses of questionnaires and interviews is currently ongoing.

Conclusion:
Participation in the COP program was associated with significant increases in ownership of several classes of household assets, used as a proxy for economic status. Further analysis will better determine the program’s socioeconomic impact. Patient volumes at SCEH increased substantially after the COP program began. Further analysis is needed to correlate COP employment at SCEH with these increases.
Background and Significance

Atherosclerosis is the key pathological process underlying myocardial infarction, stroke, unstable angina, and sudden cardiac death. Together, these so called “cardiovascular events” continue to be the leading cause of morbidity and mortality worldwide. Atherosclerosis is a progressive inflammatory disease of the arteries that ultimately results in the deposition of plaques within the vessel wall. Plaque deposition narrows and stiffens the vessel wall leaving it susceptible to the aforementioned cardiovascular events.

The chronic low-grade inflammation underlying atherosclerotic plaque development is largely mediated by small signaling proteins called cytokines. And while cytokines have been implicated in the pathobiology of atherosclerosis, the exact mechanisms by which they regulate inflammation and the progression of plaque deposition are not well understood. Thus, further examination of the specific roles of cytokines in these processes, as well as their potential utilization as biomarkers for assessing the progression of atherosclerosis, is of great clinical interest.

Objective

Our hypothesis is that mice fed a high fat diet will have higher levels of inflammatory cytokines and/or lower levels of anti-inflammatory cytokines compared to mice fed a normal diet. Additionally, ApoE-/- mice, which have a genetic predisposition for plaque development, will have higher levels of inflammatory cytokines and/or lower levels of anti-inflammatory cytokines compared to wild type mice.

Methods

Diet regulation: ApoE-/- and wildtype animals were split into two feeding groups: a normal diet group and a high fat diet group.

Organ and plasma collection: Carotid arteries, aortic arch, and other relevant organs were collected for analysis.

RNA extraction: performed using Ambion RNA isolation kit.

cDNA synthesis: performed using MMLV reverse transcriptase

RT-PCR: performed using primers specific for each cytokines and Taq polymerase.

Results

All control and animals have been euthanized. Aorta, carotid arteries, and brains, and peripheral organs were dissected. We have obtained tissue sections for histochemical analysis. Total RNAs are extracted. We are in the process of analyzing tissues and serum for changes in cytokine gene expression. Tissues are fixed and will be used for IHC analysis in the coming months. Initial RT-PCR analysis has revealed changes in the expression of certain cytokines between experimental groups, but these results need to be further validated.

Conclusions

No definitive conclusions can be made at this time.
We have successfully completed the normal and high fat diet feeding studies. All the tissues have been harvested for IHC, RNA and protein analysis. Our initial experiments indicate important changes in some inflammatory cytokines in high fat diet fed and APOE-/- animals. Further studies are needed to determine the role of cytokines/adipokines in atherosclerosis progression.
Consequence of an Early Catheter Intervention to Treat Pulmonary Artery Stenosis in a Swine Model of Congenital Heart Disease.

Carolina M. Larrain

**BACKGROUND:** Pulmonary artery stenosis (PAS) is a common complication following early surgery for congenital heart disease (CHD) and is associated with significant morbidity and mortality. PAS causes disproportionate blood flow to the lungs, impeding normal development of the vasculature and the lung parenchyma. The effects of PAS are most pronounced when occurring within the first years of life, as this is a period when PA development is dependent on normal pulsatile blood flow. New intravascular stent technologies have been developed that are being used to treat PAS in small children. The anatomic and physiologic consequences of early stent interventions to treat PAS have not been defined.

**OBJECTIVE:** To characterize the anatomic and physiologic consequences of early stent interventions to treat PAS in a swine model of CHD.

**METHODS:** 6 piglets (5.5 Kg) underwent surgery at 2 weeks of age to create left PAS. The intervention group (n=3) underwent stenting of PAS at 4-6 weeks with stent dilation at 12 weeks. At 20 weeks (52 kg) all animals: sham control (n=3), stenosis control (n=3), and interventions (n=3) underwent right heart catheterization at rest and stress (5 µcg/kg/min dobutamine), PA angiography and the lungs were harvested for histologic analysis.

**RESULTS:** Right ventricle (RV) and main PA pressures were increased at rest and with dobutamine in stenosis controls compared to normal RV/PA pressures for the sham and intervention animals. Left PAS pressure gradients were 0 mmHg in sham animals, 7-8 mmHg for interventions at rest and with dobutamine and 24-39 mmHg in stenosis controls. There were no differences between groups in heart rate, cardiac output, or stroke volume at rest and with dobutamine. Angiography demonstrated the main LPA diameters were diminished in intervention animals compared to shams but were larger compared to stenosis controls. Diameters of 1st order distal LPA and RPA branches in the intervention group were similar to shams and consistently larger than diameters for stenosis controls. Qualitative histologic analysis demonstrates septal and bronchiole arteriole smooth muscle hyperplasia. Alveolar quantification is ongoing.

**CONCLUSIONS:** Early stent intervention to treat PAS in this swine model of CHD was associated with normal RV/PA pressures and improved growth of the distal PA vasculature, yet PA growth and preliminary histology differed from shams suggesting investigation of alternative therapies for PAS is warranted.
BACKGROUND: Glioblastoma (GBM) is the most lethal form of primary brain cancer and the prognosis of GBM remains poor. Recently, tumor treating field therapy (TTF) has been shown clinically to benefit GBM patients and was therefore FDA approved. TTF uses low intensity, alternating intermediate frequency electrical field to disrupt cell division. TTF interrupts microtubules dipole alignment during mitosis which induces cell cycle arrest and apoptosis. Additionally, Depatuxizumab Mafodotin (ABT-414) is an investigational monoclonal antibody targeted towards epidermal growth factor receptor (EGFR) that releases cytotoxic material when inside cancer cells. It is thought that these two treatment modalities in combination can lead to less side effects and added survival when compared to traditional chemotherapy, especially in cells that have increased levels of EGFR.

OBJECTIVE: Based on previous evidence of the efficacy of TTF and the mechanism of ABT-414, we hypothesize that the combination of TTF and ABT-414 will show greater growth inhibition of glioblastoma stem-like cells in cell lines that express increased levels of EGFR as compared to cell lines that express standard levels of EGFR.

METHODS: These studies utilize the Inovitro TTF therapy laboratory unit and refrigerated incubator to counter the heat generated by the TTF system. In this study we investigated in increasing the incubator temperature and thus lowering the TTF strength would alter GBM proliferation. We also examined which frequency was the optimal frequency with the temperature set at 20°C. Next we establish which cell lines expressed EGFR for future testing of this novel therapeutic combination.

RESULTS: Multiple GBM cells were able to be cultured. TTF therapy still resulted in decreased proliferation of GBM cells with the incubator temperature set at 20°C. The optimal TTF frequency for the treatment of GBM cells under these culture conditions is 200kHz, which is the frequency used in clinical practice. Additionally, both EGFR expressing and non-expressing GBM cells were identified.

CONCLUSIONS: These initial findings provide the foundation to continue experimentation and progress towards conducting studies using TTF and ABT-414. It is with evidence supporting our hypothesis that more treatment options may become available for patients suffering from this aggressive cancer.
Critique of American Academy of Pediatrics' Policy Statement on Youth Tackle Football

Alec P. Lerner

BACKGROUND: Growing concerns about the short and long-term effects of repetitive head trauma and concussions have sparked a national discussion about safety in youth tackle football. In 2015, the American Academy of Pediatrics (AAP) published an official policy statement which reviewed the scientific literature and gave recommendations on the issue.

OBJECTIVE: This is a critique of the AAP policy statement on youth tackle football, particularly its reliance on informed consent as a rationale for participation. We review the current controversy about youth football; identify ten problems with the statement; and propose a draft consent form.

METHODS: We searched electronic databases including MEDLINE, PubMed and SPORTDiscus for meta analyses, systematic reviews, and primary literature on football-related injuries and outcomes, especially concussion/mild Traumatic Brain Injury (mTBI), as well as the ethics and process of informed consent.

RESULTS: Compared with other youth sports and activities, tackle football carries an inherent and disproportionate risk for injury, particularly mTBI and sub-concussive trauma leading to varying degrees of short and long-term neuro-cognitive sequelae. Problems with the AAP statement include the following: no standards for information content or assurance of adequate comprehension; inadequate information available to make an informed decision or perform meaningful risk/benefit analysis; lack of clarity regarding who is expected to give informed consent for participation and failure to address inherent challenges regarding informed consent in pediatric populations; language issues surrounding mTBI and conveying risks; inconsistencies in AAP policy statements and recommendations.

CONCLUSION: The current reliance on informed consent as a rationale for participation in youth football is problematic. The identified issues need to be addressed if informed consent is to be meaningful in this context. We hope our paper stimulates discussion which will affect the AAP’s forthcoming policy review and revised statement, expected in 2020.
One vs Two Diagnostic Nerve Blocks in Radiofrequency Ablation and the Cost-saving Implications.

Michael Loebertman

BACKGROUND: Radiofrequency ablation (RFA) of nerves is a procedure used to treat chronic pain that is refractory to other treatments. The procedure involves placing an insulated needle adjacent to a nerve using fluoroscopy as guidance. Then, a current is passed through the needle which raises the temperature of the tissue melting the nerve. This disrupts the conduction of pain signals up the nerve which gives the patient relief from their pain. Prior to using this destructive technique, a physician must ensure that the target nerve is truly conducting the pain signals. This is done by using a nerve block. If the patient gets pain relief from the nerve block, it is reasonable to continue with the more permanent RFA procedure. Many insurance companies require, and many professional societies advocate for two of these diagnostic nerve blocks to be done prior to the RFA procedure. This requirement has significant cost implications on the procedure; the cost of a single nerve block is nearly $700. The cost of the RFA is roughly twice that. For these blocks to be cost effective, they would need to exclude 50% of patients from RFA. Our study was a retrospective chart review to analyze the percentage of patients that passed their first block but failed their second block. That is, how often does this second block exclude patients from the RFA procedure.

OBJECTIVE: Our hypothesis was that a second diagnostic block does not add enough information to be a cost-effective method for patient selection, as evidenced by the percentage of patients that failed the second block after passing the first.

METHODS: The charts of all patients receiving RFA at UW-Health’s clinics and hospitals between June of 2014 and June of 2018 were reviewed (N=496). From the charts, data was added to an excel database to facilitate easy analysis. Variables collected included: age, sex, the site of RFA, results of the RFA procedure, which nerve blocks were performed, and the results of the nerve blocks.

RESULTS: The analysis of the database yielded a result that supported our hypothesis: of the patients who passed their first block, only 10.9% of patients failed their second block.

CONCLUSIONS: With only 10.9% of patients failing their second block, these blocks are ultimately fruitless in aiding in the selection of patients for RFA. This provides evidence that these nerve blocks have been a misuse of healthcare resources and has significant cost-saving implications.
Does Daily Self-Weighing (DSW) Compared To Routine Care Impact Postpartum Weight Loss?

Ali N. Lohr

BACKGROUND: Gestational weight gain which is not lost during the postpartum (PP) period contributes to obesity among reproductive-aged women. Interventions utilizing internet based programs, eHealth technologies, text messages, or social media have demonstrated promise in promoting PP weight loss. In the non-obstetric population, DSW also demonstrates efficacy in promoting weight loss.

OBJECTIVE: This study examined the impact of remote patient monitoring (telehealth (TH)), inclusive of DSW on PP weight loss compared to routine care.

METHODS: This was a secondary analysis of dataset comprised of 428 PP women, all of whom had been diagnosed with hypertensive related disorders in pregnancy (HTN). In the parent non-randomized controlled trial, participants were allocated in a 1:1 concurrent manner to either TH monitoring versus routine care. Participants in the TH arm received a tablet device, a Bluetooth enabled scale and BP equipment. The purpose of the TH was to monitor BP; weight and weight related messages were not part of the intervention. The only intervention difference with respect to weight loss was daily self weighing. Participants were instructed to perform DSW in addition to BP monitoring. The amount of PP weight lost was compared, and the trend of PP weight loss was also assessed among women completing DSW.

RESULTS: 214 TH participants and 214 controls were included in the analysis. Demographic variables were similar between groups except that TH participants had more severe HTN disorders and were more likely to have undergone CD. The mean weight loss from the time of delivery to the 6 week PP visit for TH participants utilizing daily self-weighing was $\bar{x} = 22.72$ (SD 10.5) lbs, while the control group lost an average of $\bar{x} = 22.83$ (SD 11.4) lbs (p 0.92). PP weight loss for DSW participants is shown in Figure 1.

CONCLUSION: In this study, weight loss among women with HTN discharged with TH utilizing DSW in the immediate 6 week postpartum period was not statistically different than women with HTN discharged with routine care. Thus, DSW alone may be insufficient to promote postpartum weight loss. Prior studies examining the impact of DSW also typically included regular weight-loss or healthy eating-promoting messages, whereas this study's health messages and counseling were exclusively related to HTN management. Future studies utilizing TH may consider including healthy eating or activity-promoting messages in order to promote postpartum weight loss.
Correlation of Self-Reported Depressed Mood Using Telehealth and 6-Week EPDS in Postpartum Women with Hypertension

Ali N. Lohr

BACKGROUND: Postpartum depression is a common complication in the postnatal period, affecting approximately 13% of women. The Edinburgh Postnatal Depression Scale (EPDS) is commonly administered to postpartum patients.

OBJECTIVE: To determine if a depression screening question administered via telehealth (TH) correlates with rates of postpartum depression (PPD) captured at the 6-week postpartum visit (EPDS)

METHODS: This was a secondary analysis of a TH program for a postpartum hypertension: non-randomized control trial. TH patients were asked twice weekly for 6 weeks if their mood “has been more depressed this week compared to a normal week,” along with taking routine vitals. The controls received routine care after discharge, which included an EPDS questionnaire at the 6-week postpartum visit. EPDS scores were collected from the EMR at the visit for all study participants.

RESULTS: 214 TH participants and 214 concurrent controls were included in this analysis. Maternal demographics were similar between groups, though TH participants had more severe HTN disorders and were more likely to have undergone CD. Among both groups, the rate of a previous mental health diagnoses was similar at 32%. During postpartum week 1, 29 (16%) participants reported a more depressed mood based on the TH screening question. These rates decreased weekly, with only 3 (5%) participants reporting depressed mood by week 6. This did not correlate well with the 6-week EPDS in which 22 (12.7%) of TH patients screened positive. However, among TH participants and controls, depression scores based on the 6-week EPDS were similar with 22 (12.7%) and 20 (12.4%) screening positive, respectively. At 6 weeks postpartum, the most commonly reported depression symptoms based on the EPDS were feeling anxious, worried, self-blame, and “things getting on top of me.”

CONCLUSION: Utilizing the EPDS, our rates of depression in women with diagnosed hypertensive disorders during pregnancy are similar to national postpartum rates at 13%. Our results demonstrated that depressed mood is most common during the first week postpartum. Self-reported depressed mood may not predict actual depression. However, TH could provide a promising approach in identifying PPD earlier by utilizing more sensitive questions based on EPDS commonly reported feelings, prompting earlier intervention and treatment. This is an approach that warrants future investigation.
Pain Assessment Following Adductor Canal Block in Total Knee Arthroplasty with Liposomal Bupivacaine or Standard Bupivacaine

Bradley Maerz

Background: Effective postoperative analgesia is crucial in the recovery of patients undergoing total knee arthroplasty (TKA). The neuroendocrine stress response to pain is implicated in delaying recovery and delaying discharge from the hospital. Adductor canal nerve blocks are commonly used in TKA and are associated with improved patient satisfaction and improved recovery. Liposomal bupivacaine (LB) is a newer formulation of bupivacaine that is designed to prolong the duration of action.

Objective: Evaluate the impact of LB compared with a standard bupivacaine (SB) formulation for adductor canal blocks in TKA on pain.

Methods: We performed a randomized, double-blind, clinical trial at UW Health American Center. Subjects undergoing elective unilateral TKA who were eligible were invited to participate. Eligibility criteria included: age ≥ 18 years and ≤ 80 years, weight between 65-130 kg, and subject’s primary anesthesia care team has planned for a neuraxial anesthetic. Subjects were randomized to receive either LB or SB for an adductor canal block. Baseline characteristics were obtained. VAS pain scores were assessed preoperatively, and at 24, 48, and 72 hours postoperatively.

Results: 63 subjects were enrolled in the study with 32 in the SB group and 31 in the LB group. One patient was derandomized and not included in the results due to concern among our surgical colleagues following a postoperative fall. There were no significant differences in baseline characteristics (age, sex, BMI, range of motion) between groups. The mean pre-op pain at rest was 1.1 (±1.9) for SB and 1.1 (±1.5) for LB (P=.99). The mean pain at rest for day 1, 2, and 3 for SB and LB are 2.2 (±2.2) and 2.0 (±1.8) (P=0.64), 3.4 (±2.7) and 2.6 (±2.1) (P=0.16), and 3.0 (±2.5) and 2.1 (±2.1) (P=0.11) respectively. The mean pre-op pain with activity was 5.7 (±2.2) for SB and 4.9 (±2.4) for LB (P=.19). The mean pain with activity for day 1, 2, and 3 for SB and LB was 4.5 (±2.4) and 4.1 (±2.3) (P=0.53), 5.9 (±2.6) and 4.4 (±2.0) (P=0.009), and 5.0 (±2.3) and 4.5 (±2.2) (P=.368) respectively. Median duration of hospital stay was 1882 (range 1566-3600) minutes for SB and 1923 (range 1544-4724) for LB (P=0.53)

Conclusions: Liposomal bupivacaine shows a modest benefit in pain control compared to standard bupivacaine on the second postoperative day that dissipates by the third day. Improved pain control has the potential to improve recovery in these patients.

Works Cited:

Characterization of Toll-like receptors in human vocal fold tissue and human epithelial cells
Alexandra Mechler-Hickson

**Background:**
The larynx is of vital importance in humans, contributing to breathing, swallowing, and phonation. It is uniquely positioned at both the junction of the respiratory and GI tracts and the immunological boundary between the upper and lower respiratory systems. The vocal folds (VF), located in the larynx, are exposed to an array of inhaled and ingested challenges. There is evidence that cells in the VF play a role in responding to these challenges: toll-like receptors (TLR) 1-6, 8 and 9 have been found in VF fibroblasts, the primary cell type of the lamina propria. Also, the majority of VF diseases are inflammatory in nature and have large economic and social consequences for patients.

**Objective:**
Despite the importance of the VF, and the inflammatory etiology of much of VF disease, mechanisms of host immunity in the larynx are ill-defined, and treatment of these disorders is largely empiric. We worked to characterize TLR1-9, integral receptors in the innate immune system, in murine VF tissue and in human VF epithelial cells.

**Methods:**
To localize TLR1-9 in murine VF tissue, excised larynges were coronally sectioned and processed for immunohistochemistry. Primary antibodies against TLR1-9 were used, with an α-IgG secondary and diaminobenzidine as a staining agent. Transcript levels of TLR1-9 were investigated in immortalized human VF epithelial cell lines. Cells were at a density of 1.5E5/mL and grown to near confluence. Cells were then treated with or without 5µg/mL LPS for 24 hours in wells intended for RT-PCR, and with or without 5µg/mL LPS for 8 hours in wells intended for ELISA analysis of IL-8, a downstream product of TLR activation. Staining, RT-PCR and ELISA were performed in biological and technical triplicate with positive and negative controls.

**Results:**
TLR1-9 were found in the epithelial cell layer of VF. At the time of abstract submission results are ongoing, but we expect to find TLR1-9 in VF epithelial cells, with decreased expression for TLR6 -7. When treated with LPS we expect to find increased TLR expression and IL-8 levels, similarly to prior work in VF fibroblasts.

**Conclusion:**
This study localized TLR1-9 in VF epithelium. Exploring this, and how TLR expression and downstream cytokine activation differs between normal epithelial cells and those exposed to inflammatory stimuli, better elucidates how laryngeal epithelium responds to the variety of insults it is exposed to and may provide targets for treatment of airway disease.
Disparities in Gynecologic Cancer Prevention Referral Patterns: 
Promoting health equity and process change
Laura Miller

BACKGROUND: Gynecological cancer inequalities in health care among different socio-economic, ethnic, and racial groups have been well documented in the U.S. Wisconsin’s incidence of cervical cancer is 5.7 for white non-Hispanic women, compared to 9.1 in Hispanic women and 13.3 in African American women. Share the Health (STH) serves as a referral center for gynecological consults and procedures for uninsured women in South-Central Wisconsin. The care provided helps to promote health equity and reduce these disparities in health outcomes including gynecologic cancer prevention and early cancer diagnosis. However, few African American patients are referred to STH, the group with the highest cervical cancer rate statewide.

OBJECTIVE: To identify disparities in referral patterns for gynecologic health problems that may impact differences in gynecologic cancer rates.

METHODS: As part of an inclusive study of the barriers to access in gynecologic care, this was a retrospective review of population data regarding demographics and insurance status. Data was collected from two major referral sites to STH and compared to data from STH. Statistical analysis will identify significantly underrepresented groups amongst patients at STH compared to our referring clinics and University of Wisconsin Hospital and Clinics.

RESULTS: Since 2014, STH has seen 359 patients, of which 110 were referred for cervical/vulvar/vaginal lesions. Patients identifying as Hispanic at clinics referring to STH compose 29.5% of the patient population. Of these patients, 48.6% are uninsured. Additionally, those who identify as Caucasian make up 62.1% and of those, 23.6% are uninsured. African Americans make up 19.4% of the patient population, and of those, 15.7% are uninsured. When compared to the STH database, those who identify as Hispanic comprise 58.2%, Caucasian comprise 44.1% and African American comprise 4.94%. All patients at STH are uninsured.

CONCLUSION: Although initial results, disparities in referral patterns at STH, especially for patients who identify as African American are clear. It appears that the low number of African Americans seen at STH does not correlate with referral clinic demographics. Additionally, lack of insurance does not appear current barrier for African American women accessing gynecologic care in southern Wisconsin. Therefore, research to further investigate other barriers in this patient population are needed to improve access and clinic outreach at STH.
THE IMPACT OF INTRAOPERATIVE HEMODYNAMICS AND BLOOD LOSS ON RISK OF POSTOPERATIVE DELIRIUM

AUTHORS: Samantha Miller, Bryan Krause, Heidi Lindroth, Sara Twadell, Tyler Ballweg, Robert D. Sanders

DEPARTMENT: Anesthesiology, University of Wisconsin School of Medicine and Public Health

MENTOR: Dr. Robert D. Sanders, MD, PhD

SUPPORT: Shapiro Summer Research Program; Department of Anesthesiology

BACKGROUND: Post-operative delirium (POD) is a severe disorder occurring in up to 54% of major elective non-cardiac surgical patients. Presenting as disturbed consciousness and cognition, POD has been implicated in longer length of hospital stay, greater rates of 30-day readmission, and increased mortality. As no treatment exists, it is imperative to prevent POD as a surgical complication. Although no causal relationship has been established yet, we hypothesize that intraoperative hypotension and blood loss are associated with worse delirium severity. Through this research, we hope to gain better insight into the specific perioperative conditions which should be avoided to prevent POD.

METHODS: Patients over the age of 65 undergoing major elective non-cardiac surgery were consented to the study. Patients underwent pre-operative cognitive testing, including Trail Making Test B (TMTB), and an ACS NSQIP surgical risk score was calculated, both of which have been shown to predict POD. The Delirium Rating Scale-Total Score (DRS-TS) was used to determine delirium severity. Following surgery, DRS-TS assessment was performed twice daily until postoperative day 4 or until delirium resolved, whichever was longer. Intraoperative data was then extracted from the medical record and analyzed to determine the impact of intraoperative hemodynamics on DRS-TS.

RESULTS: Our cohort included 96 subjects with complete data. In a linear regression model including age, sex, TMTB, NSQIP, blood loss, and blood pressure, both blood loss (p=0.0012) and blood pressure (p=0.0035) were significant predictors of DRS-TS. However, a model also including operative time introduced substantial multicollinearity (variance inflation factor = 3.5) and neither blood loss (p=0.098) nor blood pressure (p=0.41) significantly improved model fit. A higher blood pressure threshold (40% under relative) was not significantly correlated with DRS-TS (adjusted R²=0.02) likely because few subjects incurred such decrease.

CONCLUSION: Our results indicate that both intraoperative blood loss and time spent 10% under the patient’s relative blood pressure provide predictive value of delirium severity in post-operative patients. However, these measures were highly correlated with operative time and were not predictive when operative time was considered. In the future, the relationship between delirium and larger deviations in intraoperative hemodynamics could be assessed in a larger sample of surgical patients.
School-based immunization as a method of increasing HPV vaccination rates among Wisconsin youth

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Mentor(s): Noelle LoConte, MD and Sarah Kerch, MPH
Institution and Department: Wisconsin Comprehensive Cancer Control Program

BACKGROUND:
For over 10 years, HPV vaccines have been recommended for adolescents and young adults as primary prevention of HPV infection and consequently, HPV-related cancers. Unfortunately, uptake of HPV vaccine has lingered below rates of other adolescent vaccines. Administering vaccine in schools is a unique strategy that has been adopted by some Wisconsin (WI) local public health departments (LHD) to raise coverage rates. While these programs are made possible by the federal Public Health Emergency Preparedness grant and vaccine procured at no cost from the Wisconsin Immunization Program, their scope and operational details are largely unknown.

OBJECTIVE:
To measure rates of school-based vaccination in middle and high schools by WI LHDs and gauge challenges for sustainability as perceived by program leaders.

METHODS:
In May 2017, exploratory interviews were conducted with 15 LHD immunization coordinators across WI. These interviews informed the design of a one-time internet survey sent to all 85 WI LHD administrators in July, 2017. The survey included items about current and past school-based immunization offerings, population served, staffing and financial support, and challenges encountered. Descriptive statistics and bivariate analyses were conducted using IBM SPSS Statistics 25.

RESULTS:
67 LHDs returned completed surveys (79% response rate). 36 LHDs (54%) reported currently providing immunizations in schools, 28 LHDs (42%) reported past participation, and only 3 LHDs (5%) had never participated. Among LHDs with current programs, 62% and 57% provided HPV vaccine to middle and high school students, respectively. The vast majority (83%) immunized all students regardless of health insurance status or type. Parental hesitation toward all or some vaccines and uncertain funding were the most common challenges reported by LHDs with current programs. LHDs with past involvement were most likely to cite burdensome workload for LHD staff, parental hesitation, and decreased need for school-based programs.

CONCLUSIONS:
WI LHDs have extensive experience providing vaccines in school settings and their involvement may be integral to future initiatives that increase coverage rates for HPV and other vaccines. During the 2017-2018 school year, State support for immunizations other than influenza has greatly decreased and new data is being explored to understand if and how LHDs have continued to provide HPV vaccine.
Evaluating Survivorship Care Plans for Use by Hematopoietic Stem Cell Transplant Survivors and Non-Transplant Clinicians: An Engineering, Primary Care, and Oncology Collaborative for Survivorship Health

Colleen M. Morken

**Background:** Survivors of hematopoietic stem cell transplants (HSCTs) face many chronic and late complications that pose challenges to future survivorship care. The provision and review of Survivorship Care Plans (SCPs) has been proposed as a method to improve knowledge of these complications as well as screening and treatment recommendations among survivors and their non-transplant clinicians.

**Objective:** Our objectives were to determine what content should be included in HSCT-focused SCPs for these diverse users as well as format and preferred timing of SCP provision.

**Methods:** Eligible HSCT survivors were >18 years and received a HSCT > 12 months ago. Non-transplant primary care and oncology clinicians were eligible if they provided care to HSCT patients. Those eligible were invited to complete a survey evaluating a HSCT-focused SCP with treatment summary data generated by an electronic health record (EHR). The survey utilized both 5-point Likert scales and open-ended questions.

**Results:** Survey response rate exceeded 80% (n=29/36 survivors; n=18/22 clinicians). Our survivor respondents were a median age of 59 (range 32-73), White (100%), mostly female (52%) and educated (52% held an associate degree or higher). Clinician respondents were predominately female (67%), White (78%) and providing primary care (56%).

Over 85% of survivors and clinicians perceived information about treatments received, recommended follow-up and health maintenance, survivor and clinician resources, graft versus host disease and other late/chronic side effects to be useful or very useful. The majority of survivors also found care team contact information useful or very useful.

Additionally, over 85% of survivors and clinicians agreed or strongly agreed that the SCP would improve follow-up care and increase their understanding of treatments and chronic/late side effects. Overall, 88% were satisfied with the SCP and found it understandable and easy to use.

All respondents indicated a desire to receive SCPs. Survivors (93%) prefer to receive the SCP as a paper document at the end of a regular follow-up, and most would like to receive the SCP immediately after transplant (70%) or two to three months after transplant (67%). Clinicians (89%) would prefer to receive the SCP through the EHR.

**Conclusion:** These results will help improve future HSCT-focused SCP templates to meet the needs of these users. Future work will include leveraging the EHR for creation and provision of SCPs with ease.

Alison M. Mueller

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BACKGROUND: The hip capsule is an important consideration in hip joint stability. As we become more adept at treating the pathology of the hip through arthroscopic techniques, our treatment of the hip capsule has evolved over the years. Entering and exiting the hip joint has become a balance between obtaining necessary visualization and preventing iatrogenic instability of the hip capsule. Inadequate visualization can lead to failed arthroscopic treatment. A balance must be considered between creating adequate visualization and access with capsulotomies but at the cost of compromising the integrity of the capsule. This component of capsular management is one of the more difficult aspects of hip arthroscopy. As hip arthroscopy has evolved over the years we have come to recognize the role of the hip capsule in post-operative stability and improved patient outcomes. While recent publications tend to favor capsule closure, it is not uniformly performed by all hip arthroscopists.

PURPOSE: The purpose of our study is to assess current trends in capsule management amongst hip arthroscopists, and to better understand the thought process that influences these decisions.

METHODS: We conducted our survey via the online platform, Qualtrics. The survey was distributed via email, contacting a list of surgeons compiled from literature searches on “hip arthroscopy” and surgeons self-identified as hip arthroscopists. The survey included 29 questions covering arthroscopy training, experience, practice volume, capsulotomy and closure technique, post-operative protocols, and complications.

RESULTS: 65 arthroscopists responded, 80% of which had fellowship training. Surgeon volume and experience ranged from 15 - 500 (median 150) cases each year and 1 - 32 (median 8) years in practice. Interportal capsulotomy was always utilized by 80% of surgeons, sometimes by 8%, and in cases of labral repair by 3%. Only 53% always closed the capsulotomy (average 3 sutures). 31% of surgeons utilize a T-capsulotomy, 78% of which always perform a repair (average 3 sutures). 14 surgeons reported recent changes in capsular management, 62% of which have begun closing more capsules or performing more robust repairs. There were 13 post-operative dislocations in 12 surgeons (18% of surgeons surveyed). The capsule was not repaired in 27% of dislocation cases.

CONCLUSION: This study suggests that the trends in capsular management amongst hip arthroscopists have reflected the improved outcomes with repair in recently published literature. Nonetheless, there is still a sizable portion of surgeons that elect not to perform capsular repair in their own practice.
Mineral-Coatings for mRNA-based Reprogramming in Nerve Grafts

Miguel A. Navarro

The main limitations of non-viral therapies are that they are very inefficient, can cause tissue damage, and are impractical due to the large injection volume needed. An ideal non-viral delivery method compared to current methods would: improve efficiency, reduce cytotoxicity, keep the therapy localized, and can be delivered in vivo. We hypothesize that transfecting using mRNA via mineral-coated microparticles (MCMs) will improve transfection efficiency, reduce cell cytotoxicity, and localize transfection.

We tested the efficiency of lipoplexes to bind to the MCMs, and the ability of the MCMs to aid in localized transfection of enhanced green fluorescent protein (EGFP) in vitro in human embryonic kidney cells (HEK293). Cell viability was characterized by using a resazurin reduction viability assay. We then characterized the transfection efficiency of mRNA-MCMs in vivo compared to mRNA alone in peripheral nerve grafts (PNGs).

We showed approximately 70% binding efficiency of lipoplexes to MCMs in vitro. In vitro, we showed that lipoplexes did not diffuse away from the MCMs, and GFP+ cells were confined locally. We showed significantly more cell viability by using MCM-mediated delivery of lipoplexes compared to soluble lipoplexes alone. In vivo, we showed increased transfection efficiency in neural tissue using mRNA-MCMs compared to lipoplexes alone.
Cancer Rates Are down Nationally: Are They down Where You Live?

Andrew Nguyen

BACKGROUND

This year’s Annual Report to the Nation on the Status of Cancer, released jointly by the Centers for Disease Control and other organizations, emphasized a decreasing trend in incidence for men and a stable trend in incidence for women, for all cancer sites combined and for each racial and ethnic group. The report also noted significant decreases in cancer mortality among both sexes for each racial and ethnic group. While encouraging, it is important to note that racial and ethnic disparities remain in the national data. Furthermore, U.S. cancer data by race and ethnicity varies geographically, and is subject to variation among subpopulations. This can result in significantly different rates and trend trajectories, signifying the risk that large population-level data can mask important information.

OBJECTIVE

The objective of this work is to underline the importance of observing cancer rates and trends locally to identify and monitor areas that vary from the national averages.

METHODS

Wisconsin cancer incidence and mortality rates (1995-2013) for Black and White populations, were collected from data publicly available through the Wisconsin Interactive Statistics on Health (WISH) Cancer Module. Similar national cancer data were collected from the National Cancer Institute’s publicly available database. Linear regression was performed to compare trends in state and national cancer incidence and mortality. Because of the difference in trend quantification methodology between state and national reports, the significance of trends could not be compared and thus were not included in the analysis.

RESULTS

Trends in female cancer incidence, while stable nationally among Blacks and Whites, were stable among Whites but increasing among Blacks in Wisconsin. For male cancer incidence, disparities in trends were closing between Blacks and Whites nationally, but the disparity persisted in Wisconsin. Female cancer mortality rates decreased nationally for both Blacks and Whites nationally, while remaining stable for Blacks and decreasing for Whites in Wisconsin. Male cancer mortality demonstrated decreasing trends both nationally and in Wisconsin.

CONCLUSIONS

Trends in cancer incidence and mortality between Blacks and Whites are improving nationally, but either persist or worsen in Wisconsin. As such, it is important to examine local cancer incidence and mortality rates to assist governments, cancer centers, and other stakeholders to focus their efforts on improving cancer incidence and mortality at the local level.
Exploring the Effects of Cytokine Administration on Liver Allografts During Normothermic Ex-Vivo Liver Perfusion (NEVLP)

Andre U. Obua

BACKGROUND: Liver transplant is the best treatment for liver failure. Normothermic Ex-Vivo Liver Perfusion (NEVLP) is an alternative to currently static cold storage techniques. Recently completed phase III trials have demonstrated that NEVLP perfused livers exhibit superior graft function and decreased early graft dysfunction when compared to cold stored livers. Additionally, NEVLP allows for the modification of the liver prior to transplant, which has potential to reduce graft rejection. Current immunosuppressant strategies have significantly decreased acute graft rejection, however chronic graft rejection remains a significant cause of morbidity in patients receiving liver transplants. Modification of the liver during NEVLP, through the addition of immunoregulatory cytokines, may provide a novel technique to decrease graft immunogenicity through the induction of donor regulatory T & dendritic (DC) cells.

OBJECTIVE: The objective of this experiment is to examine the effect of cytokine administration during NEVLP on donor allograft resident lymphocytes, and their effects on long term allograft survival.

METHODS: Male and female 10-12 week old Lewis rat livers will be removed in the standard fashion, and placed on a small animal ex-vivo liver perfusion apparatus (Harvard Apparatus). Rat recombinant IL-2 (20ng/mL), IL-10 (40ng/mL) and TGFβ (5ng/mL) will be added to the perfusion solution, and livers will be perfused for 12 hours through the hepatic artery and portal vein. NEVLP perfused livers without cytokines, cold stored and fresh livers will serve as controls. The effect of NEVLP on donor lymphocyte populations will be assessed using flow cytometry. To assess the effect of cytokine administration on allograft rejection, livers will be cultured with Brown Norway responders in a mixed lymphocyte reaction.

RESULTS: Due to delays in the delivery and installation of the NEVLP apparatus, we were not able to perform any experiments on NEVLP perfused livers during the allotted 10-week fellowship. During this time, we generated an 11-color flow cytometric protocol for assessing lymphocyte populations within the liver. Additionally, we optimized a protocol for the isolation and culture of primary rat hepatocytes for the mixed lymphocyte experiments.

CONCLUSIONS: NEVLP provides an attractive alternative to current cold storage techniques. We will continue to explore the utility of NEVLP and assess its potential to modify liver allografts by modifying the perfusate.
To Operate or Not: An Assessment of Operative Indication of Distal Radius Fractures Using X-Rays and CT Scan in the Same Patient
Tetyana Osadchuk

Background
There are multiple treatment options for management of distal radius fractures, including invasive and non-invasive procedures. The American Academy of Orthopedic Surgery (AAOS) has specific imaging recommendations for absolute indications of surgery and relative indications of surgery. To assess the fracture X-rays are routinely performed. However, computed tomography (CT) scans have been increasingly used and are seen to be more accurate in determining extent of injury. It has also been shown that surgeons tend to choose more invasive treatment modalities when evaluating CT scans as compared to X-ray. The purpose of this study is to better elucidate the reasoning behind different management modalities in the treatment of distal radius fractures and determine whether indications for surgical management change when evaluating X-ray versus CT scan.

Study goals and objectives
Our main objective is to determine whether practitioners who treat these fractures identify and consider different operative indications when evaluating X-rays versus CT scans. We hypothesize that increased operative indications will be cited when comparing X-rays and CT scans in the same patient. The results of this study will better delineate how CT scans influence decision-making in the management of distal radius fractures.

Methods
De-identified data was extracted from the UW Hospital EMR to find patients who had distal radius fractures and who had both X-rays and CT scans performed. 20 patients were selected based on post-reduction radial shortening, dorsal tilt, intra-articular displacement, or step off. De-identified X-rays and CT scans of these patients were extracted, the images were randomized into 40 slides and presented to four fellowship-trained hand surgeons at UW Hospital. For each case, surgeons were asked to determine whether, based on AAOS guidelines, an operative indication was identifiable in the image. They were then asked to select one of four management options for treatment: a) cast/splint immobilization, b) percutaneous K-wire fixation, c) open reduction and internal fixation with volar locking plate, d) external fixation or dorsal bridge plate fixation +/- supplemental K-wire fixation. Finally, they were asked to describe their reasoning for choosing each treatment option in free-form text.

Results/Conclusion
CT and X-ray images are currently being assessed by the four hand surgeons. Results and conclusions will be evident post data collection.
A Gap Analysis of Surgical Simulation Training in Medical Education for Students with Physical Disabilities

Kush A. Patel

Background
Within the past decade, medical schools are admitting an increasing number of students who are physically disabled. These students are finding success in adapting to the rigorous demands of medical school education and are establishing professional careers in numerous specialties (Stiens, 1987). At the same time, according to an Association of American Medical Colleges (AAMC) survey in September 2011, simulation has become one of the most prominent innovations in medical education over the past 15 years. Most hospitals and health profession training institutions have simulation equipment or simulation-based education programs. These technologies are used for teaching, practice and assessment of medical students. While there are tools and information developed to help institutions accommodate physically disabled students, there is no published information regarding the best practices of how medical schools can accommodate these students within their simulation-based curriculum, assessments, and evaluations. There is also very little described about how simulation can be used to assist learning for students with physical disabilities.

Objective
Our goals are to (1) develop a survey instrument, targeted to surgical clerkship directors, regarding the use of simulation in medical education for students with physical disabilities; (2) provide a description of how surgical clerkships accommodate physically disabled students within their simulation-based curriculum, assessments, and evaluations; and (3) to identify ways in which simulation is currently being used to enhance the learning of physically disabled students.

Methods
A literature review was performed. Semi-structured interviews were performed of key stakeholders at the University of Wisconsin School of Medicine and Public Health including the surgery clerkship program manager, medical school technical standards director, and the clinical simulation center manager. Conventional content analysis of the interview transcriptions was performed by an interdisciplinary group to identify salient themes. These themes were used to categorize and develop a survey tool.

Results
Review of interview transcriptions revealed themes that were used to develop a survey tool which features the following categories: structure of the program, simulation curriculum, simulation infrastructure, types of accommodations provided, attitudes and perceptions of clerkship directors, and barriers and limitations. A 21-question survey was developed. The survey is currently under review by the Association for Surgical Education Committee of Clerkship Directors. It will be sent to all surgical clerkship directors once approved.

Conclusions
The use of simulation to support the educational opportunities of students with disabilities is a multifaceted process. The results from our survey instrument will help inform medical education curriculum development by providing insight into the current strengths and challenges that surgical clerkship programs face.
Feeding Outcomes Following Mandibular Distraction Osteogenesis in Pierre Robin Sequence

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Background and Purpose: Newborn feeding difficulties are commonly associated with Pierre Robin Sequence (PRS). Mandibular distraction osteogenesis (MDO) is well-described as a treatment for the airway obstruction associated with PRS, but fewer data is available regarding feeding outcomes for infants after MDO. The purpose of this study was to evaluate short and long term feeding outcomes after infant MDO.

Methods: A retrospective study of infants who underwent MDO between 2012 and 2018 for a diagnosis of PRS under the age of 12 months was conducted. Demographic variables included gestational age at birth, associated pathology including cleft palate and other airway lesions, and associated genetic syndromes. Surgical variables included age at MDO surgery, age at removal of mandibular hardware, distraction distance, and duration of time the infant was intubated after surgery. Feeding-related variables included preoperative and postoperative feeding method, preoperative and postoperative reflux symptoms and use of reflux medications, and preoperative and postoperative weight percentile.

Results: 30 patients were identified who underwent MDO for Pierre Robin Sequence. 10 (33%) patients had an identified genetic syndrome. 24 (80%) patients had a cleft palate. Preoperatively, only 40% of patients were feeding completely orally. The majority had a nasogastric tube. 3 patients had a preoperative surgical gastrostomy tube (G-tube) placed. In the early postoperative period, patients were intubated for a median of 7 days (range 4-14 days), took their first oral feeding attempts at a median of 9 days, and 60% of the patients had transitioned to full oral feeds at discharge, a median of 14 days after surgery. Ultimately, 70% were able to progress to full oral feeding after discharge to home with a nasogastric tube in place. Mean weight percentile dropped from preoperatively (15.8%) to the time of distractor hardware removal (8.2%), but had increased significantly at the time of most recent follow up (25.7% at a median of 4.6 years). 33.3% of patients were on reflux medications preoperatively, compared with 53.3% on reflux medications post-operatively at hospital discharge.

After MDO, an additional 6 patients underwent G-tube placement for a total of 30% with a G-tube at any point. Patients who required G tubes were more likely to have an associated syndrome (55%) and only 1/9 patients were feeding orally preoperatively. Mean weight percentile was lower in this group preoperatively, at the time of hardware removal, and at the most recent follow up.

Conclusions: After MDO, patients were more likely to feed orally and long term follow up weight percentile increased, suggesting that MDO for PRS improves feeding and growth outcomes. Patients who required gastrostomy tube placement were more likely to have an associated genetic syndrome and lower weight percentiles. This data may help to predict which patients will require additional feeding support.
Predictors of chronic post-operative shoulder pain
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Background
Persistent post-surgical pain remains a major problem. Patients receiving an operation on the shoulder or upper arm experience a greater persistence of pain than those receiving operations on any other part of the body. Little is known about pre-operative predictors of post-operative pain following non-joint replacement shoulder operations. A better understanding of who is most likely to benefit from shoulder operations is imperative to optimizing treatment plans for those with shoulder disability and pain.

Objective
This prospective study attempts to determine predictors of greater pain following non-joint replacement shoulder surgeries. We hypothesized that higher pre-operative scores on kinesiophobia, pain catastrophising, and neuropathic pain are predictive of greater post-operative pain following non-joint replacement shoulder surgeries.

Methods
We recruited patients aged 18 and over undergoing a non-joint replacement shoulder operation. At their preoperative appointment, patients completed the Short-Form McGill Pain Questionnaire-2 (SF-MPQ-2) to assess severity and quality of pain, the painDetect Questionnaire (PDQ) to screen for neuropathic pain, the Tampa Scale of Kinesiophobia (TSK) to assess fear of movement and fear-avoidance beliefs, and the Pain Catastrophising Scale (PCS) to gauge rumination, magnification, and pessimism. All four of these questionnaires were completed again postoperatively three months after their operation.

Results
Seventy-eight patients have completed the pre-operative survey and 32 have completed the post-operative survey. Between groups, median visual analog scale (VAS) pain scores dropped from 40/100 to 12/100 (p<0.001). Average kinesiophobia scores dropped by 8% preoperatively to postoperatively (p<0.001). No significant changes in scores were observed in pain catastrophizing or neuropathic pain; however, preoperatively, 5.1% of patients likely had a neuropathic pain component and 21.7% possibly had a neuropathic pain component. None of the scales were found to have preoperative predictive value with respect to postoperative pain.

Conclusion
Small sample size is the major limitation of this study. One interesting finding is the prevalence of neuropathic pain, a component of pain gaining more appreciation in the field. Moving forward, we will continue to enroll patients and follow up with patients to collect post-operative survey scores.
Postoperative Pain and Opioid Use in Total Knee Arthroplasty Using Liposomal Bupivacaine Versus Bupivacaine for Adductor Canal Block

Haley A. Probst

**Background:** Amid the opioid epidemic impacting and claiming the lives of people across America, there is a great push in healthcare to effectively control pain with less opioids. Postoperative pain management is a target for alternative methods of pain control because treatment of this pain serves as an initial exposure to opioids and a potential route of establishing dependence. In the setting of a total knee arthroplasty (TKA), peripheral adductor canal blocks using bupivacaine are a widely accepted standard of care to lessen the need for opioids. Currently, the reduction of opioids used is limited by the duration the nerve block lasts. This led to a reformulation of bupivacaine that may provide longer lasting analgesia and be an alternative to continuous infusion techniques; it is a slow release formulation called liposomal bupivacaine (LBP). Objective: This study evaluates the effect of LBP on postoperative pain and opioid use compared to the standard of care, bupivacaine.

**Methods:** Our study was a prospective, single-center, double blind, randomized control trial with recruitment of 63 subjects scheduled for TKA at The American Center. Subjects were evaluated prior to their nerve blockade for baseline pain at rest and with activity in the operative knee. The adductor canal block was placed using the randomly assigned drug, either LBP or bupivacaine. Follow up was completed at 0, 24, 48, and 72 hours postop to assess pain at rest and with activity, opioid consumption, and overall satisfaction.

**Results:** Pain at rest between those given Bupivacaine and LBP did not reach significance at any time point but trended toward LBP recipients having less pain over time. At 48 hours, pain with activity reached significance ($p=.009$) with LBP recipients having less pain than Bupivacaine recipients. The number of subjects in each group taking opioids did not reach statistical significance but trended toward it. At 72 hours post op, 93.8% of the bupivacaine group took opioids compared to 76.7% of the LBP group ($p$ value=.077). At 24 and 48 hours postop, subjects that received LBP had taken a significantly lower morphine equivalent than those that received Bupivacaine (at 24 hours $p=.02$, at 48 hours $p=.016$)

**Conclusion:** LBP reached several significant measures indicating it lessens opioid use postoperatively. Lessened opioid use maybe on the order of a few tablets of oxycodone or hydrocodone but perhaps is significant in lieu of the opioid epidemic.
Dynamic Assessment of Cardiac Metabolism and Function using PET/MR with Continuous FDG Infusion

Razalan, Mary Grace Francheska; Centanni, Ryan; Barton, Gregory P; McMillan Alan B; Goss, Kara N

BACKGROUND: We recently demonstrated the feasibility of simultaneous assessment of cardiac contractile function and metabolism in an animal model via positron emission tomography/magnetic resonance imaging (PET/MRI) with continuous $^{18}$F-fluorodeoxyglucose (FDG) infusion. This novel cardiac imaging technique has the potential for revealing early shifts in cardiac metabolic reserve while also examining their relationship with cardiac mechanics.

OBJECTIVE: To determine feasibility of utilizing continuous FDG infusion in humans to assess real-time response to cardiac stressors.

METHODS: Subjects underwent standard cardiac MRI while receiving continuous FDG infusion for 60 minutes, with the first 15 minutes in normoxia ($\text{FiO}_2 = 0.209$) followed by 45 minutes in hypoxia ($\text{FiO}_2=0.12$). Contractile response was assessed by standard MRI volumetric analysis. For PET analysis, 3D regions of interest (ROIs) were drawn over the left ventricle, paraspinal muscles, right hepatic lobe, and blood pool. Average ROI values were extracted to develop time-activity curves, which were used to quantify the uptake ($K_i$) in tissues of interest using Patlak analysis. A paired t-test was used to compare changes from normoxia to hypoxia.

RESULTS: Eight subjects were scanned. Hypoxia resulted in mild hemodynamic changes, with an increase in heart rate, mean arterial pressure, and cardiac indices determined via MR analysis. PET analysis demonstrated expected shifts in glucose uptake and metabolic activity in all regions of interest. On average, myocardium $K_i$ increased by $75.7\pm42.1\%$ ($p=0.5$), consistent with previous reports of increased glucose utilization in the literature. Liver showed an $85.3\pm6\%$ ($p=0.04$) decrease in $K_i$ during hypoxia, suggesting active gluconeogenesis. Similarly, skeletal muscle $K_i$ decreased by $81.0\pm5\%$ ($p=0.01$).

CONCLUSION: Simultaneous PET/MR with continuous FDG infusion captures real time changes in cardiac contractile activity and metabolism. Further investigation to refine this novel, noninvasive modality will be useful to study early shifts in cardiac metabolism and reserve, which may precede development of cardiac dysfunction.
Outcomes of Norovirus Diarrheal Infections in Kidney Transplant Recipients: a Single-Center Retrospective Study
Stacey C. Rolak

BACKGROUND: Infections are a significant cause of morbidity and mortality following kidney transplantation. Several studies have identified Norovirus (NV) diarrheal infections and Clostridium difficile (CD) infections as important causes of post-transplant infection. However, there is limited information on the causative factors and complications of diarrheal infections in KTRs.

OBJECTIVE: In this study, we aimed to better elucidate the risk factors and outcomes associated with NV diarrheal infections.

METHODS: We examined KTRs transplanted at our center between 01/01/1994 to 12/31/2014 who suffered from NV or CD infection-related diarrhea. Those who suffered NV or CD infection were matched with controls randomly selected from surviving recipients without these infections to that point in time with a 5:1 ratio.

RESULTS: Of the 2,112 KTRs eligible for analysis, there were 66 cases of NV, 286 positive control cases of CD, and 1,760 negative controls. In univariate competing-risks regression, censoring for KTRs who did not develop any infection, race, gender, induction immunosuppressives, prior transplantation, the cause of ESRD, age, and living donor transplantation were not significantly associated with an increased risk of developing NV infection. The median uncensored graft survival post-NV infection was similar to the CD group (NV 497.5 days vs. CD 440 days) but considerably shorter than the negative control group (1,271 days). Mean estimated glomerular filtration rate (GFR) was higher in the control groups than the NV or CD groups for 9 months post-infection. Overall graft failure and patient mortality occurred at a higher frequency in the CD group than the NV or negative control groups (graft failure: 64% CD vs. 39.4% NV vs. 38.8% control, p<0.001; mortality: 52.4% CD vs. 21.2% NV vs. 27.3% control, p<0.001). Cox proportional hazard regression observed similar graft and patient survival between the NV group and the negative control group (graft failure: HR 1.23; CI 1.0, 1.52; p=0.054). CD was also associated with detrimental outcomes as compared to the negative control group (graft failure: HR 2.41; CI 2.01, 2.90; p<0.001, patient mortality: HR 2.80; CI 2.29, 3.41; p=0.001).

DISCUSSION: Both NV and CD infections have detrimental effects on graft survival and allograft function post-transplant. Providers should be aware of these effects in transplant patients, as early prevention and management of these infections may prolong graft survival.
Optimization of a multi-color flow cytometry immunophenotyping panel for T cell biomarker discovery in canine metastatic melanoma

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BACKGROUND: Malignant melanoma is usually incurable once metastatic to distant sites. Recent data demonstrate improved clinical outcomes in human metastatic melanoma patients following treatment with immune checkpoint blockade (e.g., anti-PD1). An unmet need is a strategy to identify in vivo anti-melanoma T lymphocyte populations in peripheral blood mononuclear cells (PBMC) from these patients following treatment with immune checkpoint blockade. Canine malignant melanoma has been shown to be an appropriate pre-clinical model for treatment of human melanoma, and a caninized anti-canine PD1 monoclonal antibody for in vivo treatment of canine melanoma has been developed. This study aimed to develop a flow cytometry panel to characterize T cell subsets and their activation status in canines (CD3, CD4, CD8, CD45RO, CD62L, Bim, and PD-1) for future use in a canine immunotherapy trial.

OBJECTIVE: To develop a flow cytometry panel for T cell subsets and T cell activation markers in canine melanoma.

METHODS: Peripheral blood samples were obtained from four healthy companion canines from which PBMC were isolated. PBMC were stained with fluorescein-conjugated anti-canine or cross-reactive monoclonal antibodies to CD3, CD4, CD8, CD45RO, CD62L, Bim, and PD-1 for 30 minutes at 4°C and then fixed with paraformaldehyde. Antibodies were diluted in 1X phosphate-buffered saline containing 1% fetal bovine serum and titrated to identify optimal concentration based on positive and negative population staining resolution and stain index statistics. Dead cells were excluded by the live/dead indicator Zombie Red. No less than 250,000 cells per titration point were used for markers with predicted low expression (PD-1, Bim, CD62L). For markers with higher expected expression (CD3, CD4, CD8, CD45RO), a minimum of 100,000 cells per titration point was used. Data were acquired on a BD LSRII flow cytometer and analyzed with FlowJo software.

RESULTS: Antibody titrations were performed to detect candidate T cell subsets and T cell activation markers in the canine. The optimized antibody dilutions were: Zombie Red (1:400), CD3 FITC (1:10), CD4 Super Bright 645 (1:40), CD8 eFluor 450 (1:40), CD45RO BD Horizon BB700 (1:80), CD62L DyLight 350
(unable to assess), Bim PE (1:400), and PD-1 Alexa Fluor 647 (unable to assess).

**CONCLUSIONS:**
Data support the use of CD3, CD4, CD8, CD45RO, and Bim to identify T cell subsets and T lymphocyte biomarkers in the canine. Poor CD62L staining suggests that the antibody used is not cross-reactive with canine as previously shown in the literature, and therefore it will no longer be pursued as part of this panel. PD-1 antibody requires further optimization. Findings from this study will help develop the canine model to investigate translational approaches for human melanoma.

Research support was provided by an award from the University of Wisconsin School of Medicine and Public Health, the Herman and Gwendolyn Shapiro Foundation, and gifts to the University of Wisconsin Carbone Cancer Center.
Use of BNP in the Emergency Department  
Sarah N. Saenz

BACKGROUND:

B-Type natriuretic peptide (BNP) is secreted in cardiac tissues and is secreted by cardiac myocytes in response to increase stretch and wall stress. BNP has been shown to be helpful in the diagnosing heart failure in acutely dyspneic patients presenting to the emergency department.

The role of an isolated brain natriuretic peptide measurement in the emergency department is unclear. BNP level can be used to help in the diagnosis of heart failure in the emergency department, but sensitivity and specificity are markedly influenced by cut point and levels are also influenced by a variety of noncardiac factors such as age, renal function and body mass index. Isolate measurements of brain natriuretic peptide may have little correlation with acute symptomatology. Serial BNP levels have been shown to be helpful in guiding therapy for decompensated heart failure and as a prognostic tool, but the use of changes in BNP levels at emergency department presentation has not been reported previously.

OBJECTIVE:

The purpose of this study is to evaluate the role of BNP measurements in the emergency department. Specifically, we aim:
1: To examine the correlation of BNP measurements with acute symptomatology.
2. To examine the relationship between changes in BNP measurements and degree of cardiac dysfunction related to acute symptoms.
3. To examine the relationship between BNP level and clinical decisions (dx, admission).

METHODS:

Setting and patient population: This is a retrospective review of patients presenting to the University of Wisconsin Emergency Department or the William Middleton Veterans Administration Hospital Emergency Department. All patients presenting to the ED during the time period 1/1/17 to 12/31/17 who had a BNP measured are eligible for inclusion. Data collected from the patient charts included medical history, demographics, and clinical signs and symptoms.

RESULTS:

Preliminary data demonstrates correlation between ejection fraction and brain natriuretic peptide levels; that is that as BNP levels increase, there is a trend of decreasing ejection fraction. However, there is no correlation between BNP levels and acute symptomology.

CONCLUSIONS:

Isolated brain natriuretic peptide measurements in the emergency department are not ideal measurements due to the many confounding factors that contribute to their usefulness (cut points, renal function, and body mass index). Additionally, the isolated brain natriuretic peptide is not helpful when looking at patients whom have a history of moderate-to-severely decreased systolic function.
**Title of Research Project:** Antibiotic use and indications in a community survey of adults in Wisconsin

**Author:** Maria Schletzbaum

**Department:** Population Health Sciences

**Mentors:** Ajay Sethi

**Support:** Work funded by the University of Wisconsin-Madison Medical Scientist Training Program (grant number T32GM008692), the Wisconsin Partnership Program at the University of Wisconsin School of Medicine and Public Health, the UW-Madison Microbiome Initiative of the Office of the Vice Chancellor for Research and Graduate Education, and by the Survey of the Health of Wisconsin.

**BACKGROUND:**

Each year in the US, 2 million serious infections and 23,000 deaths are due to antibiotic resistant bacteria—highlighting the urgent need for antibiotic stewardship to limit resistance. In a 2007-2011 national survey, 6% of Americans reported using antibiotics in the last 30 days. In Wisconsin, 745 antibiotic prescriptions were dispensed per 1000 people in the population in 2015. The CDC currently estimates 30% of all antibiotic prescriptions are inappropriate, and while antibiotic prescription rates have declined for children, prescribing has increased slightly for adults.

**OBJECTIVE:**

This study evaluated differences between antibiotic users and non-users, classes of antibiotics used, and indications among adult Wisconsin residents.

**METHODS:**

This study was conducted as part of an ancillary study, WARRIOR, within the Survey of the Health of Wisconsin (SHOW). In 2016, WARRIOR/SHOW participants were asked about antibiotic use in the last year and the antibiotic name(s) and indication(s). Sociodemographic, health behavior, and comorbidity information was also collected. 595 adults participated. Antibiotics were grouped into pharmacologic classes. Indications were grouped into clinically related categories.

**RESULTS:**

Among adult Wisconsin participants, 32.6% reported taking an antibiotic in the last year. Females (OR=1.87), people with health conditions (OR=2.04), and people with a mental health or developmental condition (OR=1.93) were statistically significantly more likely to report antibiotic use. There was a suggestive association between higher BMI and antibiotic use, while diabetes, heavy drinking, and being an ever-smoker were not correlated with antibiotic use.
The five most commonly used antibiotic classes were penicillins, macrolides, first generation cephalosporins, tetracyclines, and quinolones, representing 80% of use. The top four indications antibiotic users reported were upper respiratory infection (33%), dental condition or procedure (21%), surgery (13%), and lower respiratory infection (11%).

CONCLUSIONS:

Antibiotic use varies among Wisconsin adults. The top indications for antibiotics reflect categories with inappropriate and prophylactic prescribing, representing potential to further reduce the use of antibiotics. Importantly, dental conditions and procedures was the second most common antibiotic indication reported, underlining the importance of working with dental professionals as we address antibiotic stewardship.
Vascular Surgery Outcomes of Trauma Patients at TASH, Addis Ababa, Ethiopia
Authors
Semma Y.Z., Getachew F., Tefera G.

Introduction:
The field of vascular surgery is a relatively new surgical practice in Ethiopia. Currently, there is only one trained vascular surgeon practicing at Tikur Anbessa Specialized Hospital (TASH) in Addis Ababa, the major referral hospital in the country. No previous study has been done to look at the impact of this new surgical field and the outcomes of trauma patients that have undergone vascular surgery procedures at TASH.

Methods:
We identified the list of vascular procedures performed in the TASH emergency department over the past two years since the program was fully implemented. Of the identified cases, we analyzed the outcomes of trauma patients we were able to find the paper charts for.

Results:
Of the 89 total vascular procedures that were identified to have been performed over the two year period, patient paper charts for were located for 40. Of these, 32 of the procedures were cases related to trauma – penetrating (81.21%), blunt (6.25%), and crush injuries (9.37%). The primarily affected vessels were the popliteal and femoral artery, accounting for 43% of the cases. Over 50% of the patients presented at TASH at least three days past the onset of symptoms or injury and were referred to the ED by general practitioners and surgeons at other hospitals. The most common presenting symptoms were bleeding (87%), absent or weak pulses (50%), pain (47%), and loss of sensation of the affected limb (25%). 36% of the patients were operated upon within six hours of admission and 76% were within two days of admission. Of the procedures performed, direct repair and ligation were the top two procedures accounting for 36% and 27% of the procedures respectively. The most common postoperative complications were infection (31.25%), amputation (9%), surgical site bleeding (9%), and compartment syndrome (6%). At discharge, 71% of the patients were near full functional capacity, 9.7% had mild loss of function, and 19.3% had severe loss of function. There was one death (3.2%) during inpatient stay due to severe sepsis over one month after surgery. One patient (3.2%) was readmitted 2 month after discharge due to sepsis.

Conclusions:
Although our study was limited in terms of the number of cases we were able to find charts for, it does show that vascular surgery outcomes of trauma patients at TASH are relatively good, reflected by the near full functional capacity of 71% of the patients at discharge. Several factors affect the outcomes of these procedures including delay between onset of symptoms and surgery. Our results highlight the effectiveness of the vascular surgery training at TASH and call for further exploration of its impact and outcomes in the elective surgery setting as well as the emergency department over all.
A Pilot Study of Female Athlete Triad and Iron Deficiency Prevalence and Association in High School Athletes
Paige Skorseth

BACKGROUND The female athlete triad is a syndrome including decreased energy availability, menstrual changes, and low bone mineral density (BMD). Although Relative Energy Deficiency in Sport (RED-S) identifies iron deficiency as interrelated with components of the female athlete triad and a study published in 2017 depicts the precise biological mechanism for this relationship, there has been no data indicating how the relationship between female athlete triad and iron deficiency presents clinically in high school aged, female, distance runners. This subsection of athletes is disproportionately plagued by the female athlete triad and iron deficiency, in isolation from each other.

OBJECTIVE The objective of our study is to determine if a clinical relationship, manifested through female athlete triad risk scores and ferritin iron levels, exists between components of the female athlete triad and iron deficiency in high school aged, female, distance runners. We hypothesize that increasing female athlete triad risk scores will correlate with decreasing ferritin iron levels.

METHODS Data was collected on 40 subjects living in the Palo Alto, CA area including: a validated survey evaluating components of disordered eating (DE) and menstrual irregularities, height and weight, lab values (ferritin iron, 25-hydroxy Vit. D, estradiol, Insulin Like Growth Factor, Free T3), and DXA scan to evaluate bone mineral density.

RESULTS The statistician for the Stanford University Department of Orthopedics is currently evaluating results, and we expect to have results within the next two weeks.

CONCLUSIONS If the hypothesis proves true, further research will be prompted that may necessitate a revision of diagnostic and treatment protocols including dual testing for triad components and iron deficiency in all athletes.
fNIRS Imaging of Effortful Listening to Normal and Degraded Speech in Noise

Gabe Sobczak, Xin Zhou, Ruth Litovsky

BACKGROUND

Cochlear implant (CI) users are challenged by auditory stimuli that are less taxing for normal-hearing (NH) individuals, due to degraded input from the CI. One such stimulus is speech in co-localized noise. Performance as assessed with percent-correct word identification typically improves when speech and noise are spatially separated; i.e. spatial release from masking (SRM). However, little is known about the cognitive load involved in effortful listening to degraded speech and in SRM. A novel neuroimaging modality, functional near-infrared spectroscopy (fNIRS), is an emerging tool to investigate this phenomenon. fNIRS assesses changes in blood oxygenation by recording changes in cerebrovascular hemoglobin concentration (ΔHgb). Since neural activation, increased regional blood flow, and hemoglobin mobilization are all tightly coupled, fNIRS is a valid indirect modality to measure neural activity.

OBJECTIVE

Identify a neural signature for release from effort, by examining cortical activity during listening tasks using fNIRS.

METHODS

This study simulated hearing conditions of listeners with single sided deafness (SSD) who receive a CI in the deaf ear. NH participants were tested with auditory stimuli presented through insert earphones. Stimuli consisted of speech, either unprocessed or vocoded (processed to sound like CI inputs), in vocoded noise. Monaural speech was presented to the left ear, with ipsilateral or bilateral noise, at two signal-to-noise ratios (SNRs, -10 and -15 dB SPL). Experiments were organized into 6 trials, each 9 minutes duration, and fNIRS data was recorded throughout each trial.

RESULTS

Preliminary results from 9 young right-handed NH participants showed greater responses in the bilateral inferior prefrontal cortex (IPFCs) when attending to vocoded speech compared to normal speech. These findings agree with previous fNIRS and fMRI studies that reported bilateral IPFC involvement in effortful listening to degraded speech. We are currently collecting data in a new cohort of NH participants to validate our previous findings.

CONCLUSIONS

Our preliminary results are encouraging and reveal cortical regions that may play a role in effortful listening situations in NH adults. We ultimately aim to investigate whether fNIRS could reveal the neural signature for the release from effort in SSD CI users.
Content Validity of the PROMIS® Pediatric Family Relationships Measure for Children with Chronic Illness

Jacob Svenson

BACKGROUND: Families play a critical role in supporting the health and well-being of children with chronic illnesses, who face a lifetime of responsibility for self-management of their condition. Our goal was to investigate whether the novel Patient-Reported Outcomes Measurement Information System® (PROMIS®) Pediatric Family Relationships measure, developed primarily within the general pediatric population, reflects the experiences of family relationships for chronically ill children and their parents.

OBJECTIVE: Validate the content of the PROMIS® Family Relationships measure to ensure it reflects the experiences of children with chronic illnesses.

METHODS: We conducted semi-structured qualitative interviews with children (aged 8-17) with common chronic conditions: asthma (n=6), type 1 diabetes (n=5), or sickle cell disease (n=5), and separately with one of their parents (n=16). Interviews were recorded, and two team members independently coded the written transcripts facilitated by Nvivo 10. The systematic content analysis used a combination of: 1) pre-specified themes corresponding to the six facets of the domain identified during measure development and reflected in the content of the items (i.e., Sense of Family; Love and Caring; Value and Acceptance; Trust, Dependability, and Support; Communication; Enjoyment), as well as 2) open-coding, allowing participants to define important concepts (i.e., disease impact).

RESULTS: Family relationships were conceptualized in a similar way to the general population, as evidenced by child and parent responses to open-ended questions about family relationships and to specific probes that corresponded with the item content in the Family Relationship 8-item short form. Children spontaneously discussed the impact of their disease on family relationships less than parents did. Although participants described how living with a chronic illness positively and negatively impacted aspects of family relationships, nearly all participants believed their responses to the PROMIS® Family Relationships items would not change if they (or their child) did not have a chronic illness.

CONCLUSIONS: Among a sample of families of children with one of 3 chronic illnesses, participants described family relationships in a way that was consistent with the facets of the PROMIS® Family Relationship domain. This study adds to the content validity of the measure for children with chronic illness.
Barriers to adoption of Medication Assisted Treatment for opioid use disorder by Family Medicine physicians, in Wisconsin
Quinton A. Taylor

Background: Opioid use disorder (OUD) and opioid overdose represent a public health emergency in the United States. Medication Assisted Treatment (MAT) is an evidence-based approach to treatment of OUD. In 2000, the Drug Addiction Treatment Act (DATA) was passed to expand MAT availability by allowing physicians to obtain a waiver to prescribe Buprenorphine, a partial opioid agonist, in a community clinic setting. The uptake of MAT has been slow and the majority of physicians who are eligible to prescribe MAT have not obtained the waiver.

Objective: To describe barriers to providing MAT among primary care providers in Wisconsin.

Methods: A thirty question survey was mailed to 1500 family medicine physicians. The survey assessed physician perspectives of the opioid epidemic and barriers to MAT prescribing. Additionally, semi-structured phone interviews were conducted with six buprenorphine-waivered family medicine physicians, in Wisconsin to investigate the barriers and facilitators that influenced their decision to pursue the waiver and provide MAT.

Results: 598 surveys were returned by providers, including 78 who reported having a DATA2000 waiver and 520 who did not have a waiver. Respondents identified several barriers to expanding MAT in primary care settings: 82% cited lack of mental health services, 73% cited time constraints, 72% cited concerns of misuse/diversion, and 65% cited attraction of drug users to the practice. 70% of non-waivered physicians reported that they were “not at all likely” to become an authorized buprenorphine in the future. Systematic analysis of the qualitative data has not been completed, however, several themes arose. All the physicians interviewed described how providing MAT requires more time, more clinic resources, and more mental health treatment. Exposure to MAT during medical school or residency was often mentioned as a facilitator to providing MAT, as was mentorship by physician colleagues who prescribe MAT.

Conclusions: The quantitative data collected by the survey was consistent with the qualitative data gathered through the interviews. A combination of system and individual level barriers to providing MAT were identified. Approaches that provide more peer and specialty support showed the most potential impact to increase the number of MAT providers.
Physician Calls To Pediatric General Surgeons – Foundational Data To Guide Future Interventions

Ainsley Timmel

BACKGROUND
The "Access Center" is a toll-free phone line that is staffed 24/7 by registered nurses who specialize in acute care and connect providers calling in with appropriate specialists to discuss treatment and transfer options. Many tertiary care hospitals have implemented call centers to triage patient transfers, facilitate interdisciplinary phone consults, and expedite referrals. The type of calls received and decisions made based on these phone calls have not been well described.

OBJECTIVE
The goal of this study was to characterize calls received by the Pediatric Surgery service at a single tertiary care children’s hospital and to use that data to guide future educational outreach interventions.

METHODS
A retrospective chart review was completed for all calls to Pediatric Surgery documented in the EMR between March 2014 and August 2016. Data collected included call location, call diagnosis, patient age, and call decision (treat at referring facility vs. transfer). Additional information was collected for patients that were transferred, including days admitted and interventions performed.

RESULTS
676 patients met inclusion criteria. 38% of patients remained at the calling location for care, 24% of patients were directly admitted to the children’s hospital inpatient unit, 24% of patients were seen in the children’s hospital emergency department (ED) and later admitted, and 14% of patients were seen in the ED then discharged home. Of 325 patients that were admitted to the hospital, the average admission was 3.32 days and 73% of patients had an operation during that admission. Of the 96 patients seen at the children’s hospital ED but not admitted, 28% were evaluated for generalized abdominal pain and 20% for suspected appendicitis. Suspected intussusception (9%) and gtube complications (8%) were also commonly evaluated in the ED only.

CONCLUSIONS
Many patients (38%) remained at the referring location, while admitted patients had operations 73% of the time, illustrating effective use of telephone consults. 14% of patients were transferred to the children's hospital, sometimes from great distances, but were discharged from the ED. These patients represent opportunities for intervention to better facilitate patients staying in their home communities. Further analysis of imaging, bedside procedures, and specialty consults associated with diagnoses that frequently were not admitted after transfer to the children's hospital will inform intervention development.
FUNCTIONAL OUTCOMES FOLLOWING MEDIAL PATELLOFEMORAL LIGAMENT (MPFL) REPAIR FOR CHRONIC PATELLAR INSTABILITY

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Background: Lateral patellar dislocation is a common injury that often occurs in young, active people. The medial patellofemoral ligament (MPFL) is the primary soft tissue restraint against lateral patellar translation. The MPFL is routinely injured in cases of patellar dislocation, with damage seen in almost every case. In young individuals in particular, a traumatic lateral patellar dislocation can lead to chronic instability that manifests as recurrent dislocation and/or subluxation. Surgical treatment for recurrent patellar instability includes soft tissue augmentation/reconstruction, repair, and bony realignment procedures. MPFL reconstruction is a commonly performed soft tissue procedure for the management of patellar instability and has been previously studied. Though reconstruction has demonstrated favorable results, significant complication rates have also been observed. MPFL repair offers an alternative technique that restores patellar stability and provide results comparable to reconstruction. The indications leading to successful outcomes for patients undergoing MPFL repair have yet to be fully investigated.

Methods: A retrospective chart and radiographic review was performed on all patients currently 18 years of age and older that underwent MPFL repair by a single surgeon from September 2010 through June 2017 without simultaneous or past history of bony realignment procedures. Patient demographics, surgical details, and follow-up information was gathered and reviewed. Surveys were sent to patients via email to assess their current symptoms and functional status.

Results: 75 patients that underwent MPFL repair were included in this study. 57 patients experienced instability pre-op. Of that group, 50 (88%) had no recurrent patellar instability post-op (p<.001). 66% of patients that experienced pain pre-operatively had no reported pain at their last clinical follow-up (p<.001). After controlling for age and BMI, individuals with generalized ligamentous laxity were nearly 15 times more likely to experience post-op instability (p=.01). Current functional outcome and symptom survey results were still being collected at the end of the Shapiro project period.

Conclusion: MPFL repair can be an effective procedure in treating patients with patellar instability when TT-TG distance is less than 15 mm and in patients without generalized ligamentous laxity.
Impact of Liposomal Bupivacaine Injected for Adductor Canal Block on Recovery Profile and Block Characteristics Following Total Knee Arthroplasty

Priya B. Varghese

BACKGROUND: Total knee arthroplasty (TKA) is one of the most common musculoskeletal surgical procedures performed in the U.S. today. Postoperative analgesia for TKA is incredibly important as it allows for effective physical therapy and proper function of the joint hardware. Opioids are commonly utilized but can be associated with a number of potential side effects including nausea, respiratory depression, tolerance and the potential for abuse. To reduce postoperative opioid use but still maintain analgesia, a number of groups have begun to evaluate the use of Liposomal Bupivacaine (LBP) in the adductor canal block. PACIRA© has released the first and currently only available liposomal, which allows for slow-release and a reported duration of approximately 72 hours. The use of LBP has been shown to reduce pain scores post-operation and allows for long-term anesthetic duration through the use of the adductor canal nerve block.

OBJECTIVE: This study will assess the effects of liposomal bupivacaine for adductor canal nerve block on postoperative pain and enhanced recovery following total knee arthroplasty, in comparison to standard bupivacaine formulation.

METHODS: 63 patients undergoing a unilateral TKA that met study requirements were recruited and blindly randomized to receive either Bupivacaine or LBP pre-operatively. Patient’s baseline (pre-op) pain was recorded quadricep muscle strength (QMS) was assessed using the Kiio FLEX© system. Post-operative pain, QMS, range of motion (ROM), and opioid consumption were determined 24, 48, and 72 hours post-surgery.

RESULTS: On days 1 and 2 post-op, those given LBP used less morphine equivalent than those in the Bupivacaine group (p = 0.02, p = 0.016, respectively). On day 2, pain with activity was significant lower in the LBP group than the Bupivacaine group (p = 0.009). Not surprisingly, QMS in both groups was lower on the second day post-surgery, but we did not detect a significant strength difference between the two groups. Furthermore, strength drop is due to both the pain limiting motion, and the motor block itself. Other variables such as pain disturbing sleep and satisfaction, were not statistically significant, but may have clinical implications.

CONCLUSIONS: It appears that LBP has several statistically significant benefits over Bupivacaine in terms of post-operative analgesia via the adductor canal block. A larger patient sample may better determine which factors are considered relevant and significant.
Investigating the relationship between CSF metabolites, Alzheimer’s biomarkers and demographic data in people with a parental history of Alzheimer’s disease.

Michael Wakely, Carol A. Van Hulle, Karen Lazar, Cynthia Carlsson

Background: The pathology of Alzheimer’s disease is still not completely understood, and the typical biomarkers we have to track the disease process must be collected via a lumbar puncture to obtain cerebrospinal fluid. Studies in the past have identified some metabolites, such as lipids, as possibly being related to Alzheimer’s disease and its biomarkers. However, the link between metabolites and AD biomarkers has not yet been fully explored. If a biomarker was found that could not only be tied to AD biomarkers, but also modifiable, perhaps this could change the way we manage patients with AD. We investigated a large spectrum of metabolites collected from the cerebrospinal fluid to understand how they relate to disease biomarkers as well as simvastatin use due to its ability to modify lipids.

Methods: All data for this study was collected as part of a separate study named SHARP, which investigated statin effects on AD biomarkers, specifically beta amyloid. For the SHARP study, 88 cognitively normal individuals with a parental history of Alzheimer’s disease were divided into a placebo and treatment group, randomly, in a 1:1 ratio. The treatment group received 40mg simvastatin orally every day, in contrast to a placebo pill for the other group. Both groups received cognitive testing, a blood draw, and a lumbar puncture at 3 different visits, months 0, 12, and 18. For this study, only 78 of the original 88 participants had sufficient metabolomics data performed.

Results: Analysis found several metabolites that differed significantly between men and women, as well as some that differed between age groups. The correlations between metabolites and Alzheimer’s disease biomarkers included 159 different metabolites ranging from lipids to amino acids and many others, some of which correlated very strongly to biomarkers such as amyloid beta 42, total tau, and other proteins known to be linked to Alzheimer’s disease.

Conclusions: This study uncovered a large group of possible metabolites that could be used to track Alzheimer’s disease, however this study was only an initial step. Because the metabolites for this study were collected in the CSF, it is important to account for variables not observed here such as how metabolites in blood relate to metabolites in CSF, as well as factoring in actual disease progress.
Comparing the Characteristics of Pediatric Osteoarticular Infection on MRI: 
MRSA vs. Non-MSRA

Jarrett A. Warden

**Background:** The prevalence of osteoarticular infection caused by community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) has steadily increased over time, while the rate of methicillin-susceptible *Staphylococcus aureus* (MSSA) has remained constant. This is of concern due to the more aggressive disease process that MRSA causes. MRSA has a higher prevalence of extraosseous involvement, more complications, and requires more procedures and longer hospitalizations than other culprit organisms. MRI provides excellent anatomical detail of bone and soft tissue giving it high sensitivity and specificity early on in infection. Overall, it is the tool of choice in the diagnosis and management of osteoarticular infection. Characterization and assessment of the severity of osteoarticular infection in children using MRI can help distinguish MRSA from another causative organisms.

**Objective:** Patients with osteoarticular infections caused by MRSA demonstrate differing MRI findings from other causative organisms including: A “patchy” appearance at the primary site of infection, higher rates of infection spread, and increased severity of the infection.

**Methods:** A retrospective case control study was performed utilizing Health Link and PACS software. From 2002 to 2018, all patients under the age of 18 with the diagnosis of osteomyelitis, septic arthritis, or pyomyositis were included. Patients were excluded if no causative organism was identified on culture or if they did not receive an MRI. Basic demographic and clinical information were obtained on all eligible patients. A blinded radiographic assessment will be performed characterizing the osteoarticular infection on MRI. Statistical analysis of the data will be done comparing MRSA to non-MRSA cases.

**Results:** Preliminary results have demonstrated MRSA osteoarticular infection to have a worse clinical course including more surgeries (p=0.024) and complications (p=0.020) than non-MRSA. Current patient data collection is 75% complete. A blinded radiographic assessment of MRIs and subsequent statistical analysis will occur soon after completion of chart review.

**Conclusion:** Virtually all patients receive an MRI at presentation. The results of this study may show that MRI can provide a predictive value to the causative pathogen and help characterize where the infection started and how it is spreading. This knowledge would help guide and even expedite the treatment of a child with osteoarticular infection.
A Multidisciplinary Approach to Patients with Acute Necrotizing Pancreatitis

Kyle EW. Williams

BACKGROUND:
Acute necrotizing pancreatitis develops in 20% of the 240,000 patients diagnosed with acute pancreatitis each year in the US. Necrotizing pancreatitis often has a clinical course marked by sepsis and end organ failure with a mortality rate of 20-40%. Historical treatment with open necrosectomy carried a similar mortality rate of up to 40% along with a high risk of complications including pancreatic insufficiency. In recent years, minimally invasive techniques including percutaneous or endoscopic drainage and Video Assisted Retroperitoneal Drainage (VARD) have been shown to significantly improve mortality and complication rates when used in a “step-up” approach. It has been advocated to be adopted as the best treatment. However, this requires use of a multidisciplinary clinical approach. The initiation and development of multidisciplinary care is not well described, particularly for acute benign disease. In November 2015 University of Wisconsin Hospital and Clinics (UWHC) developed a multidisciplinary group called: UW PANC: Pancreatitis Acute Necrotizing Complex Multidisciplinary Workgroup in order to coordinate both inpatient and outpatient care of these complex patients.

OBJECTIVE:
The aim of this project is to evaluate the effect of the development of a multidisciplinary care management team (UW PANC-Multidisciplinary Workgroup) on outcomes for UWHC patients diagnosed with acute necrotizing pancreatitis.

METHODS:
A retrospective review based upon the UW PANC database of patients with necrotizing pancreatitis was carried out. Number of procedures performed, number of operative interventions, length of stay, and readmissions were reviewed. Workgroup records were also reviewed for specialty member attendance, volume of referrals, number of patients reviewed, and review of conference minutes to identify implementation challenges and evaluation for other themes.

RESULTS:
A retrospective review was completed and a RedCap Database was developed using this patient information. Statistical analysis will be performed on data obtained.

CONCLUSIONS:
Patients with necrotizing pancreatitis can be medically complicated and treatment historically has been associated with high morbidity and mortality. Treatment with a “step-up” approach with utilization of a multidisciplinary team has been shown to improve outcomes. With this research we hope to assess the outcome of this approach undertaken by the UW-PANC workgroup.
Disability Information Needs of Women with Advanced Breast Cancer

Athena S. Wilson

BACKGROUND: The population of women living with metastatic breast cancer is growing as advances in treatment extend the mean survival of this incurable disease. Research suggests that a significant proportion of this population continues to work after their diagnosis, yet little has been elucidated about the employment challenges and information needs that they experience. The interests of this underrepresented population are emerging as a priority for research and interventions are needed to improve quality of life for these patients.

OBJECTIVE: The objectives of the study were to begin characterizing the work status and information needs of women with metastatic breast cancer, and to explore the importance of work, including reasons for working or not working.

METHODS: Women with metastatic breast cancer were recruited through a breast cancer advocacy group and the Wisconsin Oncology Network. Data were collected via an electronic survey between November 2014 and February 2015. Survey questions collected information about demographics (age, race, household income, level of education), employment status, work ability, work importance, and work and disability information needs. Respondents were divided into “stably working” and “no longer working” groups based on self-reported employment level at time of metastatic diagnosis. Comparisons were made between groups regarding perceived work ability, importance of work, effect of symptom burden on work, and information needs.

RESULTS: Employment declined over time for the study population following a metastatic breast cancer diagnosis. Free-text responses from those who had stopped working still largely reported a desire to work and suggested that the decision to stop working was involuntary due to symptom burden. Among those still working, many experienced discrimination (28%) and over three quarters (76.6%) were concerned about having to stop working due to symptoms of their disease. Respondents reported unmet information needs in regard to employment-related topics they consider important, such as how to talk to oncologists about work, and where and to whom to talk to about financial assistance.

CONCLUSIONS: This study expands knowledge and provides insight on areas for investigation regarding the barriers, importance, and information needs regarding employment for women living with metastatic breast cancer.
Assessing the feasibility and barriers of a diabetic diet in a rural Guatemalan community

Authors: Julia Wilson, James E. Svenson MD, MS, Jessica N. Schmidt MD, MPH

BACKGROUND:

Non-communicable diseases such as diabetes are growing in prevalence across the globe with the majority of people affected living in low and middle-income countries. In Guatemala, the prevalence of diabetes continues to increase with a higher burden of disease found in indigenous rural communities. Modifiable lifestyle factors, especially diet, can play a significant role in establishing good diabetic control, but dietary changes may not be easily undertaken in many developing countries.

OBJECTIVE:

In this study, we aimed to assess knowledge of and adherence to a diabetic diet and to identify barriers to maintaining a diabetic diet in a rural indigenous Guatemalan population.

METHODS:

Interview participants (n=32) were selected from a convenience sample of adults with type 2 diabetes identified by local health promoters in villages around San Lucas Tolimán, Guatemala. Interviews occurred at weekly diabetic clinics in or at home visits. A structured interview was used to assess knowledge about diabetic diet, current dietary habits and perceived obstacles to maintaining a diabetic diet. Thematic analysis was used to reveal common barriers and solutions identified by participants. All interviews were conducted in Spanish and verbal consent was obtained from all participants.

RESULTS:

81% of participants interviewed were female, the mean age was 53.5 years, and the mean weekly per capita expenditure on food was reported to be 58.8 GTQ (7.85 USD). 28 participants (87%) were able to identify foods important to a diabetic diet including vegetables (‘hierbas’), lean-meats and ‘foods without sugar’. Cost (31.25%), access/transport (31.25%), incompatibility with traditional diet and cultural norms (22%), time required to prepare diabetic foods (16%), and lack of knowledge (9%) were the most commonly cited barriers to maintaining a diabetic diet. Participants were able to identify possible solutions to these barriers including a community garden and a mobile market.

CONCLUSIONS:

Although participants in this study were able to identify foods important to a diabetic diet, several structural and cultural barriers exist to prevent adherence to this diet. Interestingly, participants were also able to identify creative local solutions to decrease cost and improve access. More research is needed to further evaluate if such solutions could improve adherence to a diabetic diet in this patient population.
Top-down Proteomics of Hypertrophic Cardiomyopathy for Precision Medicine
Max G. Wrobbel

**Background:** Hypertrophic cardiomyopathy (HCM) is a common genetically inherited disease characterized by heterogenous phenotypic expression and natural history. HCM can be particularly devastating, leading to consequences such as heart failure, cardiac arrhythmia, and sudden cardiac death. Many of the mutations that lead to the development of HCM involve genes that encode the sarcomeric proteins (i.e. actin, tropomyosin, troponin, and myosin). However, the exact mechanism by which these mutations lead to different phenotypic expressions and clinical outcomes is not well understood. Previous studies have used explanted cardiac tissue samples to study the expression, post-translational modifications, and interactions of various sarcomeric proteins that are thought to be underlying the pathogenesis of HCM. However, many external factors including sample heterogeneity, tissue collection, and tissue handling can alter the cardiac proteome of explanted cardiac tissue.

**Objective:** To control for these external factors, we proposed using a 3D engineered cardiac tissue (ECT) model using induced pluripotent stem cells (IPSCs) to examine the mechanisms that lead to the development of HCM. We hypothesized that the sarcomeric proteome of the 3D ECT model will closely resemble that of the native explanted cardiac tissue. We further hypothesized that there would be alterations in the expression and post translational modifications (PTMs) of various cardiac sarcomeric proteins that will be useful for exploring the molecular pathogenesis of HCM.

**Methods:** We assessed changes in the sarcomere sub-proteome from ECTs using a high-resolution LC/MS-based “top-down” proteomics method developed by our group.

**Results:** We were able to identify multiple sarcomeric proteins including actin, myosin, troponin, and tropomyosin in 3D ECTs. However, the pattern of expression of these protein in the ECTs was notably different than the pattern of expression in adult explanted cardiac tissue, more closely resembling tissue from fetal hearts. In the future we will quantify the expression of these proteins and evaluate their post translational modifications to explore the molecular mechanisms underlying the development of HCM.

**Conclusions:** These experiments demonstrate that 3D ECTs are a valid model for studying the molecular mechanisms underlying the pathogenesis of HCM. Additionally, these findings highlight the power of top-down proteomics for examining the sarcomeric proteome of 3D ECTs.
BACKGROUND: Hundreds of patients are treated for burn injuries each year at University of Wisconsin School of Medicine and Public Health. Pain control can be challenging during their hospitalization, particularly following skin grafting procedures. It is common for opioid requirements to significantly increase following a skin grafting procedure. Currently, no clinical studies evaluate the efficacy of various analgesic medications for burn patients and consequently perioperative pain management varies among providers.

OBJECTIVE: The purpose of this study was to evaluate efficacy of different analgesic medications for burn patients undergoing skin grafting. Our primary outcome measure for the study was the change in opioid requirements following a skin grafting procedure. We then associated the use of different analgesic medications with the change in opioid requirements. Our secondary outcome was to characterize current practices in perioperative analgesic management for burn patients undergoing skin grafting procedures at the University of Wisconsin.

METHODS: A retrospective chart review was performed on burn patients who underwent skin grafting procedures between January 2011 and June 2018. The primary outcome analyzed was opioid consumption on postoperative day 1 compared to the day prior to surgery. Additional data extracted included patient characteristics, total body surface area of the burn, skin graft site, preoperative and postoperative pain scores, and analgesic medications used in the perioperative period.

RESULTS: Initial results show that patients received 50% more opioids in the postoperative setting compared to the 24-hour preoperative period. 33% of patients received intraoperative Ketamine. 30% were given preoperative Tylenol and 30% received Gabapentin. Only 13% received at least three nonopioid analgesics in the perioperative period. Additional analysis will be performed to determine if any nonopioid analgesics were associated with less opioid use.

CONCLUSIONS: Our findings suggest that postoperative pain control is largely based on opioid use rather than alternative analgesic methods. There are multiple side effect associated with these medications and further analysis needs to be done to demonstrate whether nonopioid analgesics can reduce dependence on opioid medication.