SCHOOL OF MEDICINE & DENTISTRY

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2017

Annual Medical Student Abstract Journal

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Novel Method of Weighting Cumulative Helmet Impacts Improves Correlation with Brain White Matter Changes after One Football Season of Sub-Concussive Head Blows

Background: Sub-concussive head blows (SHBs) are head impacts that do not produce concussion symptoms, and a new focus in TBI research. SHBs are associated with axonal injury-like WM changes among non-concussed, contact athletes. Standard helmet sensor summary measures have been unsuccessful at predicting WM changes on DTI, perhaps because they do not account for the transient period of increased neuronal vulnerability to successive hits.

Objective: Improve prediction of diffusion-tensor-imaging (DTI)-detected white matter (WM) changes after a season of collegiate football using helmet-accelerometer data by weighting impacts for time between exposure events.

Methods: Ten division-III football players were equipped with helmet-mounted accelerometers throughout one football season, which recorded 5 helmet impact metrics (HIMs) for every head impact. Cumulative impact data were weighted for time in three novel ways: 1) time between hits (TBH); 2) time from index hit until the postseason DTI (TUD); 3) combination of 1 and 2 (TBH+TUD). Each player underwent a preseason and postseason DTI scan; wild bootstrapping was used to calculate percent of whole-brain WM voxels with a significant increase or decrease in fractional anisotropy (FA), which was correlated to the players' cumulative weighted and unweighted (mean, peak, cumulative) HIMs. The relationship between cumulative HIMs and FA-increase and FA-decrease were explored using multivariate regression. We compared weighted to unweighted correlations using R^2 values.

Results: Correlations using the novel weighted cumulative HIMs were consistently greater than unweighted metrics for all HIMs ($R^2_{\text{weighted}} := 0.42 \pm 0.16$; $R^2_{\text{unweighted}} := 0.23 \pm 0.15$). The TBH+TUD weighting was the most consistent among all HIMs at predicting WM changes, with 60% of the correlations being significant ($R^2_{max} = 0.77$).

Conclusions: Cumulative HIMs weighted for time are stronger than standard unweighted measures for predicting WM changes after one season of football. This dose-response pattern suggests a causal relationship between SHBs and axonal injury-like WM changes. Helmet sensor data may be a useful proxy for predicting WM changes.

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High-Fidelity, Simulation-Based, Team-Training
in Nontechnical Skills of OR Teams at URMC

In surgical operating rooms in the United States, communication failure is the leading cause of sentinel events and wrong-site operations, having been cited as the root of error in at least 60% of cases reported to the Joint Commission on Accreditation of Healthcare Organizations. Though surgeons, anesthesiologists, and nurses receive extensive training in technical skill in order to practice in an operating room (OR), the high incidence of sentinel events caused by failures in nontechnical skills—including communication, situational awareness, and teamwork—indicates that further training is necessary in these areas.

Since its advent in the 1960s, high-fidelity, simulation-based training has proven to be effective in teaching both technical and nontechnical skills in fields in which human error can significantly impact human life, such as the military, aviation industry, and nuclear power generation. In medicine, simulation-based training has been used extensively in anesthesiology and obstetrics, but has historically involved only individual disciplines. Due to the interdisciplinary nature of operating room functionality and the frequency of failure in whole team communication, it is important to enhance nontechnical skills in the OR by involving all three major disciplines: surgery, anesthesiology, and nursing.

Due to incidents of sentinel events caused by communication failures at the University of Rochester Medical Center (URMC), a high-fidelity, simulation-based team-training program has been created to enhance nontechnical skills in our operating rooms. Over the course of months and a series of improvements through practice simulations, a carefully planned patient case scenario and 3D model of hemorrhage have been fine-tuned for implementation. Complemented with "good judgement" debriefs, the simulation has demonstrated success in emphasizing the importance of closed-loop communication, situational awareness, assertiveness, and other nontechnical skills in managing adverse events in a simulated OR. Once the program is officially implemented, an objective assessment of every team's nontechnical skills during the simulation, surveys conducted before and after each session, and a survey six months following participation will assess the immediate and long-term impact of the training program. Ultimately, with regular participation by the OR staff at URMC, this high-fidelity, simulation-based team-training program is expected to reduce and ideally eliminate sentinel events caused by failures in nontechnical skill in our operating rooms.

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Impact of Retinal Image Review on Motivation for Self-Care and Glycemic Control in Diabetic Patients

Objective
The use of personal retinal images to educate patients with diabetes has been shown to improve glycemic control. However, the influence of retinal images in the primary care setting has not been examined. The objectives of this pilot study were to evaluate the effectiveness of conveying the risk of vision loss from personal retinal images and current level of glycemic, blood pressure, and blood lipid control in a patient education tool on motivation for self-care among diabetic patients and glycemic control in the primary care setting.

Materials and Methods:
46 patients with type I or type II diabetes (DM) were randomized into intervention (DM education material + personal retinal images discussion) and control (DM education material only) groups. Retinal photos were taken using a non-mydriatic fundus camera. Primary outcomes included measures of the Health Belief Model (self-efficacy, perceived severity, perceived susceptibility, perceived threat, and perceived benefits) evaluated at baseline, immediately after the education session, and at 4-month follow-up using modified, validated questionnaires. The secondary outcome was glycemic control, which was assessed by HbA1c measurements at baseline and at 4-month follow-up. Paired t-tests, Wilcoxon signed-rank tests, and two-sample t-tests were performed when appropriate.

Results:
A total of 39 patients completed the study: 20 from the intervention group, and 19 from the control group. With regards to the Health Belief Model, the intervention group had a significant increase from baseline in self-efficacy for diet ($p = 0.046$) and exercise ($p = 0.038$) immediately following the retinal image discussion. Both intervention and control groups had significantly increased perceived self-efficacy with respect to exercise ($p = 0.006$ and $p = 0.047$, respectively) at 4-month follow-up. The intervention group also had significantly greater perceived risk severity

for strokes compared to control (p = 0.045). In terms of glycemic control, the intervention group had a mean HbA1c decrease of -0.13 between baseline and 4-month follow-up (p = 0.662), whereas the control group had a mean HbA1c increase of +0.3 (p = 0.419). However, comparison in glycemic control between both groups was not statistically significant (p = 0.360).

Conclusions:

Utilization of personal retinal images as an education tool in the primary care setting significantly increased diabetic patients' perceived self-efficacy to maintain healthy diets and exercise immediately after receiving the intervention and heightened awareness of stroke as a complication of diabetes. Though the use of personalized retinal images did not demonstrate a significant improvement on glycemic control in this pilot study, a trend towards HbA1c improvement was observed in the intervention group, with worsening levels in the control group. Our results demonstrate promise for tailored education to improve patient compliance in achieving goals. Additional studies using larger sample sizes should be considered to investigate this relationship further.

Acknowledgements:

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Retrospective Analysis of Causes for Buprenorphine Treatment Failure

Background: Prescription opioid misuse and abuse in the United States has been identified as a devastating epidemic by the Centers for Disease Control. Long-term opioid use in the treatment of chronic pain carries risks for abuse and addiction, fatal respiratory depression and possibly opioid-induced hyperalgesia. Buprenorphine, a semi-synthetic opioid analgesic, was initially introduced as a sublingual preparation. Previously, it has been utilized in the context of treating opioid addiction. Increasingly, buprenorphine is used to treat patients with chronic pain and a diagnosis of opioid use disorder. Buprenorphine is a partial opioid agonist; there exists a ceiling effect on respiratory depression not seen with pure mu opioid agonists. However, the ceiling effect does not seem to apply to buprenorphine's analgesic properties. Thus, it may be used in the treatment of chronic pain with a significantly decreased risk for opioid-induced overdose. However, this medication can be ineffective and/or poorly tolerated in patients with chronic pain and opioid use disorder. The aim of this retrospective clinical study was to describe various factors among patients that discontinued buprenorphine in the treatment of chronic pain to better characterize candidates for effective buprenorphine therapy.

Objective: To identify correlates among patients that discontinued buprenorphine to better predict which patients will benefit from its use.

Design/Methods: Patient health records (n = 32; 17 female; average age = 56.34 years) were evaluated for treatment history prior to, during and after buprenorphine use. Patient demographics, chronic pain diagnosis, years of pain, opioid type and dose prior to buprenorphine, buprenorphine dose, dates of induction and discontinuation, and treatment(s) following buprenorphine were noted. Concomitant medications, history of opioid use disorder, and urine drug screen results during both opioid and buprenorphine use were also recorded. Reasons for discontinuation were categorized as: Lack of Efficacy, Tolerability, and/or Noncompliance. These reasons were not mutually exclusive. Descriptive data analysis was conducted to identify trends between reasons for discontinuation and other data collected.

Results: Significant correlations were not found between the reason for discontinuation and the patients' age or sex. We evaluated the difference between the morphine sulfate equivalent dose

of prior opioid therapy and dose of buprenorphine therapy and found no significant correlation with the reason for discontinuation. Negative findings may support a significant lack of association between commonly suspected variables.

Conclusions: External factors may play a less significant role in buprenorphine responsiveness than previously hypothesized. Further evaluation of history in additional patients who failed buprenorphine will be necessary to elucidate correlates.

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Functional Return after Implant-Based Breast Reconstruction: A Prospective Study of Objective and Patient-Reported Outcomes

Background:
There is sparse literature studying the functional morbidity of subpectoral implant-based breast reconstruction. We aimed to prospectively investigate this technique's impact on objective upper extremity function and patient-reported outcomes.

Methods:
Women undergoing mastectomy and immediate subpectoral tissue expander insertion with ADM sling were enrolled from November 2014 to August 2016. Pre-operative evaluation of shoulder range of motion, pectoralis major strength, and QuickDASH and Breast-Q surveys were conducted preoperatively and at 1 month and 6 months post-operatively, or until return to baseline pectoralis major strength.

Results:
Eighteen women (mean age 51 years, SD 9.6, range 35-72) comprising 26 breast reconstructions completed postoperative follow-up. The average follow-up length was 9 months (range 3 -18 months; SD 144 days).

At one-month follow-up, there was a statistically significant decrease in lower and non-dominant upper fiber pectoralis strength from preoperative baseline ($p < 0.05$). At final postoperative follow-up, 24 reconstructions (92.3%) recovered to at least 80% of preoperative strength in upper and lower fibers.

From preoperative to final postoperative follow-up, QuickDASH scores showed a statistically significant ($p = 0.008$) increase from 4.1 (range 0 – 20.5, SD 6.1) to 18.7 (range 0 – 45.5, SD 13.4).

Physical Wellbeing: Chest was the only Breast-Q domain in which the average score significantly decreased ($p = 0.02$) between preoperative assessment and final follow-up.

Conclusions:
After implant-based breast reconstruction, patients achieve return of objective upper extremity function, but patient-reported outcomes do not return to baseline. Thus, pectoralis-sparing reconstructive strategies such as prepectoral implant insertion should be pursued.

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Reduced Bone Mineral Density and Bone Quality in GHS Rats is Due to Changes in Osteoblast and Osteoclast Activity

Background:

For most physicians, the primary end-point for successful treatment of patients with calcium (Ca)-containing kidney stones is a decrease in the rate of stone recurrence. However, stone formers have both a reduction in bone mineral density (BMD) and an increase in fracture rate compared to non-stone formers. Although acute stone episodes often are resolved quickly, patients may live the remainder of their lives in pain and with reduced mobility due to complications related to fractures. While decreasing stone formation is an important goal, what should concern clinicians equally is preserving and possibly improving the stone formers' BMD and bone quality.

The majority of human kidney stone formers with Ca-containing kidney stones are hypercalciuric compared to non-stone formers. Patients with idiopathic hypercalciuria (IH, an increase in urine (u) Ca with no demonstrable metabolic cause) often excrete more uCa than they absorb indicating a net loss of total body Ca. The source of this additional uCa is almost certainly bone, the largest repository of body Ca. IH has been associated with markers of increased bone turnover.

To help understand the mechanism of idiopathic hypercalciuria, we developed an animal model of this disorder. Through >100 generations of successively inbreeding the most hypercalciuric progeny of the most hypercalciuric Sprague-Dawley (SD) rats, we established a strain of rats that now consistently excrete ~10 times as much uCa as SD controls and universally form kidney stones. These animals are termed genetic hypercalciuric stone-forming (GHS) rats. Compared to SD, GHS rats have a normal serum Ca and absorb far more dietary Ca, similar to observations in many humans with IH. Their kidneys also reabsorb less Ca than SD and their bones have a greater response to 1,25-dihydroxyvitamin D3 to stimulate bone resorption. In long term studies of kidney stone formation GHS rats have been found to have decreased bone mineral density concomitant with increased stone formation.

In this project, we sought to characterize the osteogenic potential of bone marrow stromal cells (BMSC). We cultured BMSCs from GHS and SD long bones in differentiation medium and quantitated mineralization with Alizarin Red S staining. We than compared the level of expression of osteoblastic genes using qPCR from BMSC obtained from GHS and SD adult rat long bones. Finally, osteoclastic potential of monocytes derived from bone marrow was determined through tartrate-resistant acid phosphatase staining.

Results:

BMSC from GHS rats had significantly less mineral content as measured by alizarin red staining when compared to BMSC from SD controls after 21 days in culture (Figure 1, p=0.0013). Expression of osteoblastic genes from BMSC induced to become osteoblasts at three weeks (Figure 2) showed a significant decrease in collagen 1A1 (p=0.049), osteopontin (p=.047), and RANK ligand (p=.000185) in GHS bone marrow derived osteoblasts compared to cells from SD rats. Finally, TRAP staining and osteoclast quantification (Figure 3) demonstrated a significant increase in osteoclast number (p= 2.1×10^{-7}) and area (2.5×10^{-11}) in cells derived from marrow monocytes isolated from GHS rats compared to SD rats.

Summary and Conclusion:

This study confirms a decrease in BMD in GHS rats compared to SD rats. Using primary BMSC cultures, osteoclast number and activity are increased while osteoblastic activity is decreased in GHS cells compared to cells from SD. Alizarin red, a stain that shows mineral accumulation in extracellular matrix, was significantly decreased in GHS BMSC. Collagen 1A1, osteopontin, and RANKL all significantly decreased in GHS osteoblasts compared to SD osteoblasts.

These results suggest alterations in baseline characteristics of osteoblasts and osteoclasts in GHS rats lead to decreased BMD and bone quality, perhaps due to their known increase in vitamin D receptors. Better understanding of the role of GHS bone cells in decreased bone quality may provide new strategies to prevent or reverse the low bone mass and increased fracture risk found in IH patients.

Figure 1: Alizarin Red quantification (A) and representative pictures (B) from three-week differentiation to osteoblasts of bone marrow derived stem cells.
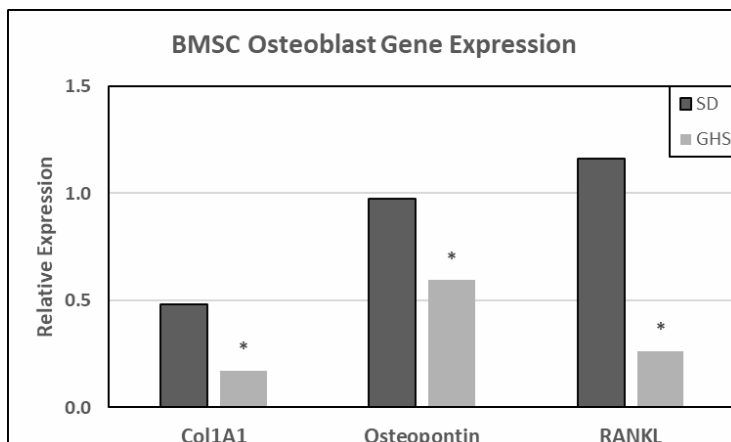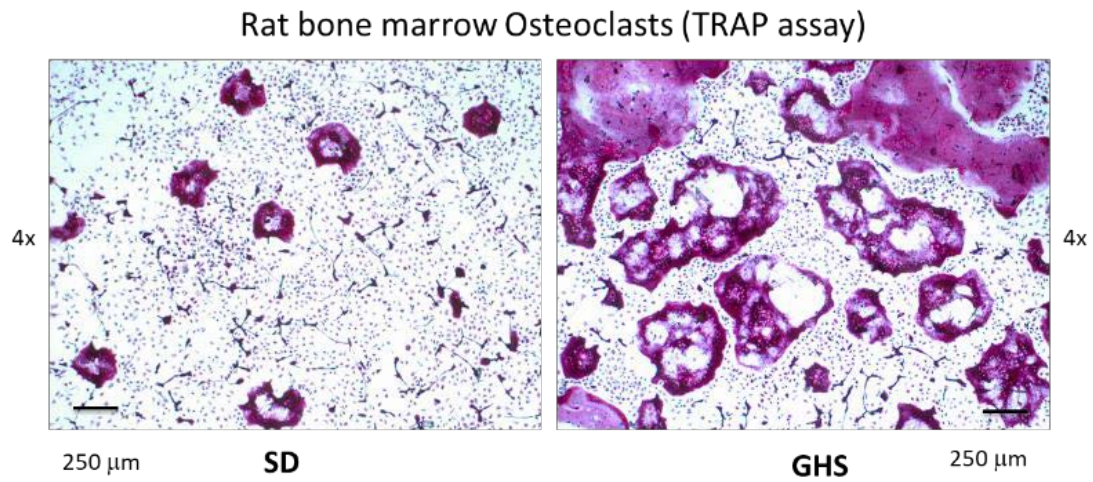
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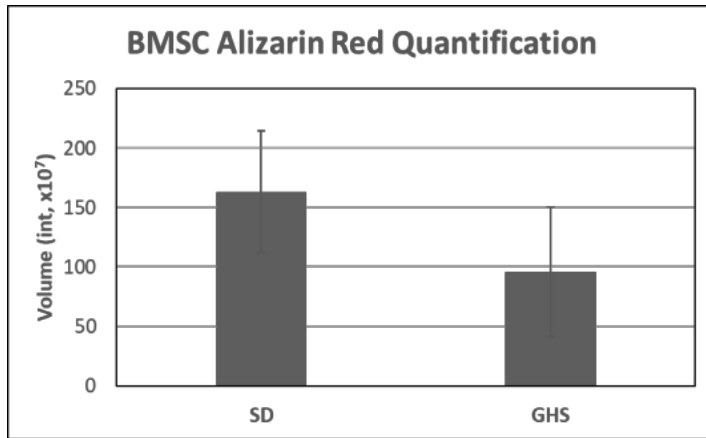
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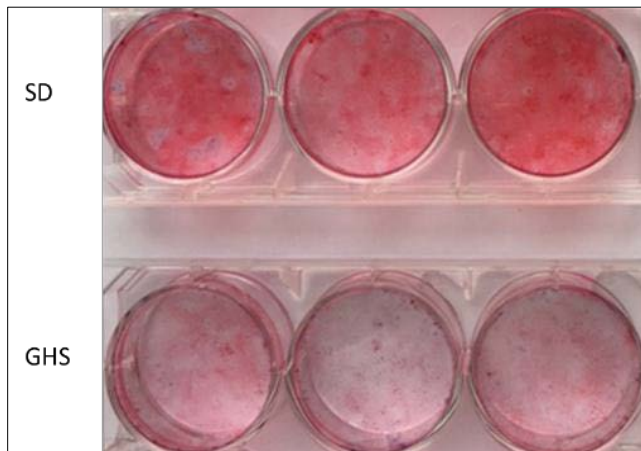
Figure 2: Relative expression of RNA in SD and GHS rats from RNA collected from osteoblast three weeks from differentiation.
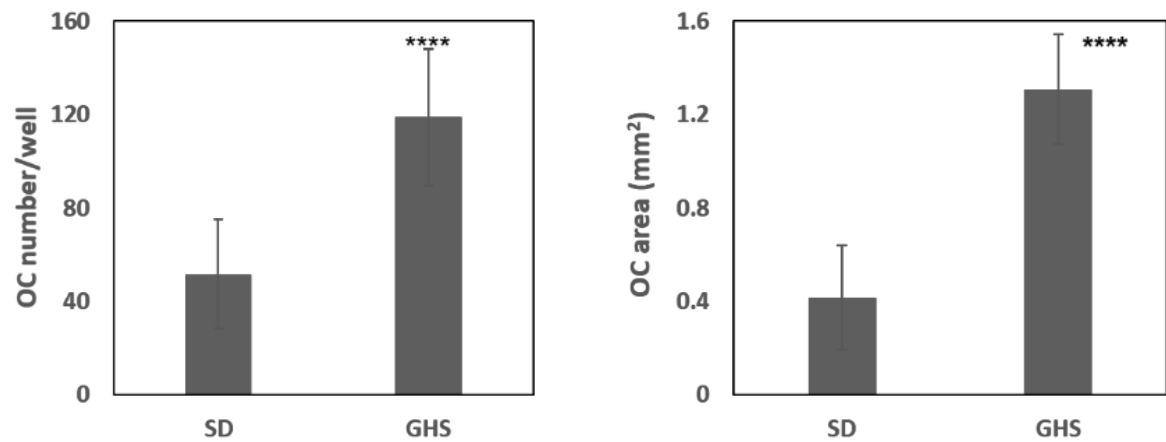
Figure 3: Representative pictures of osteoclast TRAP staining (A) and quantification of osteoclast number and area (B) in SD and GHS rats.

A.

Rat bone marrow Osteoclasts (TRAP assay)

4x   250 μm   **SD**   **GHS**   250 μm   4x

B.

Basic Science, Clinical & Translational Research

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Use of Intra-Operative CT Guided Navigation Versus Freehand/Fluoroscopy in Spine Surgery for Patients Age 10 and Under

Summary
57 patients aged 10 years-old or younger underwent pedicle screws placement with either freehand/fluoroscopic or intra-operative 3D imaging (27) guidance at our institution from 2009-2015. Patients with screws placed under CT guided navigation had lower EBL; however, there was no detected difference in operative time, screw malposition rate, or unplanned return to OR.

Hypothesis
We hypothesized that placement of pedicle screws using O-arm guidance would result in longer OR times and blood loss.

Design
Single center retrospective comparative study

Introduction
Placement of pedicle screws can be performed using freehand/fluoroscopic or intra-operative CT guided navigation. Our institution utilizes both techniques. Utilization of the O-arm allows direct visualization of screw alignment and allows the surgeon to review the screws placement in both the transverse and sagittal plane but results in increased radiation exposure for the patient. We sought to review the outcomes for pedicle screw placement using fluoroscopic vs. CT-guided navigation.

Methods

All included patients were aged 10 years or younger and underwent pedicle screw instrumentation between 2009 and 2015 with a minimum of 2 years follow up. Incidental CTs following the index surgery were reviewed to assess screw positioning.

Results

57 patients aged 10 or younger underwent spinal instrumentation at our institution between 2009-2015. 30 patients had pedicle screws placed using fluoroscopic guidance, while 27 patients had pedicle screws placed with CT-guided navigation. Patients with navigation had a lower total estimated blood loss (EBL) (436 mL vs. 924 mL, p-value 0.04) however this was not statistically significant when controlling for number of levels fused (EBL/level) (70mL vs. 105 mL, p-value 0.3). No patients required repeat surgery as a direct result of screw malposition.

Conclusion

Patients with pedicle screws placed under O-arm guidance had a statistically significantly reduced EBL (p-value 0.04), however, this difference did not hold after controlling for number of levels fused. There were no significant difference in operative time or return to OR for screw malposition in EOS patients undergoing pedicle screw placement with freehand vs. CT-guided navigation. Blood loss was less in the patients undergoing screw placement with CT-guided navigation.

	Fluoro/Freehand	O-Arm	P-value
Number of Cases	30	27	
Gender (M/F)	(16/14)	(12/15)	0.5
Number of OR spins	--	2.1	
EBL (mL)	924.3	436.1	0.04
EBL/Level	104.5	70.1	0.3
Op Time	415.7	387.3	0.42
Op Time/Level	63.5	62.3	0.92

Basic Science, Clinical & Translational Research

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Analysis of Gene Expression in Leukemia Stem Cells from Refractory AML Patients Identifies FOXC1 as A Critical Driver of Leukemia Initiating Ability

Acute Myeloid Leukemia (AML) is the most common type of acute leukemia in adults and is also associated with the poorest clinical outcomes. There is currently a 5-year survival rate of 25.9%, and, for patients' refractory to induction, outcomes are worse yet; less than 5% of these men and women will survive to five years. Certain clinical markers, such as advanced age, and the presence of high risk cytogenetic aberrations may be associated with resistant disease, but studies suggest that they are only "fairly predictive" of it—leaving the question as to why 20-40% of AML patients go on to fail induction largely unanswered.

To this end, an important avenue of inquiry has involved leukemia stem cells (LSC); populations of cancerous cells capable of both self-renewal as well as differentiation into blasts, thereby both maintaining and propagating a patient's leukemic burden. The existence of such a cell has been described in the context of breast, colorectal, central nervous system, and pancreatic cancers as well; however, AML remains the premier disease model for work with cancer stem cells.

Our group and others previously described an 8- to 40-fold expansion of the LSC pool in patients with relapsed disease. In subsequent work, we sought to characterize the relationship between LSC populations and primary refractory disease. Our results indicate that a number of treatment refractory AML patients harbor markedly enlarged LSC pools. Importantly, when injected into non-irradiated NSG mice, only those sorted LSC populations from refractory samples were able to engraft, while remission samples did not. Gene expression analysis of these LSC populations identified ninety-five differentially expressed genes, as compared to LSC populations in complete remission samples and normal bone marrow. Amongst the most highly expressed genes in this signature was the transcription factor, Forkhead Box C1 (FOXC1).

In solid tumors, such as those of the liver and breast, FOXC1 promotes the epithelial-to-mesenchymal transition implicated in metastasis. Additionally, FOXC1 has been shown to induce

a cancer stem cell phenotype in basal-like breast cancer. An important property of stem cells is their ability to maintain quiescence, which likely contributes to chemoresistance in LSC. Depletion of FOXC1 in hair follicles results in loss of hair follicle stem cell quiescence. Within AML, FOXC1 has been shown to promote monocyte lineage differentiation block and increase clonogenic potential.

The ability to engraft has been previously associated with a worse prognosis in AML; however, the specific factors driving engraftment and initiation of leukemia are unknown. Given the upregulation of FOXC1 in engrafting LSC-enriched refractory samples, and the known role of FOXC1 in stem cell maintenance and oncogenesis, we further hypothesize that <u>FOXC1 is a critical driver of leukemia initiating ability:</u>

The dual objectives of this hypothesis are as follows:
1. *Demonstrate that FOXC1 knockdown impedes AML cell growth in vitro*
2. *Develop an in vivo model to assess the role of FOXC1 in leukemia initiation.*

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Demographics and Clinical Characteristics of Traumatic and Non-Traumatic Spinal Cord Injuries

Study Design: Retrospective review

Objective: To evaluate etiology, management, complications, and outcomes following spinal cord injury.

Summary of Background Data: As the population in the United States continues to age, injury mechanisms, treatment, and outcomes of spinal cord injuries (SCI) will also change. It is anticipated that the number of falls will increase, as will the number of non-traumatic spinal cord injuries. There is a scarcity of literature on non-traumatic etiologies.

Methods: Patients with traumatic and non-traumatic spinal cord injuries admitted to the inpatient rehab unit at a Level 1 Trauma Center from 2003 to 2013 were reviewed. Demographics and clinical characteristics were evaluated.

Results: 757 entries were identified, and 685 unique patients met our inclusion criteria. 65.5% were males and 34.5% were females. 17.4% were <35 years of age, 51.7% were 35-64 years of age, and 30.9% were at least 65 years old. The young adults had the highest proportion of fractures (60.5%) and subluxations (21.8%), while the oldest group had the highest rates of stenosis (35.4%), spondylotic myelopathy (16.5%), and cancer (15.1%). In patients <35 years of age, 66.6% were caused by falls, motor vehicle accidents, and violence, while only 30.2% of the geriatric SCI were caused by these traumatic mechanisms of injury. 61.6% of all SCI were non-traumatic. Surgical management was more prevalent with increasing age (58.8%, 73.7%, 82.1% from youngest to oldest group), as were overall complications rates (58.6%, 59.4%, 66.7%). Mortality rates significantly increased with age at all time points post discharge (2.5%, 18.9%. 40.6% overall mortality rates in the three age groups). The overall mortality rate in non-traumatic SCI was 27.7% compared to 14.8% in traumatic SCI patients.

Conclusions: Falls caused significantly more SCI than expected, and most SCIs were predominantly non-traumatic in etiology. The epidemiology of SCI is shifting rapidly.

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Cricothyrotomy and Tracheostomy Simulator Using 3-D Printing and Hydrogel Polymers

Cricothyrotomy and tracheostomy procedures are normally performed in emergency situations where there is inadequate access to the patient's airway. Medical residents who are expected to perform the procedures, such as anesthesiologists and emergency medicine physicians, often have inadequate training to perform the procedure without compromising patient safety. This is in part due to the lack of training opportunities, as inexpensive and realistic training modules are not available. Current training therefore relies on live patients, which can lead to complications. Our research involved designing an anatomically correct 3D training module on which the procedures could be performed safely, in order to provide residents feedback on performance before they perform the procedures on live patients. Thus far the full 3D model of neck structures has been built, but has yet to be fully tested using medical professionals to test the validity of the model. A hydrogel polymer membrane simulating the cricothyroid membrane, and also the tracheal membrane has been developed. Hydrogel polymers that simulate the various skin and fascial layers of the neck has been developed. Future testing will be designed to simulate live testing conditions in order to get professional feedback. Vasculature will also be added to the models in order to simulate bleeding during the procedures. Tissues that simulate the human tracheal rings and thyroid cartilage will be created in order to make the model as anatomically correct and realistic as possible. There is potential in using this low cost simulation model to train future residents in performing cricothyrotomy and tracheostomy procedures safely before performing them on live patients in order to lower patient complication rates.

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Redundant Target Effect in Patients with Visual Field Defects

Patients with lesions to primary cortical areas or their afferent inputs present with visual field deficits or partial blindness within their field of view. While those patients do not have conscious perception of visual information presented within areas of deficit, the brain still receives and processes visual data from the blind field via projections that bypass the geniculate-striate pathway. Behavioral manifestations of non-geniculate-striate pathway visual processing are referred to collectively as 'Blindsight'. A simple experimental paradigm was adapted to study blindsight—participants push a button when any visual stimulus appears. On some trials one visual stimulus appears; on other trials two stimuli appear. It is known in neurotypical individuals that response times are faster for detection of multiple targets compared to a single target (the Redundant Target Effect, RTE). Three patients with visual field defects secondary to stroke were tested using the Redundant Target Effect paradigm. The location of the stimuli varied randomly around the center fixation point; when a second visual stimulus was also presented it could appear in either the intact or the blind hemifield. Reaction times for double stimuli presentations where the second stimulus was within an unaffected visual field region were faster than reaction times for singly presented stimuli, demonstrating RTE. Reaction times for double stimuli presentations where the second stimulus was within the region of visual field defect were also faster than reaction times for singly presented stimuli demonstrating RTE. While significance testing indicates that more trials are required, these initial results provide preliminary support that the RTE may serve as an index of non-geniculate-striate processing in patients with cortical blindness.

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PI3K/Akt/mTOR Inhibition in AML: Overcoming Resistance to Enhance Effectiveness

The phosphatidylinositol 3-kinase / protein kinase B (Akt)/ mechanistic target of Rapamycin (PI3K/Akt/mTOR) pathway is amplified in 60 - 80% of patients with acute myelogenous leukemia (AML). AML is a collection of clonal disorders resulting in an accumulation of dysfunctional and unregulated hematopoietic stem cells and myeloid progenitor cells. These immature cells accumulate in the bone marrow where they impede normal marrow cell numbers and function, causing anemia, thrombocytopenia, and neutropenia, which may manifest as bleeding, bruising, fatigue, or recurrent infections. AML is the most common cause of adult acute leukemia and the second most common cause of childhood leukemia. AML primarily affects patients over the age of 60, with the median age of diagnosis hovering at 65. Although elderly patients are more likely to get AML, they are also far more likely to have a poor prognosis. Most patients with AML go into remission following polychemotherapy, however a large number will subsequently relapse and require salvage therapy. Due to both a more susceptible leukemia cell population as well as a greater ability to tolerate high doses of chemotherapy, younger patients tend to have a better prognosis. However the five-year survival rate is still low at 20% for all ages, and it is even worse for patients over 60 and in those who have progressed to AML after having myelodysplastic syndrome (MDS) or exposure to antineoplastic agents for treatment of other malignancies. This low survival rate, especially for high-risk patients with resistant leukemia phenotypes, secondary leukemia, elderly patients, highlights the need to identify new therapeutic approaches in AML.

The PI3K/Akt/mTOR pathway is a good candidate for investigation as this complex pathway is crucial to cell functions such as growth, proliferation, and survival, inhibition would be postulate to inhibit leukemia initiation and propagation. Inhibitors of mTORC1 have been met with limited success in AML due to multiple resistance mechanisms including direct insensitivity of the mTORC1 complex, feedback activation of the PI3k/Akt signaling network, insulin growth factor -1 (IGF-1) activation of PI3K, and many others. This review functions to explore the role of mTOR inhibition in AML, mechanisms of resistance, and means to improve outcomes through use of dual mTORC1/2 inhibitors or dual TORC/PI3K inhibitors.

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Effects of In-Home Endotoxin on Children's Asthma Control in a Rural, Dairy Farming Community

This research was conducted at the University of Washington.

Background: Endotoxin, also known as lipopolysaccharide (LPS), is a component of bacterial cell walls. Exposure to LPS causes airway inflammation via Toll-like receptor (TLR) 4 and can produce an obstructive airway response. Dairy farms are a potential source of LPS. While occupational LPS exposure in the setting of dairy farming is associated with pulmonary symptoms and airway inflammation, we know little about the effects of LPS in rural communities and among children who live near dairy farms.

Hypothesis: We hypothesized that, after controlling for correlated environmental exposures, age, gender and income, higher levels of in-home LPS would be associated with poorer asthma control among asthmatic children whose primary home is within a half mile of a dairy farm.

Methods: Children with physician-diagnosed asthma who were participating in the Yakima Valley Farm Workers Clinic's asthma education program were enrolled in our intervention study. The aim of the intervention study is to determine the effectiveness of an in-home air purifier and whether or not the intervention reduces levels of household asthma triggers ($PM_{2.5}$, ammonia and LPS), beyond the effects of asthma education alone. The present study included only children who completed all pre-intervention activities: household exposure assessment, lung function testing and completion of a demographic questionnaire and the Asthma Control Test (ACT), a validated measure of asthma control. LPS was measured by way of an electrostatic dust fall collection device. ACT scores were measured at two time points before the intervention, at a clinic visit and a home visit. Data were analyzed with generalized linear mixed effects models.

Results: Fifty children completed all pre-intervention, study related activities and are included in the present analysis. Demographics were consistent with previous studies conducted with this population. $PM_{2.5}$ and ammonia levels were also within expected ranges. The geometric mean (GSD) of LPS concentrations measured in homes was 2198 (6) endotoxin units/m^2, and the minimum and maximum were 44 and 76040, respectively. In univariate analysis, LPS concentration was associated with lower ACT scores (poorer asthma control), but the effect was not significant. The effect of LPS was robust to the inclusion of age, gender, income, $PM_{2.5}$ and ammonia, but the effect remained not significant.

Conclusions: In-home LPS concentration had no significant effect on ACT score; however, the direction of association was consistent with our hypothesis and warrants study in a larger population. As we continue to enroll subjects in this ongoing intervention study, we expect to see the effect of LPS on ACT score approach significance.

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Development of an Intraoperative Electrophysiological Monitoring Simulator for a Peripheral Nerve Schwannoma Model

Introduction:
Surgical education currently relies heavily on direct training in the operating room. As operative times increase during teaching, patient safety is unfortunately threatened. Peripheral nerve tumors are relatively rare surgical cases, leading to underprepared resident graduates for this procedure. A Schwannoma is a benign nerve tumor made of Schwann cells that tends to push the nerve in the affected area aside and if not removed in a timely manner, can cause debilitating pain, numbness, weakness, or infection. Resecting a nerve-based tumor has many technical nuances to prevent nerve damage during surgery. This project aimed to develop a simulator that measures nerve stretch and replicates intraoperative stimulation for use during practice resection of a sciatic nerve schwannoma.

Methods:
Using 3D printed injection molds and polyvinyl alcohol (PVA) hydrogel, a peripheral nerve schwannoma surgical phantom was fabricated. In order to measure stretch and electrical stimulation for training metrics, conductive wires were implanted into the nerve and connected to a computer through a digital analog converter. For stretch validation, the conductive sensor was stretched vertically in 1cm increments and voltage was recorded. To test the ability for electrical stimulation to locate a nerve, a tumor model was stimulated around the transverse circumference in 0.5mm increments (figure 1). Voltage at each distance from the nerve fascicles was recorded.

Results:
We were able to accurately measure the amount of nerve stretch and locate the simulated fascicles in a predictable pattern (figure 2 and 3). The percent voltage increase during nerve stretch was

22.5% per centimeter (SD=0.06) up to 5cm. Upon stimulation, there was a 117% increase in voltage when the probe was within 5mm (p=0.005) of the nerve fiber simulators. Incorporation of the nerve simulators into the full posterior thigh model provided a realistic surgical experience with the added benefit of immediate performance feedback without compromising the safety of patients.

Conclusion:

Simulation can protect patients from novice errors of basic technique. A low-cost, high fidelity schwannoma resection simulator was achieved using 3D printing, PVA hydrogels, and conductive wire. Incorporation of the electrical wire was critical to provide metrics on the degree of nerve stretch, fascicular damage, and permit intraoperative stimulation. Next steps for this project are to perform full simulation validation studies, and create a peripheral nerve training curriculum.

Figure 1: Image of the schwannoma tumor model with stretch and conductive sensors to simulate nerve activity.
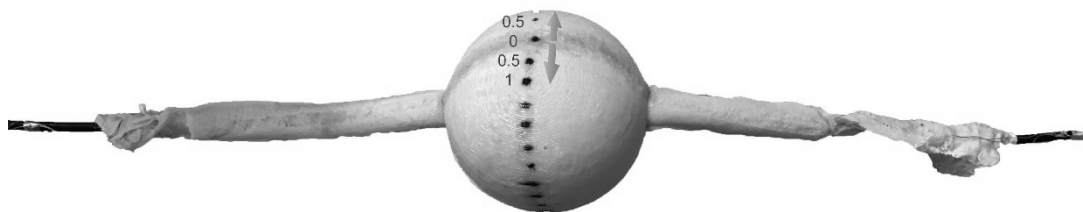
Figure 2: Stimulation validation with an electric probe on the tumor model sensor. The mean of the "no-nerve" area (control area with no nerve present) was 4.89V, and the mean "on-nerve" reading was 5.75V (p=0.005).

Simulated Nerve Fascicle Stimulation With Electric Probe Around Tumor Circumferene
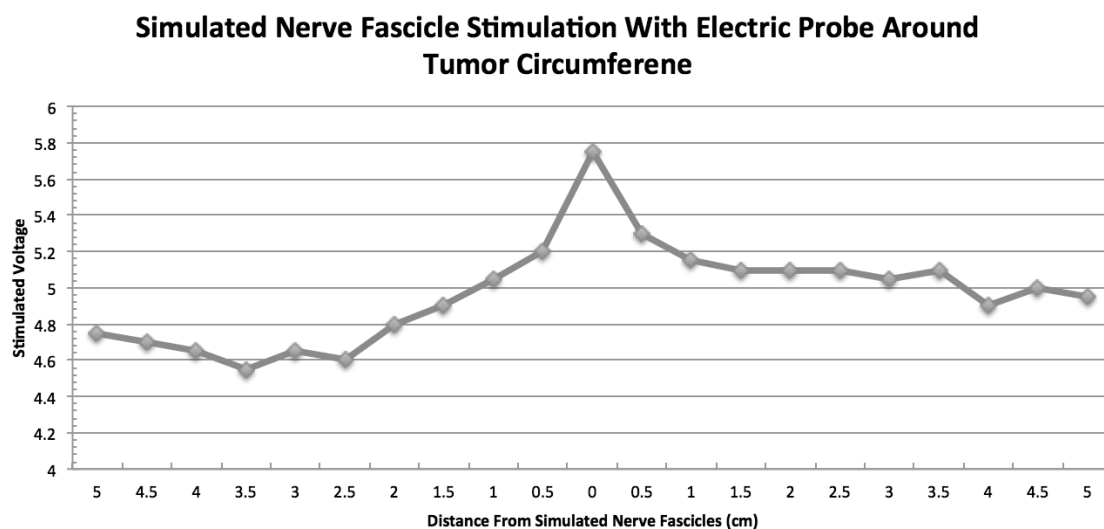
Figure 3: Stretch validation with percent voltage change per centimeter. A linear regression of slope 22.5% per centimeter up to 5cm of stretch (SD 0.06) was noted.
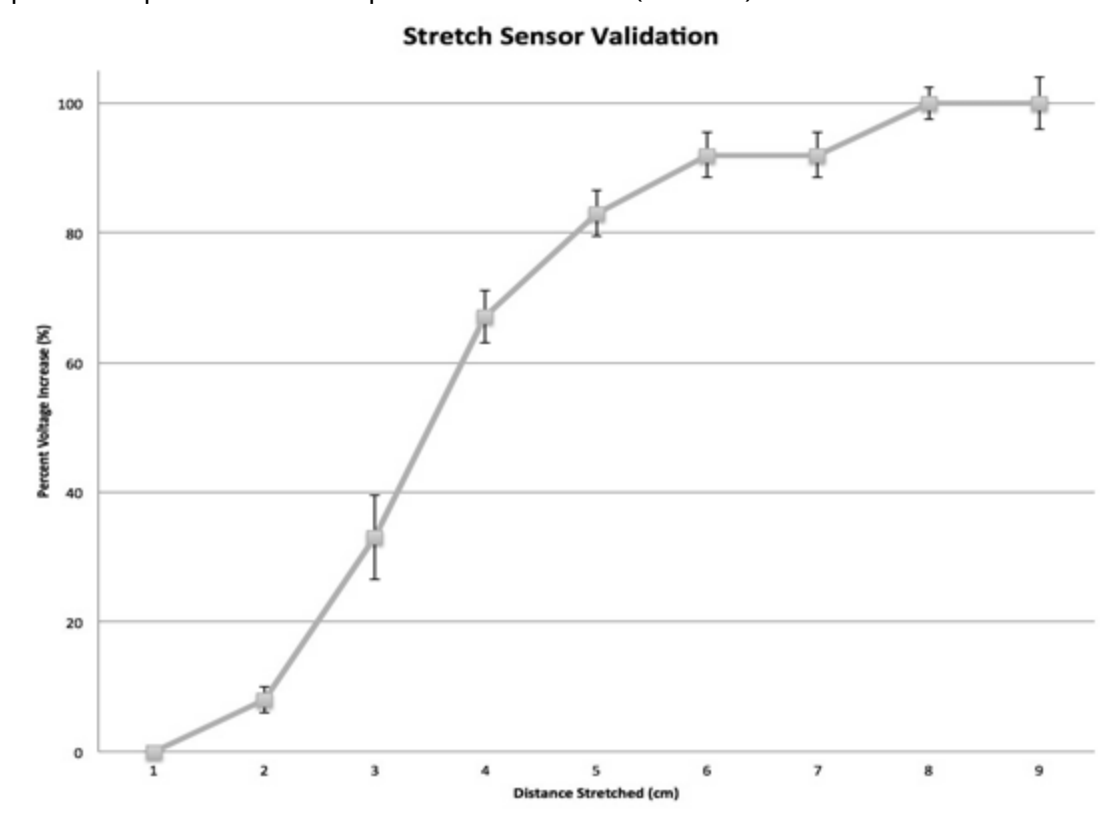
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Histological Assessment of Morphology, Fibrosis, and S100A4 Expression Profile in Murine Abdominal Adhesion Tissue Samples

Introduction

Abdominal adhesions most commonly occur in response to peritoneal tissue trauma during abdominal and pelvic surgeries. Serious consequences resulting from post-operative abdominal adhesions include female infertility, chronic pain, intestinal obstruction, and preclusion of surgical entry into the abdomen during subsequent procedures. Abdominal adhesions have a tendency to reform after treatment with removal through laparoscopic or open surgery. To find alternative methods to treat adhesions, there has been a focus on understanding the cellular and molecular mechanisms behind adhesion formation in order to identify therapeutic candidates to prevent or reverse adhesion formation. In the present study, we have established a murine model of abdominal adhesions to study the characteristics of tissue morphology and fibrosis in surgery-induced abdominal adhesions. We also looked at the tissue expression profile of S100A4, a calcium binding protein that has been implicated in various pathologically fibrotic conditions.

Methods

Abdominal adhesions were induced in C57BI/6J wildtype mice (Jackson labs #0664) using a surgical procedure described by Marshall, et al. The procedure consisted of anesthetizing the mouse, creating an abdominal skin incision, exteriorizing the cecum, abrading the cecum with sterile sandpaper, abrading and suturing the peritoneal surface of the muscle of the abdominal sidewall, and closing the abdominal incision. The abdominal adhesion tissue was harvested at seven days post-surgery to histologically assess tissue morphology (Hematoxylin & Eosin stain), collagen accumulation as an indicator of fibrosis (Masson's Trichrome stain), and S100A4 expression (Immunohistochemical stain). Tissue samples from non-operated mice were used as controls.

Results

Cecum had become attached to abdominal wall by day seven when tissue samples were collected. Hematoxylin and Eosin stained sections of adhesions at seven days post-surgery showed cecum attached to the abdominal wall via an adhesive interface containing fibrous connective tissue. The presence of fibrosis was also indicated by Masson's Trichrome stained sections showing an

abundance of collagen accumulation at the adhesion interface between cecum and abdominal wall. Such accumulation of collagen was not observed in Masson's Trichrome stained tissue sections of cecum and abdominal wall from non-operated mice. Immunohistochemical stained tissue sections showed S100A4 protein expression throughout the abdominal wall with highest S100A4 expression at the adhesion interface.

Conclusion

A murine model for studying abdominal adhesions was successfully established in our lab. The surgical procedure induced the formation of adhesion between cecum and abdominal wall. Adhesion formation was confirmed by assessing both gross and histological morphology of the attachment site between cecum and abdominal wall. The abundance of collagen accumulation at the adhesion interface suggested the presence of fibrotic connections that are characteristic of adhesion formation. This will provide a model for studying the cellular and molecular mechanisms, such as the role of S100A4, behind the formation of abdominal adhesions.

Acknowledgements

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The Cingulate and Insular Cortices and the Affective Dimension of Pain: Neuroconnectivity and Potential Targets for Chronic Pain Therapy

Pain, as a conscious experience, can be broken down into two dimensions: the "sensory" dimension, consisting of the qualitative/quantitative physical sensation of pain; and the "affective" dimension, consisting of the negative-valence emotional state of suffering. These dimensions can and have been modulated and studied independently (Kupers, Konings, Adriaensen, & Gybels, 1991; Rainville, Carrier, Hofbauer, Bushnell, & Duncan, 1999). Functional differences have been observed between the activation patterns necessary to elicit each of the dimensions of pain (Kong et al., 2006). However, these models are limited in detail (Treede, Kenshalo, Gracely, & Jones, 1999). The concept of pain as a collection of signals able to be modulated and processed has roots in the gate-control theory of pain (R. Melzack & Wall, 1965), which showed the ability of non-noxious stimuli to down-regulate ascending pain signals. Later, a more complicated model was proposed (the "neuromatrix"), which describes pain as the cooperative activation of a number of high-level brain regions, irrespective of any specific sensory stimulus (R. Melzack, 2001). It is of interest to clinicians and neuroscientists alike to better understand the necessary and sufficient activity required to produce various aspects of the conscious pain experience.

This project seeks to determine if there is anatomical evidence to support the theory of region(s) within the ACC (anterior cingulate cortex) or MCC (medial cingulate cortex) as hubs for processing a collection of stimuli as "painful suffering". Specifically, is there a region in the ACC or MCC with overlapping inputs from anteromedial thalamic nuclei and the insula? There is already some imaging and lesion-study evidence that these proposed converging information streams are not segregated within the cingulate (Tolomeo et al., 2016). We have aimed to further examine and validate this model using invasive dye tracings in macaque monkeys.

A literature review was conducted of neuroanatomical studies on sensory and affective pain in humans and NHPs. Studies reviewed included task-based nerve recordings and tracer-based tissue studies. A neuroconnectivity map was created based on the aforementioned literature review. A modified selection from this map is shown below. The following nodes of interest were

identified: 1) Brodmann area 24b within the ACC (receiving connections from MD and CenL thalamus), and 2) Anterior insula (with input from the thalamus and projections to the cingulate and amygdala).

The hub analysis aspect of this project has not yet been completed. Slide sets of anterograde and retrograde injections in cortical and thalamic regions of interest in macaque monkeys have been charted and divided into sub-regions for future analysis. The next step of this project will be to perform the analysis on these slide sets. This poster presents the summation of my research for and creation of a pain map, which serves as one of the primary goals of this project.
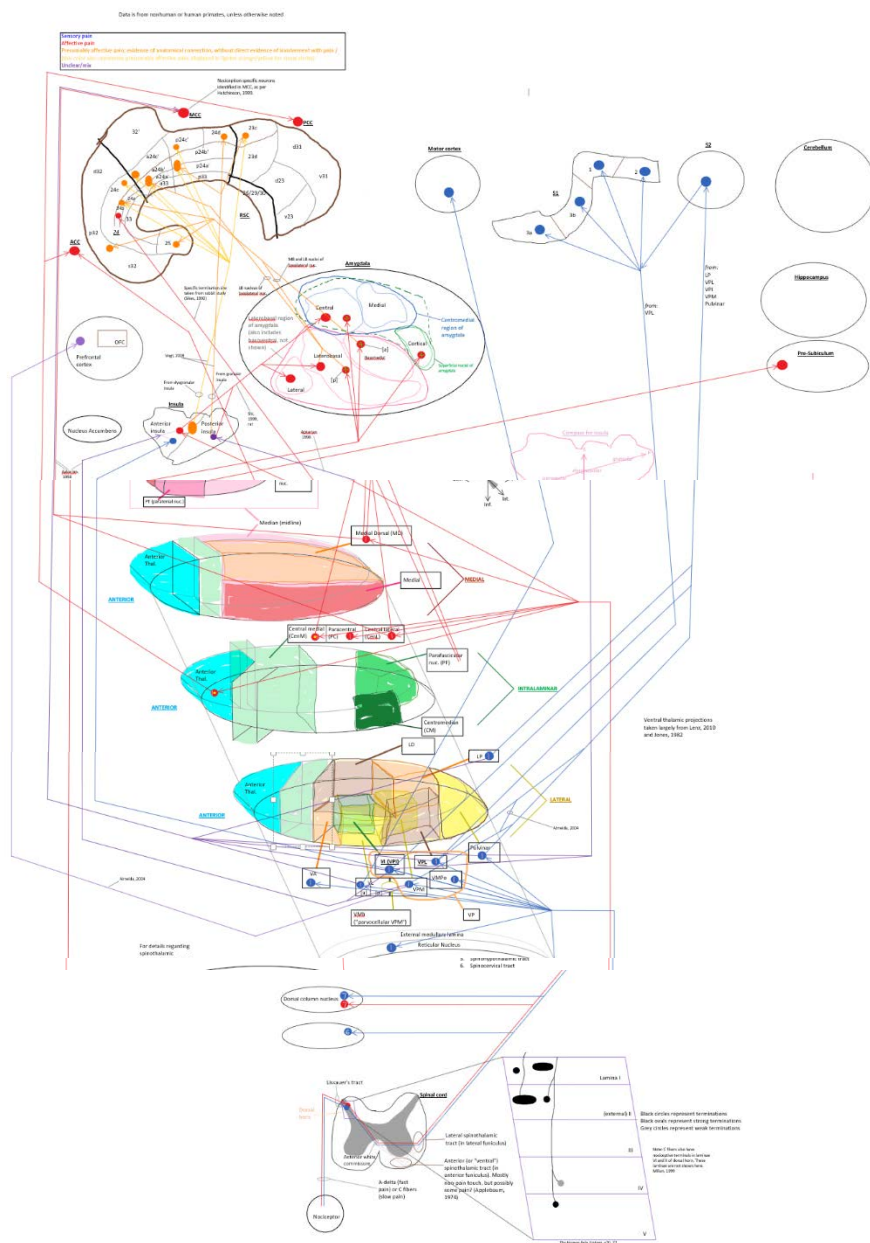
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Bridging the Digital Divide: Community Outreach for Parkinson Disease

Objective
The Parkinson Disease Care New York (PDCNY) three month outreach effort has been implemented to inform and engage communities in receiving Parkinson disease telemedicine care.

Background
Recent Medicare data shows that 42% of beneficiaries with Parkinson disease have not seen a neurologist. This discrepancy is likely due to distance, disability, and distribution of doctors. Telemedicine can provide care directly into their homes. However, adoption has been slowed by social factors and the "Digital Divide". In an effort to bridge the gap in access to neurological care, our outreach strategies have targeted underserved communities in both the Greater Rochester region and New York State.

Methods
We identified 39 senior centers/senior programs, 49 community organizations, 22 senior villages, 14 libraries, 3 New York State health systems, 13 Offices of the Aging, 60 assisted living/independent living facilities, and 5 primary care offices to enroll individuals with Parkinson disease from primarily underserved communities. Methods of outreach include email, phone calls, in-person meetings, presentations, and collaboration with community leaders. Additionally, we determined five potential locations for community telemedicine "hubs" where telemedicine visits for individuals without internet can be conducted.

Results
As of August 2017, we reached 35 senior centers/senior programs, 24 community organizations, 6 senior villages, 10 libraries, 3 New York State health systems, 13 Offices of the Aging, 11 assisted living/independent living facilities, and 3 primary care offices. Since June 2017, we established 3 telemedicine hubs, conducted 6 presentations, and enrolled 23 participants. Total enrollment

demographics include an average age of 69.6, with 37.3% women, 66.7% with a bachelor's degree, and 51.4% who had not previously seen a Parkinson disease specialist (**Table**).

	PDCNY
Age (range)	69.6 (34-91) (n = 102)
Women [n (%)]	38 (37.3) (n = 102)
Bachelor's degree or higher [n (%)]	70 (66.7) (n = 105)
Parkinson disease specialist [n (%)]	51 (48.6) (n = 105)

Conclusion

Despite a minimal increase in enrollment, both our qualitative and quantitative results suggest community outreach efforts are an important long-term strategy in recruitment of underserved individuals. Compared to previous studies, we have enrolled an older, less educated population who had previously received less specialty care. Future efforts require a sustained community outreach plan including continued development of existing partnerships, an increase in the number of satellite clinics, and gaining support from state and local community leaders.

Basic Science, Clinical & Translational Research

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Preventing Teen Pregnancy with LARC: Evaluation of Overall Impact

Background: The United States continues to have higher rates of adolescent pregnancy than most other developed nations and large disparities in race/ethnicity and income persist. Inconsistent contraceptive use is one factor that contributes to teen pregnancy. Although long-acting reversible contraception (LARC) is the first-line contraceptive choice for teens, its use among adolescents remains low.

Methods: In 2014, the Greater Rochester LARC Initiative was initiated to increase LARC use among teens in Rochester, New York by providing scientifically accurate information about LARC to adults who work with teens in medical and community-based organizations. LARC Initiative talks were delivered using an academic detailing approach and aimed to increase the "supply" of healthcare practitioners providing LARC and the "demand" for LARCs among teens. The impact of the program will be assessed by using an interrupted time-series analysis to measure the number of LARC insertions in adolescent females in Monroe County before and after the intervention. Comparison with national statistics will allow for differentiation from the secular trend.

Results: Preliminary data from 4 clinics in the city of Rochester show that from 2014 to 2017, the cumulative number of LARC insertions in adolescent females was 1095. This represents an increase from about 20 quarterly to 80. These preliminary data are very promising and suggest a more comprehensive study is warranted. Community-wide data yet to be obtained will provide a more accurate population-level picture of the trend in LARC uptake before and after the start of the intervention. Third-party longitudinal objective administrative data from all important regional payers will allow a more rigorous examination of LARC use.

Conclusions: Preliminary data from 4 clinics in Rochester show an increase in LARC uptake during the years in which the LARC Initiative was active. Delivering educational talks with evidence-based information on LARC to adults who work with teens may be a feasible means of increasing LARC use.

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Tic Severity, Sensory Preferences and Sensitivity to Stimuli in Children with Tourette Syndrome

BACKGROUND: Tourette syndrome (TS) is a neurobiological disorder characterized by involuntary motor and phonic tics that is estimated to affect up to 1% of school-age children. TS is typically associated with premonitory sensory phenomena, or urges, that precede the tics. Despite this important clinical feature, the sensory function in children and adolescents with TS is not well understood.

We posed several questions about the population of children and adolescents with TS:
1) Do they have impaired olfactory or tactile sensory function?
2) Are their behavioral responses and interactions with sensory stimuli normal?
3) Do their sensory behavioral responses correlate with measures of sensory function?
4) Do the behavioral responses or sensory functions correlate with tic severity?

We hypothesized that children and adolescents with TS would have sensory function that is within the range of normal. Additionally, we hypothesized that our study population would have greater behavioral responsiveness to sensory stimuli than has been reported in healthy controls. Finally, we hypothesized that the behavioral sensory responsiveness would be positively correlated with tic severity, but that sensory function would show no relationship to tic severity.

METHODS: 8 subjects between the ages of 7-17 with a diagnosis of TS were recruited from the University of Rochester Tourette Association of America Center of Excellence, provided informed consent and assent, and completed the full battery of assessments.

Sensory function was assessed in two modalities: olfaction and somatosensation. For olfaction, each subject's detection threshold and ability to discriminate were tested using Sniffin' Sticks, a validated tool with normative standard values. For somatosensation, two-point discrimination was measured on each subject's index finger on the dominant hand. The Sensory Profile was used as a well-validated test of sensory preferences and adaptive behavior (behavioral sensory responsiveness). The Yale Global Tic Severity Scale (YGTSS), the gold standard assessment of tic severity, was administered to measure tic severity in each subject.

RESULTS: All 8 of our subjects had a threshold within the normal range of 2-5mm for two-point discrimination, 5 of which were within two standard deviations of the mean of 2.6mm. For scores relating to olfactory threshold and discrimination, all 8 of our subjects had an olfactory threshold score and an olfactory discrimination score within two standard deviations of the mean for their age group and sex. This supports our hypothesis that children with TS have sensory function that is within the range of normal for the modalities of olfaction and somatosensation.

6 out of 8 subjects had behavioral sensory responsiveness that was either "more than others" or "much more than others" as defined by the Sensory Profile in at least one sub-score. This translated to a score greater than one and two standard deviations above the mean, respectively. Elevated scores indicate maladaptive behavior interacting with one's environment. This supports our hypothesis that our study population would have Sensory Profile scores higher than most of their peers.

Sensory Profile scores showed no strong correlation with scores of olfactory function, which supports our hypothesis. However, Sensory Profile scores showed a positive correlation with two-point discrimination; i.e. the higher the Sensory Profile score, the worse the tactile discriminating ability. This correlation had an R^2 value of 0.52 and a significance of 0.043. This unexpected result will require verification with a larger sample size.

Sensory Profile scores did not correlate with YGTSS scores. This did not support our hypothesis of a significant positive correlation between sensory behavior and tic severity.

Scores of sensory function correlated variably with YGTSS scores. Two-point discrimination showed no correlation with YGTSS score. Olfactory discrimination showed a positive correlation YGTSS score; i.e. the more severe the tics, the better the olfactory discriminating ability. This had an R^2 value of 0.50 and a significance of 0.049. Olfactory threshold showed no significant correlation with YGTSS score. This data does not support our hypothesis that sensory function scores would not correlate with YGTSS scores, and will require verification with a larger sample size.

CONCLUSIONS: Children and adolescents with TS have more sensory preferences and an increase in maladaptive sensory related behaviors. The measures of sensory function indicate that the sensory sensitivity of individuals with TS is not due to differences in sensory physiology, but to differences in how sensory stimuli are interpreted emotionally or behaviorally. In other words, sensory preferences and adaptive behavior in response to them are likely due to differences in higher cortical function. While preliminary, these findings suggest that the focus of effective treatment for these individuals should be behavioral therapy rather than environmental modification or desensitization therapy.

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Evaluating Renal Dysfunction in Pediatric Hematopoietic Cell Transplant Recipients

Background: Hematopoietic cell transplantation (HCT) is a life-saving procedure with significant risks to the kidneys. Kidney damage can occur due to chemotherapy, radiation, tumor filtration, underlying disease, nephrotoxic medication, graft vs host disease (GVHD), leaky vessels, hepatic sinusoidal obstruction syndrome, viral infections or transplant associated microangiopathy. We sought to investigate risk factors and the incidence of kidney damage in pediatric HCT patients and associated risk with mortality.

Methods: We retrospectively collected data on patients who had a HCT at Children's National Medical Center from 2013 to August 2016. Patient and transplant demographics, chemistry values and urinalysis values were collected at pre-transplant evaluation. Chemistry lab values, urinalysis, infection status and renal replacement therapy (RRT) status were collected at day 30, day 100, 1 year and 2 years post-transplant. Using KDIGO criteria, it was determined if patients had acute kidney injury (AKI) or chronic kidney disease (CKD) at each time point. Significant differences were tested between the group that had AKI and that did not. Interval differences values were analyzed using Wilcoxon rank sum testing and categorical were analyzed using chi-square analysis. Results were considered significant with a p-value of <0.05.

Results: Ninety-eight patients were included in the study: allogeneic (n= 96) or autologous (n= 2) HCT, mean age 8.66, 50% African American, 3% Asian, 21% Caucasian, 13% Latino, 13% Other. Forty-seven percent of patients had an AKI within the first 2 years of transplant. Increased risk for AKI was associated with a lower pre-transplant creatinine level (p=0.001), abnormal pre-transplant BUN (p=0.019) and an unrelated donor (p=0.022). For patients that needed RRT (n=8), the risk of death was 19.5x compared to those that did not. A quarter of RRT patients survived and recovered

renal function within 2 years. Twenty-six percent of patients had an AKI within 30 days of transplant. Those with AKI stage 1 at day 30, 10% had reduced GFR and 37% died at 1 year post-transplant. Out of patients with AKI stage 2 or 3 at day 30, 14% had reduced GFR at 1 year and 43% had died at 1-year post-transplant. Out of those that did not have an AKI within the first 30 days, 24% had reduced GFR and 8% had died by the 1-year mark. Overall, those with an AKI had a 3.7 increased risk of death than those that did not.

Conclusion: Kidney injury in pediatric HCT patients has a significant incidence which may be explained by cachectic conditions (low creatinine level), previous kidney damage (abnormal BUN level) and increased immune risk due to minor HLA mismatching with an unrelated donor. For AKI patients that survived to 1-year post-transplant, the majority of them recovered renal function. With 25% of patients having kidney injury after 30 days it will be important to identify ways to reduce kidney insult as the patient is further from transplant.

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Increased Sensitivity of Poor-Prognosis Human MLL-Rearranged Acute Lymphoblastic Leukemia to Proteasome Inhibition (Bortezomib) In Vitro

Infants with MLL-rearranged acute lymphoblastic leukemia (MLL-ALL) represent a subset of acute leukemia with an extremely poor prognosis: less than 35% survival. MLL gene rearrangements result in abnormal fusion proteins that orchestrate pro-leukemic gene expression. Current attempts with therapies targeting MLL biology have not been successful. In primary human MLL-ALL cells we've demonstrated a relative increase in NFkB sub-unit expression compared to non-MLL rearranged ALL cells. To test the hypothesis that MLL-ALL cells would be more susceptible to NFkB inhibition we treated MLL-ALL and non-MLL-ALL cells with bortezomib, an inhibitor of the 26s proteasome necessary for activation of NFkB signaling. Results of bortezomib treated MLL-ALL compared to non-MLL-ALLs showed that MLL-ALL is more sensitive to proteasome inhibition. This generates additional hypotheses about whether the increased sensitivity reflects specific derangements of NFkB signaling that are targetable in these cells, and/or whether increased dependence of MLL-ALL on NFkB for survival relates to MLL fusions. To answer this, ongoing studies include RNASequencing comparing the transcriptome of treated and untreated MLL-ALL. A broader understanding of the changes in gene expression in bortezomib treated MLL-ALL will provide a more comprehensive understanding of NFkB's role in the pathogenesis of MLL-ALL that can lead to improved design of therapies to be used in conjunction with bortezomib to improve survival.

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IMP3 Expression in Renal Cell Carcinoma Formaldehyde-Fixed Paraffin-Embedded (FFPE) as Compared to Prostate Cancer FFPE Tissue Grafts

Approximately 90-95% of nephrotic malignant neoplasms are Renal Cell Carcinomas (RCC). The incidence of RCC is on the rise with a prevalence of 65,000 cases annually in the United States. With a high mortality rate and risk for surgical intervention, there is a need to understand the pathology of this disease for better outcomes. The heterogeneity of these tumors may underlie the emergence of treatment resistance. Prior studies have shown a link between the angiogenesis occurring in RCC tumors and the expression of the candidate molecular marker of RCC metastasis, insulin-like mRNA binding protein-3 (IMP3). Further exploration of this link is necessary to improve the clinical approaches currently in use. The aim of this study is to establish whether the expression of the candidate molecular marker of Renal Cell Carcinoma (RCC) metastasis, insulin-like mRNA binding protein-3 (IMP3), is higher in renal cell carcinoma grafts than in Prostate Cancer (PC) grafts. RNA was isolated from PC and RCC sample in Formaldehyde-fixed paraffin-embedded (FFPE) tissue grafts. The trials conducted to isolate RNA from the FFPE samples were set back by issues with lab equipment, inconsistent trials, lack of viable data collection, and the overall learning curve of the RNA isolation and RT-PCR techniques. After several unsuccessful trials, we determined that a new approach may be necessary to develop proficiency in the techniques. Without enough viable data, we concluded that the experiment failed. Time to learn the techniques and proper use of lab equipment is necessary to acquire adequate data for analysis and presentation. Moving forward, the RNA will be converted to complementary DNA (c-DNA) using a synthesis kit, amplified using Real-Time Polymerase Chain Reaction (RT-PCR) and analyzed. The established time to master this technique was a six month minimum.

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Effect of Erythropoietin during Ongoing Compression and Recovery Following Surgical Decompression

Purpose: Some patients afflicted with chronic nerve compression experience refractory symptoms despite surgical decompression. Neuroprotective potential of erythropoietin (EPO) has been investigated in various pathologies of the central and peripheral nervous systems. We previously described erythropoietin's (EPO) effectiveness in ameliorating the effects of acute peripheral nerve crush. This left open the question as to whether pretreatment with EPO during compression would be relevant in reducing the effect of ongoing compression.

Methods: CNC injury was created in wild-type mice by placing an inert silastic sleeve around the sciatic nerve as in previous work. Decompression surgery was performed at six-weeks with alternative mice receiving pre-decompressive treatment.

Results: During compression there was a progressive decline in nerve conduction velocity (NCV) as compared to sham-injured animals where NCV remained normal (~55 m/s) throughout the experiment (Figure 1A). NCV in saline-treated animals progressively decreased from normal (55.15 ± 3.42 m/s) to a plateau (35.68 ± 0.72 m/s) over 6-weeks of compression. This expected decline was strikingly attenuated in randomly-selected animals treated with EPO (NCV decreased from 54.09 ± 1.67 to 45.77 ± 1.08 m/s, $P<0.01$). Following decompression, all animals recovered to a normal baseline NCV by day-15 ($P=0.74$); however, the improvement in NCV observed was markedly accelerated within the first week post-decompression in the EPO-treated groups, and not in saline-treated counterparts ($P<0.01$). The histomorphometric analysis also indicated that EPO treatment conferred therapeutic neuroprotective properties.

Conclusion: The administration of erythropoietin as an adjuvant to surgical decompression accelerates the natural recovery of nerves in a murine model of compression neuropathy. Erythropoietin also demonstrates a neuroprotective effect during ongoing nerve compression.

Clinical Relevance: The therapeutic potential of EPO in the treatment of CNC injuries is promising. EPO may be able to improve clinical outcomes in patients with these disorders when used as adjuvant therapy to surgical decompression.
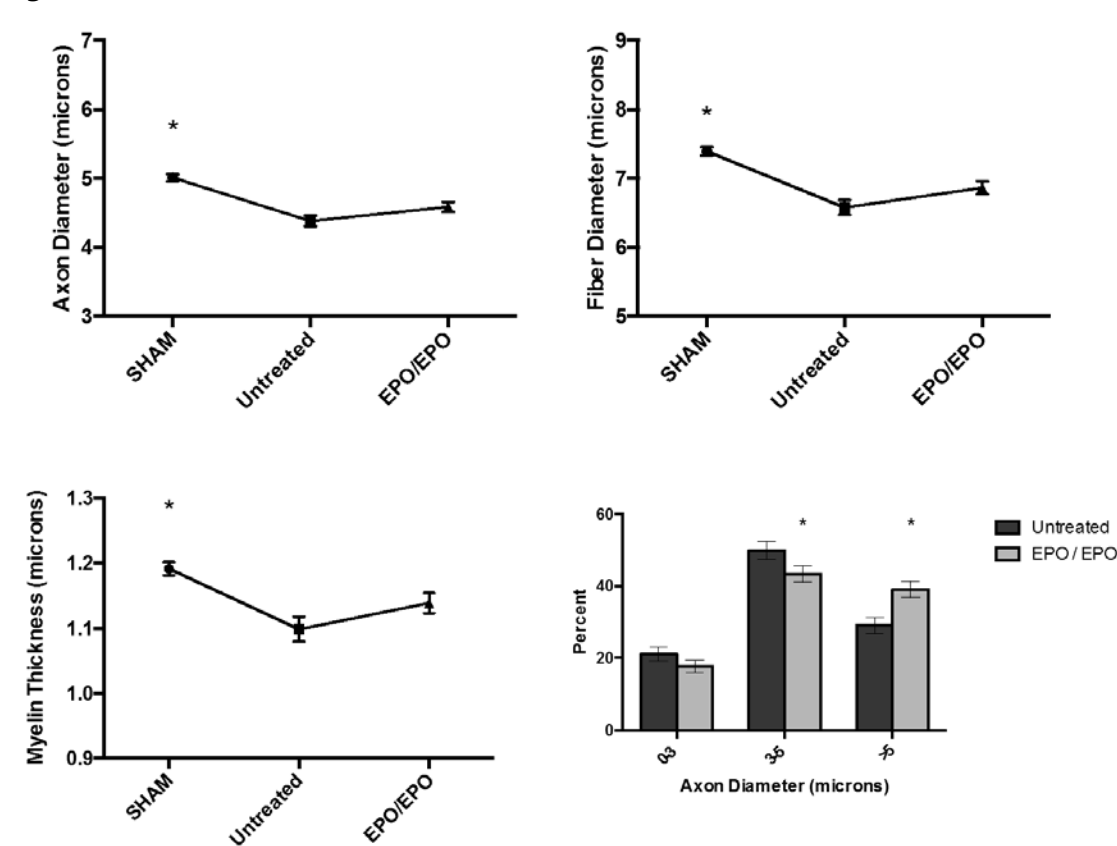
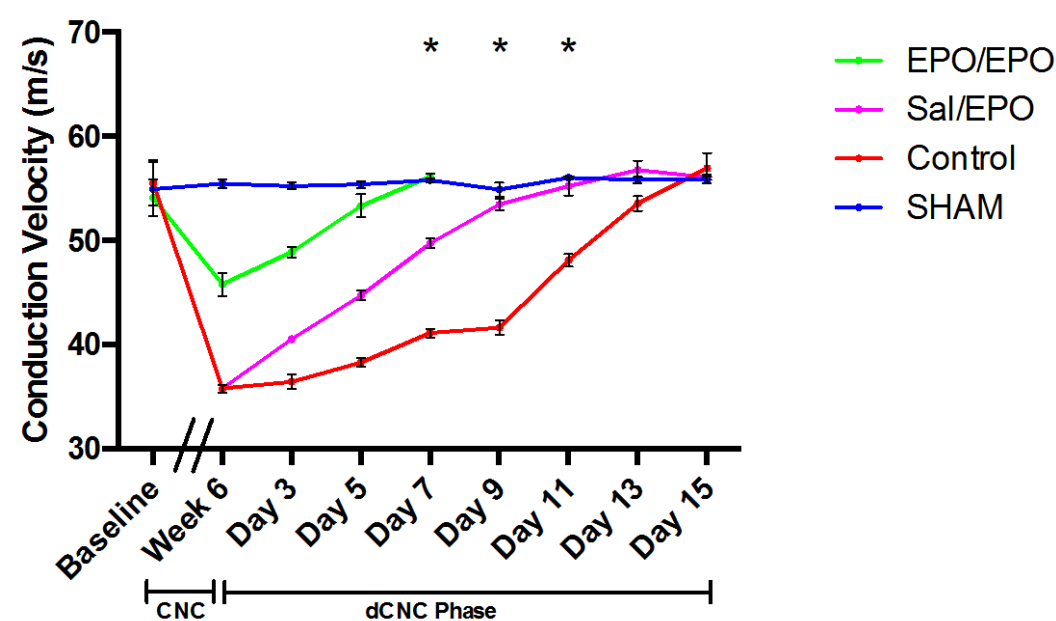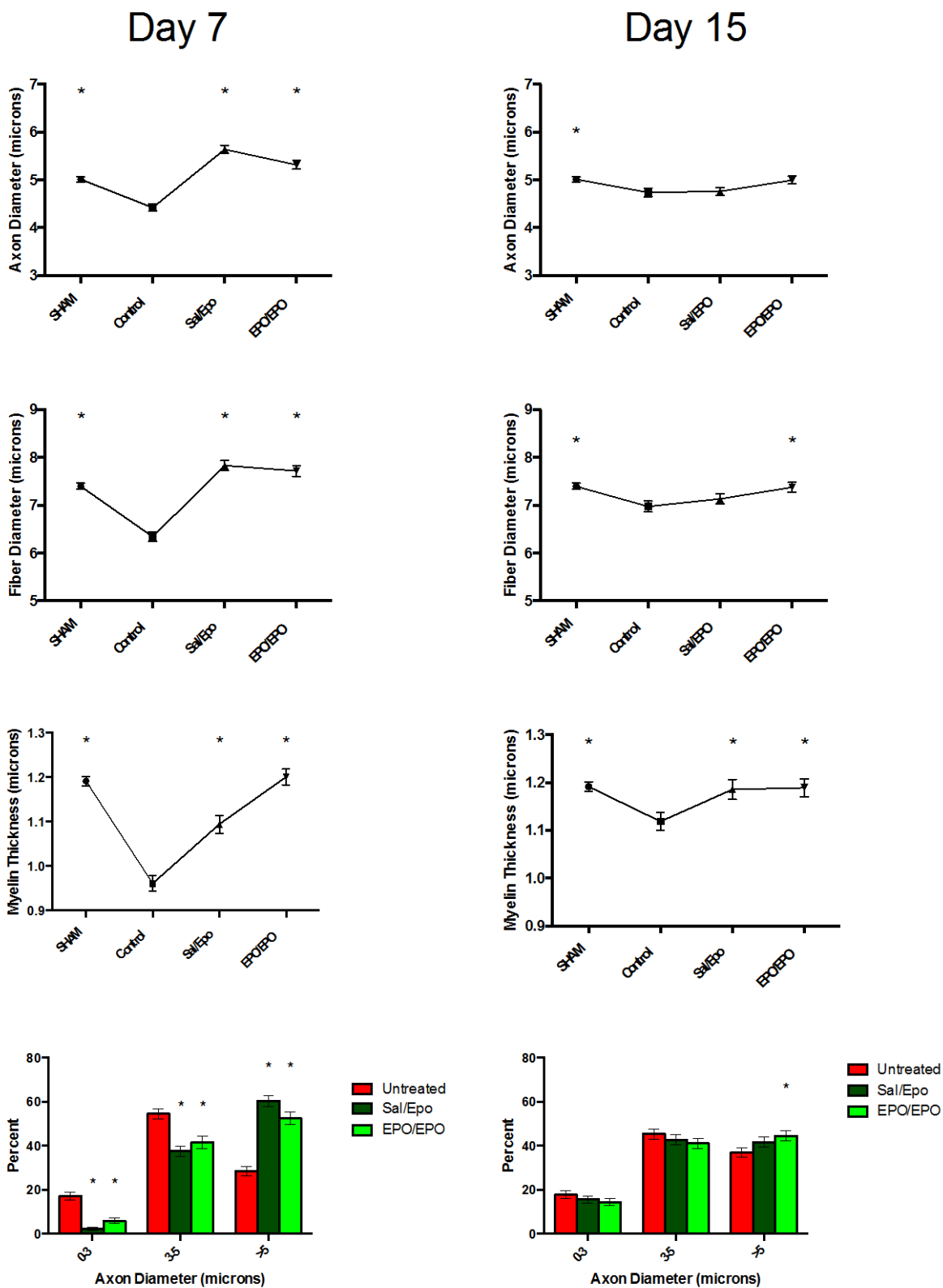**Figure 1**
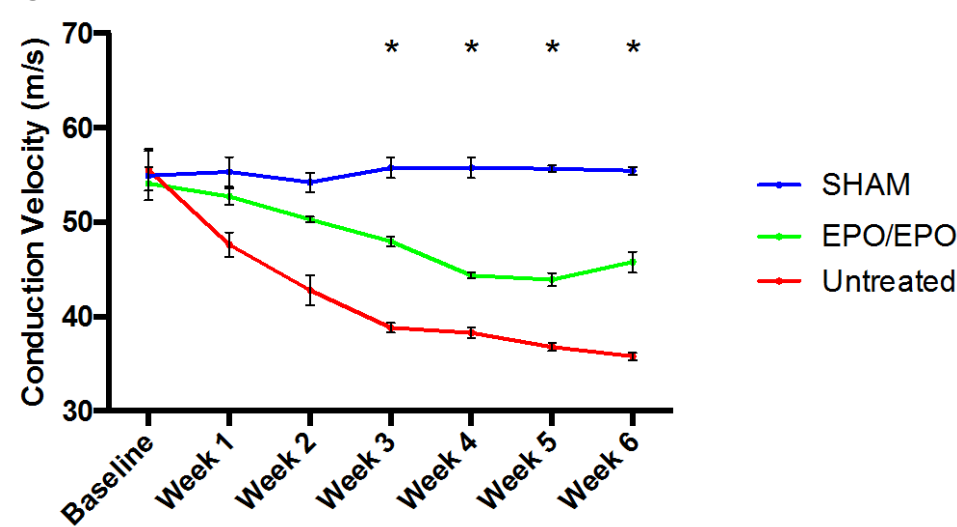
Figure 2

Figure 3

Figure 4

Day 7

Day 15

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Crenotherapy as a Complementary and Alternative Treatment for Chronic Rhinosinusitis: A Systematic Review

Introduction: Chronic rhinosinusitis (CRS) is a common condition which significantly affects patient quality of life. CRS treatments have known side-effects and variable efficacy rates. As such, complementary and alternative treatments for CRS are of continued interest. Crenotherapy utilizes high mineral content water irrigations or inhalations to alleviate symptoms of various respiratory diseases including CRS. The purpose of this study is to provide a systematic review of crenotherapy for the treatment of CRS.

Methods: A systematic review utilizing MEDLINE, Embase, and Cochrane Library databases was performed. Articles published prior to August 2017, with at least 10 patients, investigating crenotherapy treatment for CRS in humans were eligible for inclusion.

Results: This review identified 271 unique articles. After review, including relevant cited references, 12 studies met our inclusion criteria, of which 7 were randomized controlled trials (RCTs). Among RCTs, rhinosinusitis-related symptoms, mucociliary clearance, and rhinomanometry values were frequently measured with (3/5) 60%, (4/5) 80%, and (2/3) 66.7% articles showing a statistically significant improvement compared to control, respectively. Adverse reactions such as nasal irritation, burning sensation, and minor epistaxis were infrequently observed.

Conclusion: Currently, the published literature is not strong enough to make formal recommendations for or against crenotherapy as a treatment for CRS. Most studies demonstrate an overall improvement in CRS objective and subjective measures after crenotherapy suggesting select CRS patients may benefit from crenotherapy treatment. However, positive results must be interpreted cautiously given variable CRS diagnostic criteria, inclusion/exclusion criteria, and outcome measures used in individual studies.

Table 1.

Outcome parameter	Crenotherapy*	Control*	Crenotherapy vs control*
Sinusitis symptoms	(6/6) 100%	(1/4) 25%	(3/5) 60%
Nasal endoscopy evaluation	(2/2) 100%	(2/3) 66.7%	-
Olfactory function	(1/2) 50%	(0/2) 0%	(0/1) 0%
Neutrophil count	(3/4) 75%	(1/3) 33.3%	(1/2) 50%
Immunoglobulins (IgG,IgA,IgM)	(0/2) 0%	(0/1) 0%	(0/1) 0%
Rhinomanometry	(3/4) 75%	(0/3) 0%	(2/3) 66.7%
Mucociliary clearance	(4/4) 100%	(0/3) 0%	(4/5) 80%

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Characteristics and Management of Elderly Breast Cancer Patients in a Municipal Hospital

Background/Objective:
Almost half of newly diagnosed breast cancers occur in women over the age of 65. However, there is a lack of evidence-based clinical trial data for older patients with breast cancer. We sought to characterize the management of breast cancer in older adults, by examining patient demographic information, method of diagnosis, and type of treatment received.

Methods:
We performed a retrospective review of patients over 65 years old diagnosed with breast cancer at our institution over a six-year period (2011-2017). Data abstracted included demographic factors (age, race, education, income, and marital status) as well as information regarding prior history of breast cancer, manner of breast cancer detection, staging, biomarker testing, and type of surgery received (BCS, or breast conserving surgery, versus mastectomy). Chi square test was used to compare qualitative variables.

Results:
A total of 67 breast cancer patients over the age of 65 were included in this study. 52.2% were in the 65-69 year old age range, 28.4% were 70-74, 14.9% were 75-79, and 4.5% were 80-85. 25.4% of the patients were Asian, 16.4% of the patients were Black, 41.8% of the patients were Hispanic, 10.4% of the patients were White, and 6.0% identified as Other. All patients over the age of 80 years old had prior history of breast cancer. There was a significant correlation between age range and prior history of breast cancer ($\chi 2$ (4, N = 67) = 18.674, p < 0.001). Relationship between ethnicity and type of surgery received in older patients was also examined; in Asian, Black, and Hispanic populations, BCS was more common than mastectomy, while in White women,

mastectomy was more common. 73.3% of Asian women underwent BCS, compared to 26.7% who underwent mastectomies, 77.8% of Black women had BCS whereas 22.2% had mastectomies, and 88.9% of Hispanic women had BCS versus 11.1% with mastectomies. On the contrary, 28.6% of White women had BCS, while 71.4% had mastectomies. The association between race and type of surgery was significant ($\chi 2$ (8, N = 67) = 15.681, p<0.04).

Conclusions:

In our patient population, elderly patients with breast cancer have a probability of cancer recurrence that is significantly associated with age, and patient ethnicity is associated with type of surgery received. As age is one of the most important risk factors for breast cancer, it follows that increase in age is associated with likelihood of recurrent cancer. Interestingly, elderly white women were more likely to undergo mastectomies, whereas Asian, Black, and Hispanic women were more likely to undergo BCS. This may be secondary to cultural differences or patient preference, and further analysis is needed.

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De Novo Unbalanced Insertional Translocation, ins(X;5)(?q;q12.3q13.1) in an Adult Female Patient with Developmental Delay and Ovarian Insufficiency identified by DNA MicrorrayCGH and FISH Characterization

Insertional translocations (IT's) involving the X chromosome are relatively rare entity, with few case reports discussed in the literature. Insertional rearrangements on the X chromosome may cause disruption of genes responsible for sexual maturity or by chromosome effect such as inhibition of meiotic pairing or skewed X inactivation. We report a 21 year old patient with a history of intellectual disability, developmental delay who presented to clinic with amenorrhea. Previous karyotype testing at age 18 were reported as normal. The patient was referred for array comparative genomic hybridization (aCGH) and whole exome sequencing (WES). The WES findings did not report any pathogenic variants. Interestingly, a 3.3MB duplication of 5q12.3q13.1 segment was revealed by aCGH. Fluorescence in-situ hybridization (FISH) with probe RP11-841D3 identified the duplication 5q12.3q13.1 segment inserted within the long arm of chromosome X near the vicinity of XIST region. Parental studies did not identify a carrier translocation by FISH. Follow up X chromosome inactivation studies in the patient lymphocytes reported highly skewed non-random X inactivation (97.3%). Our results demonstrate that the clinical symptoms in the patient are potentially due to the disruption of the XIST gene leading to skewed X-inactivation and subsequent deleterious effects. To our knowledge, this is the first report of an unbalanced insertional translocation, ins(X;5)(?q;q12.3q13.1) that disrupts normal random X inactivation processes. The genotype-phenotype correlation will be presented. Potential future directions include using BrdU assay with FISH probe specific to inserted region on X chromosome is in progress to identify which X chromosome is active in this patient.

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Applicability of Four PROMIS Domain in Dermatologic Care

Background: Patient reported outcome (PRO) measures are an important tool to evaluating a patient's care. The patient perspective should be integrated into quality measures to assess how care is being delivered on a global scale. The Patient-reported Outcome Measures Information System (PROMIS) designed by the National Institutes of Health is intended to track specific domain outcomes across many diseases and domains. PROMIS could be a useful tool to quickly inform a provider about a patient's progress. This study examined the applicability of four common PROMIS domains (Physical Function, Pain Interference, Mood, and Anxiety) in dermatologic care.

Methods: A PROMIS health assessment, containing four PROMIS computer adaptive tests (CAT), was administered on iPads as part of routine clinical care at three general Dermatology clinics in Rochester, NY. Data was collected from 6,443 patient visits between December 2015 and June 2017. Implementation of PROMIS was evaluated by administration, completion, and decline rate of the health assessment. Physical function scores $\leq$ 45 and Pain Interference, Mood, and Anxiety scores $\geq$ 55 were described as "notable" (i.e., clinically significant). Chart reviews were conducted on age-matched and gender-matched patient with notable and not notable scores in each domain across six dermatologic diagnoses (i.e., acne, psoriasis, rosacea, non-atopic dermatitis, rash/skin eruptions, and pruritus). . Pertinent information and grading criteria for the chart review varied depending on diagnosis, but included things such as disease severity, medication, and mental health comorbidity. Five patients with recurring visits were evaluated to further assess how PROMIS domains scores correlated with treatment course. All statistical analyses (ANOVA, chi square and Fisher Exact tests) were performed at significance level of 0.05 using JMP10Pro.

Results: Of the 6,443 clinic visits, 4,682 patients initiated PROMIS, 621 patients were ineligible and 1,140 patients declined the assessment. The majority of patient completed all four domains (92%). PROMIS domain scores were influenced by patient diagnosis and demographic factors including gender, age, and race. Domain order significantly influenced completion and decline rate ($p<0.001$). Physical function scores were confounded by age and pre-existing conditions. An association between pain interference and dermatologic care was not observed. In acne patients, notable anxiety scores were associated with disease severity and scarring, and presence of mental health comorbidity. In psoriasis patients, notable mood/depression scores were associated with

disease severity, uncontrolled disease, and presence of mental health comorbidity. In the limited review of patients who came for repeat visits, scores seem to fluctuate accordingly with disease improvement and treatment course.

Conclusions: PROMIS Anxiety and Mood domains, but not Physical Function and Pain Interference domains, are informative tools for clinical care in Dermatology. Utilization of the PROMIS itch domain and a social health domain could also further benefit dermatologic clinical care.

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Humeral Head Cartilage Damage in Single- Versus Double-Row Repair Techniques for Bony Bankart Lesions

Background:
Lesions of the anterior glenoid are the most common reason for bony instability in the shoulder.[3] In 1923, Bankart described recurrent anterior shoulder-joint dislocations caused by an avulsion of the capsulolabral complex of the anteroinferior glenoid rim.[1] When an osseous fragment is also involved in this avulsion, it is commonly referred to as bony Bankart lesion.[2] When a significant amount of the glenoid bone is destabilized or missing, the resistance to excessive anterior motion of the humeral head is compromised.[2] Bony Bankart lesions are found in up to 70% of traumatic shoulder dislocations.[4] In addition, the prevalence of bony Bankart lesions in traumatic shoulder instability ranges from 8%-50%.[5]

Objective:
The purpose of this study is to determine whether the single- and double-row repair techniques for bony Bankart repair result in humeral head articular cartilage damage. Cartilage damage was assessed quantitatively using software to measure the depth and area of cartilage damage histologically.

Methods:
Ten matched pairs (10 left, 10 right) of fresh frozen human cadaveric shoulders were studied. The scapula and humerus were removed of all soft tissues except for the labrum. Bony defects of the anterior glenoid rim were created so that the width of the defect was 25% of the largest anterior-poster articular glenoid width. The simulated bony Bankart lesion was then repaired by either a single row or double row technique. Each gleno-humeral joint was then custom potted, and joint reactive forces equivalent to 130% of the cadaver's body weight were created simulating physiologic forces seen by the gleno-humeral joint. The humerus was rotated ± 45 degrees of internal/external rotation from a neutral position for 20,000 cycles at 2 Hz. The humeral head was then fixed, processed, and stained in order to quantify under microscope the potential cartilage damage caused by the two fixation methods.

Results:
Quantitative results are pending due to developing a consistent experimental protocol. In addition, the method of quantitatively analyzing the cartilage damage was not resolved until recently. Study is ongoing and early trial run results grossly display increased cartilage damage with both the single- and double-row repair techniques. Histology will be used to measure the volume of cartilage lost to suture-related mechanical wear.

Conclusions:
Single- and double-row repair techniques for bony Bankart repair **may or may not** result in lasting humeral head articular cartilage damage. Early qualitative results indicate that these repairs do result in cartilage damage possibly contributing to the development of post-traumatic arthritis over time. Development of a new repair technique that is cartilage sparing may be needed.

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New York State Health Policies Regarding Automated External Defibrillators

Sudden cardiac arrest is a major cause of death in the United States of America, particularly because it is extremely lethal – death can occur within minutes if an individual does not receive treatment.[1] Sudden cardiac arrest most commonly occurs due to sustained ventricular tachycardia leading to ventricular fibrillation, which can quickly devolve into asystole.[15] However, if an individual with ventricular tachycardia or ventricular fibrillation is shocked by an automated external defibrillator, AED, in a timely manner, it is possible to restore normal heart rhythm before brain damage or death occurs.[5] It is estimated that an individual's chance of survival after a shockable sudden cardiac arrest decreases by 7-10% every minute they go without defibrillation.[1] Thus, it is important to make early defibrillation possible in the event of an out of hospital cardiac arrests. The best way to achieve this goal is by increasing the availability of AEDs. The current NY state regulations mandate that AEDs be maintained in public schools, health clubs, surf beaches, places of public assembly including most areas for sporting events, state and federally owned buildings, and public universities, which has vastly improved the availability of AEDs over the past two decades. Local laws go even further to increase the availability of AEDs. However, there is still much room for improvement. In particular, state regulations are lacking for privately owned establishments. For instance, AEDs are not required in private schools, privately owned businesses, assisted living centers, or nursing homes. The New York State Assembly and Senate have the ability to pass new legislation regarding AEDs and add to existing laws in order to improve AED access throughout the state and improve the public welfare.

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Isolation and Examination of Vaccine-Induced Monoclonal Antibodies from Human HIV-Specific Memory B Cells

Despite significant advances in elucidating the mechanistic biology of HIV-1 infection and the development of antiretroviral therapies, HIV-1 infection persists worldwide as a prominent global health issue.[1] Past strategies against HIV-1 infection have been aimed towards the development of an efficacious vaccine that is capable of producing long-term protection through the induction of broadly, reactive polyfunctional T cell responses or broadly neutralizing antibodies (bnAbs).[2] Although inducing bnAbs is a worthy objective, some instances have shown that binding Abs can have some protection.[2-5] In particular, subsequent analyses of the most successful HIV vaccine trial to date, the RV144 trial showed some protective activity by ADCC and the binding antibodies, IgG1 and IgG3, although lacking neutralizing Abs and cytotoxic T cell responses.[2,3,5] In effort to increase the efficacy of the RV144 study elicited by the protective activity of binding antibodies, the HVTN 105 follow up study investigated the effect of various DNA or protein priming combinations on the immune response. Generally, following vaccination, memory B cells are generated and can contribute to long-lived immunity. It has been postulated that following HIV vaccination, variation in the memory B cell-dependent antigen-specific serum antibody (Ab) is influenced by the protein or DNA state of the antigen. [6-9] In this current study, memory B cells isolated from peripheral blood mononuclear cell (PBMC) samples of HVTN 105 were phenotypically sorted by antigen-specific flow cytometry and single-cell processed using a high-throughput method. Two Ig genes, reactive to all vaccine strain envelop proteins (MN, A244 and 96ZM651 gp120) were cloned and expressed as human IgG1. These results provide an evidence that HIV Env-specific memory B cells can be induced by the vaccination scheme used in the HVTN105 study.

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Investigating Role of Tear Osmolarity in Visual Performance

Background: Dry eye disease (DED) is a multifactorial syndrome affecting the stability of the tear film. A breakdown of essential structures producing normal tear significantly impacts the ocular surface's ability to withstand environmental insults. The lack of proper lubrication and protection of the ocular surface can cause discomfort, fatigue, corneal abrasions and scarring. Individuals suffer from reduced reading and screen tolerance, with the increased inability to maintain prolonged visual attention. A persistent pathological state could lead to vision loss if left unchecked. Tear film variability, a hallmark of this disorder, can present in numerous ways (interocular tear instability, reduction in corneal thickness, reduction in corneal reflectivity, wavefront aberrations, and a decrease in visual acuity), and can be utilized to develop clinical instrumentation or guidelines in the characterization of DED.

Tear film osmolarity has been shown to provide the highest sensitivity for ruling out the presence of DED in symptomatic patients (< 308mOsm/L). Concomitantly, it provides the greatest indication of OSDI symptomology (ocular surface disease index) when compared to other currently available ocular surface testing (Schirmer, TFBUT, fluorescein staining). The TearLab™ system, a clinically accessible osmometer, provides objective and accurate non-invasive measurements that reduces the risk of reflex tearing in comparison to other analytical methods.

The current study aims to quantify the relationship between tear osmolarity, retinal image quality, and visual performance. The impact of osmolarity as a clinical predictor of these criterion in patients with DED will be measured. We hypothesize that an abnormal tear film osmolarity may result in increased variable of retinal image quality and decreased visual performance relative to subjects with normal tear osmolarity.

Methods: In a preliminary analysis, data from 15 subjects (5 normal controls and 10 subjects with a varying degree of hyperosmolarity) is being used to quantify a relationship between tear osmolarity and visual performance. Interocular osmolarity was recorded in a controlled

environmental chamber using the TearLab™ osmometer and subjects were divided into three separate groups based on the highest recording between both eyes (Normal controls [<308mOsm/L], Group 1 [309-330mOsm/L], Group 2 [>330mOsm/L]). Each subject's eye with the highest osmolarity was then studied under three additional conditions. Visual acuity was measured in eight separate scenarios using the "tumbling E" method, at high (100%) and low (10%) contrasts with varied stimulus durations times. Subjects' visual performance were then observed using a ViewPoint EyeTracker® to measure regression saccades, blink rate, and reading speed. Ocular aberrations were assessed using a Shack-Hartmann Ocular Wavefront Sensor.

Results: Visual acuity (VA) was reduced in Group 2 compared to normal controls with stimuli of 400ms (10% contrast) [p = 0.017] and 100ms (10% contrast) [p=0.049]. Group 1 exhibited a reduction in VA compared to normal controls at 100ms (10% contrast) [p = 0.05]. A prolonged response time (RT) was displayed in Group 2 compared to controls at 800ms (100% contrast) [p=0.045] and 200ms (10% contrast) [p=0.009]. Eye-tracking results found no significant variation between regression saccades, blink rate, and reading speed in any group (p > .05). Ocular wavefront has not yet been able to be analyzed.

Conclusion: The preliminary findings suggest that visual acuity is a more accurate clinical predictor of ocular osmolarity than the quantity of regression saccades during reading samples. The disparity of VA and RT between normal controls and hyperosmolar subjects seems to be exacerbated by a reduction in display contrast. However, a strong correlation between tear osmolarity and visual acuity or response has not been found. Additional analysis of our data is required to investigate the relationship between tear osmolarity and ocular wavefront aberrations, and to tease out any effects of training-bias during visual acuity measurements. A randomization in the order of stimulus duration and display contrast will be used in follow-up.

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Barriers to Effective Health Education in Deaf Schools

The American Deaf community is a minority group that has been studied increasingly in recent years. Studies conducted out of Rochester, NY have shown that health literacy in the Deaf community is lower compared to their hearing peers. The Deaf community also disproportionately struggles with Intimated Partner Violence, Diabetes, and Obesity in addition to a number of other health concerns. This study hypothesizes that there are barriers to effective health education in schools for Deaf and Hard of Hearing children and aims to identify what those barriers are. In addition, the study aims to determine if Deaf schools are allotting enough instructional time to Deaf-specific health issues, like how to request an interpreter at a doctor's office visit or how to communicate effectively with medical professionals. The research was performed at Mill Neck Manor School for Deaf and Hard of Hearing children and consisted of classroom observations and interviews with students, health teachers, counselors, and administrators. Several common themes were identified among the interviewees as potential barriers to health education in the school: lack of a consistent, certified health teacher who is fluent in American Sign Language (ASL), lack of educational materials in ASL, not enough time in the school day to incorporate Deaf-specific topics into the health curriculum, and the challenges that lack of communication between parents and children brings when teaching things like health where so much is learned passively from family. These identified barriers are now being formatted into a survey to send out to a broader network of Deaf schools. Shared barriers between multiple schools may shed light onto how Deaf health education needs to be modified to increase its efficacy.

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Structural Malformations of the Brain, Eye, and Pituitary Gland in PHACE Syndrome

Introduction:
PHACE syndrome is the association of segmental facial *h*emangiomas with congenital *p*osterior fossa, *a*rterial, *c*ardiac and *e*ye anomalies. Structural brain malformations are thought to affect 41-52% of PHACE patients and can be associated with focal neurologic deficits, developmental delays, and/or intellectual disability.

Methods:
To better characterize the structural brain and other intracranial anomalies in PHACE syndrome, MRI scans of the head/neck were retrospectively reviewed in 55 patients from the PHACE Syndrome International Clinical Registry and Genetic Repository. All registry patients with a diagnosis of definite PHACE syndrome who had MRI scans of satisfactory quality were included. Prior to analysis, a standardized data acquisition form was developed to record type, location, and severity of observed structural anomalies, in addition to patient demographic information. Particular attention was given to the detection of pituitary and ocular anomalies. Images underwent systematic review by an experienced pediatric neuroradiologist and findings were documented using the data acquisition form.

Results:
Of 55 patients, 34 (62%) demonstrated ≥1 non-vascular intracranial anomaly; structural brain malformations were present in 19 (35%). There was no difference in the prevalence of brain anomalies between genders. Brain anomalies were more likely in patients with S1 and/or S2 distribution of facial hemangioma. The most common structural brain defects were cerebellar hypoplasia (25%) and fourth ventricle abnormalities (13%). Unilateral cerebellar hypoplasia was associated with ipsilateral facial hemangioma in 10/11 patients. Dandy-Walker complex and

malformations of cortical development were present in 9% and 7%, respectively. Posterior fossa malformations such as fourth ventricle abnormalities, Dandy-Walker spectrum, cerebellar hypoplasia, and a/dysgenesis of the cerebellar vermis, were frequently seen together. Extra-axial findings such as pituitary anomalies (18%) and intracranial hemangiomas (18%) were also observed. Six patients (11%) had anomalies of the globes or optic nerve/chiasm detectable on MRI.

Conclusions:
Brain malformations comprise a diverse group of structural developmental anomalies that are common in patients with PHACE syndrome. Along with brain malformations, numerous abnormalities of the pituitary, meninges, and globes were observed, highlighting the need for careful radiologic assessment of these structures in the neuroimaging workup for PHACE syndrome.

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What Are Black Church-Going, Millennial African Americans Attitudes and Beliefs Pertaining To Mental Health and Mental Illness?

Abstract: This study will build upon community based participatory research practices to explore the beliefs Black church going, African American young adults have about mental illness in order to address the significant underutilization of mental health services by the African American community. Prior literature consistently finds that middle and older age African American church going members have high rates of stigmas towards mental health. However, few studies include young adults. Without adequate research on millennials current views and attitudes about faith, mental health, and mental health services, we cannot plan or evaluate effective prevention programs to address mental health disparities.

Specific Aims:
1. Describe how faith, mental health, and health practices interrelate among Black church-going, African American young adults
2. Identify culturally responsive protective factors (i.e. perceived community support, practice of prayer) and risk factors (stigmas) for mental illness in the Black church-going, African American young adult community

We seek a minimum total of 36 participants to complete either the focus group or interviews with an inclusion criteria of Black or African American, eighteen to thirty-four years old who is English speaking and a current member of a predominantly Black church in the Greater Rochester area for a minimum of twelve Months (Includes: Congregation, Lay Leaders, Pastors, and Clergy)

Definitions:
- Young adult/millennial: a person that was born between the years of 1983 and 1999.
- Black church: a church that currently ministers to a predominantly African American or Black congregation.
- Gatekeeper model: a model that utilizes an established relationship between a recognized leader in a community and an outside agency to provide services or resources to the targeted community.

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Extended Use of the Wearable Cardioverter Defibrillator in Patients at Risk for Sudden Cardiac Death

Background: The role of a prolonged time of risk stratification for an ICD using the wearable cardioverter defibrillator (WCD) is unknown. Data on arrhythmia events and outcomes in patients using the WCD for longer than the typical use of 90 days are not currently available.

Methods: We analyzed arrhythmia events during WCD use, and ejection fraction [EF] improvement vs. ICD implantation at the end of WCD use in patients with WCD≤90 days vs. >90 days in patients enrolled in the WEARIT-II registry, further assessed by the etiology of cardiomyopathy (ischemic [ICM] vs. non-ischemic [NICM] vs. congenital/inherited[C/I]).

Results: There were 981 (49%) patients with WCD use>90 days, who more often presented with non-ischemic cardiomyopathy, and 1019 patients with WCD use ≤90 days (median 120 vs. 55 days). There was a lower incidence of sustained VT/VF events (11 vs. 50 events per 100 patient-years, p<0.001), and non-sustained VT events (21 vs. 51 events per 100 patient-years, p=0.008) with WCD use>90 days vs. WCD use ≤90 days, as expected. However, the incidence of atrial arrhythmias was similar in both WCD use ≤90 days and >90 days (103 vs. 97 events per 100 patient-years, p=0.965). Non-ischemic cardiomyopathy patients presented with similar rates of sustained VT/VF events during WCD use > 90 days vs. WCD use≤90 days (13.4 vs. 13.7 events per 100 patient-years, p=0.314). During follow-up, one-third of the patients with extended WCD use further improved their EF beyond 90 days and were not implanted with an ICD, with similar rates in ischemic and non-ischemic patients.

Conclusion: In the WEARIT-II registry, patients with extended WCD use>90 days remain at risk for ventricular and atrial arrhythmia events. One-third of the patients with WCD use>90 days

further improved their EF, avoiding the need for ICD implantation. The WCD could improve risk stratification for an ICD even after the typical 90 day wear period.

Figure 1. Total Wear Distributions of WCD by Days

Wear Time Distribution

	1 - 30	31 - 60	61 - 90	91 - 120	121 - 150	151 - 180	181 - 210	211 - 240	241 - 270	271 - 300	301 - 330	331 - 360	>360
% of Pts	8.9%	20.8%	21.3%	24.7%	10.6%	4.5%	3.4%	2.0%	0.9%	0.6%	0.5%	0.6%	1.5%
# of Pts	178	416	425	494	212	90	67	39	17	11	10	11	30

(0-3 months: 1-30, 31-60, 61-90; 3-6 months: 91-120, 121-150, 151-180; 6-12 months: 181-210, 211-240, 241-270, 271-300, 301-330, 331-360)
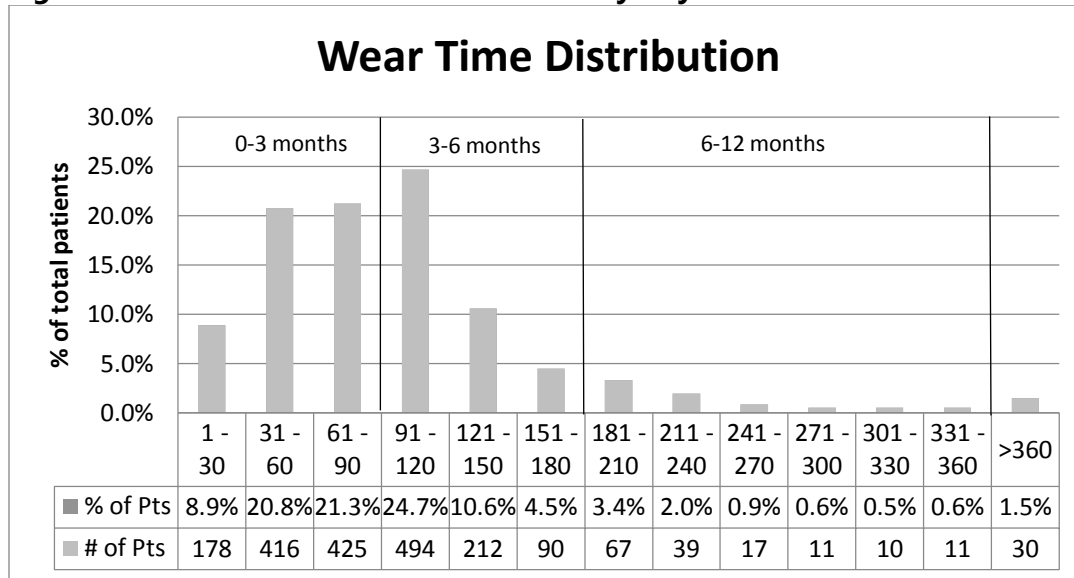
Abbreviations: WCD = wearable cardioverter defibrillator.

Figure 2. Clinical Outcomes at the End of WCD Use by Duration of WCD use

End of Use Decision

	≤ 90 days	>90 days
EF improved	47%	33%
ICD	33%	46%
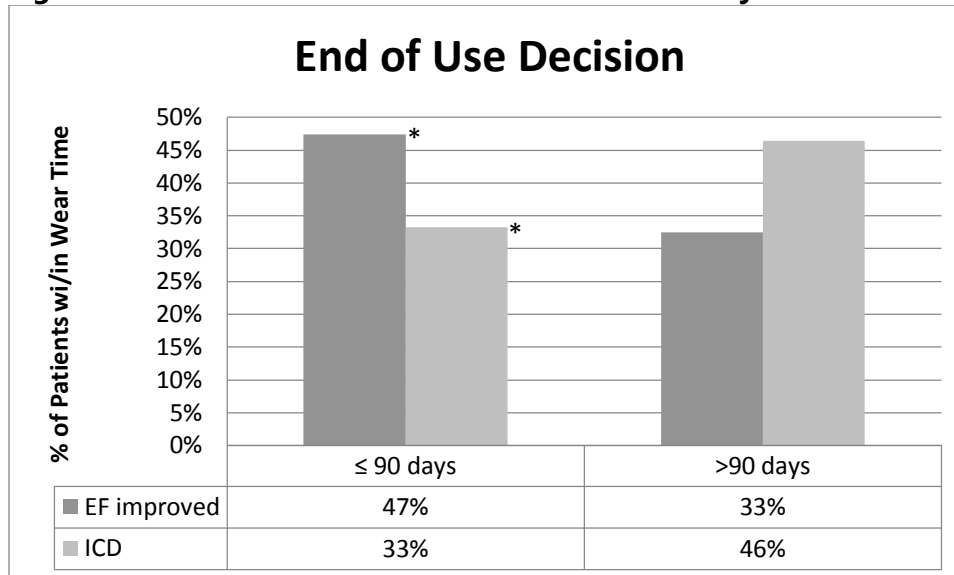
*P <0.001 for End of Use Category for patients with ≤90 days of total wear vs >90 days of total wear

Abbreviations: WCD = wearable cardioverter defibrillator; EF = Ejection fraction; ICD = received implantable cardioverter defibrillator.

Table 1. Baseline Clinical Characteristics by WCD wear time

Characteristics	WCD ≤ 90 days	WCD > 90 days	Categorical
Etiology: Ischemic (ICM)	434 (43)	371 (38)	**0.03**
Non-ischemic (NICM)	434 (43)	493 (50)	**<0.001**
Congenital/ Inherited (C/I)	151 (15)	117 (12)	0.057
Age	63(16)	61(17)	**0.011**
Female gender	302 (30)	296 (30)	0.79
White race	901 (88)	790 (81)	**<0.001**
Ejection fraction	30(15)	25(15)	**0.015**
Hispanic	31 (3)	41 (4)	0.39
Daily use, hours	22.2(2.6)	22.5(3.3)	**0.001**
Antic. Time, mo.	3 (2)	3 (2)	**0.033**
Medical History			
Heart failure at baseline	481 (47)	559 (57)	**< 0.001**
Atrial fibrillation	316 (31)	241 (25)	**0.001**
Hypertension	635 (62)	573 (58)	0.07
Hyperlipidemia	539 (53)	456 (46)	**0.004**
Diabetes	296 (29)	255 (26)	0.12
Renal Disease	79 (8)	83 (8)	0.56
Valve Disease	133 (13)	112 (11)	0.26
Myocardial infarction	479 (47)	406 (41)	**0.011**
Angioplasty	335 (33)	275 (28)	**0.019**
CABG	183 (18)	139 (14)	**0.021**
Cardiomyopathy	434 (43)	465 (47)	**0.031**
ACA	223 (22)	166 (17)	**0.005**
Syncope	199 (20)	149 (15)	**0.01**
Pacemaker	117 (11)	45 (5)	**< 0.001**
LQTS	19 (2)	7 (1)	**0.023**
HCM	44 (4)	24 (2)	**0.021**
Medications			
Aldosterone	243 (24)	318 (32)	**< 0.001**
ACE-I/ARB	714 (70)	768 (78)	**<0.001**
B Blockers	871 (85)	859 (88)	0.17
Amiodarone	142 (14)	117 (12)	0.18

Data are expressed as number and percentages and median and interquartile ranges.

Abbreviations: WCD= wearable cardioverter defibrillator; EF= Ejection fraction; ICM= ischemic cardiomyopathy; NICM= Non-ischemic cardiomyopathy; C/I= congenital or inherited condition; Antic. Time, Mo.= anticipated duration of use required in months; ACE-I= angiotensin converting enzyme inhibitor; ARB= angiotensin receptor blocker; CHF= congestive heart failure; Afib= atrial fibrillation; CABG= coronary artery bypass grafting; ACA= aborted cardiac arrest; LQTS= long QT syndrome; HCM= hypertrophic cardiomyopathy.

Table 2a. Arrhythmia Events during the Use of WCD for ≤90 Days of Total Wear

Event	Patients, n(%)	Events (mean events/patient)	Event Rate Per 100 Patient-Years	P-value for ≤90 Days vs. > 90 days
All Sust. VT/VF	28(2.7)	76(2.7)	50	**<0.001**
Sust VT no treatment	12(1.2)	49(4.1)	32	**0.008**
Sust VT treated	19(1.9)	27(1.4)	18	**<0.001**
NSVT	12(1.2)	78(6.5)	51	**0.030**
Atrial arrhythmias/SVT	26(2.6)	148(5.7)	97	0.965

Table 2b. Arrhythmia Events during the Use of WCD for >90 Days of Total Wear

Events	Patients, (%)	Events (mean events/patient)	Event Rate Per 100 Patient-Years	P-value for ≤90 Days vs. > 90 days
All Sust. VT/VF	13(1.3)	44(3.4)	11	**<0.001**
Sust VT no treatment	10(1.0)	41(4.1)	10	**0.008**
Sust VT treated	3(0.3)	3(1)	1	**<0.001**
NSVT	16(1.6)	86(5.4)	21	**0.030**
Atrial arrhythmias/SVT	46(4.7)	413(9)	103	0.965

Table 3. Arrhythmia Events during the Use of WCD by Disease Etiology for ≤90 Days of Total Wear

ICM Events	Patients, n(%)	Events (mean events/patient)	Event Rate Per 100 Patient-Years	P-value for ≤90 Days vs. > 90 days
All Sust. VT/VF	17(4.6)	37(2.2)	56.8	**0.001**
Sust VT no treatment	6(1.6)	23(3.8)	35.3	0.074
Sust VT treated	13(3.5)	14(1.1)	21.5	**<0.001**
NSVT	3(0.8)	39(13)	59.8	0.063
Atrial arrhythmias/SVT	8(2.2)	42(5.3)	64.4	0.844
NICM Events				
All Sust. VT/VF	5(1.2)	9(1.8)	13.7	0.314
Sust VT no treatment	2(0.5)	6(3.0)	9.1	0.543
Sust VT treated	3(0.7)	3(1.0)	4.6	0.055
NSVT	5(1.2)	22(4.4)	33.5	0.541
Atrial arrhythmias/SVT	14(3.2)	71(5.1)	108.2	0.760
C/I Events				
All Sust. VT/VF	6(4)	30(5.0)	135.9	**0.003**
Sust VT no treatment	4(2.7)	20(5.0)	90.6	**0.013**
Sust VT treated	3(2)	10(3.3)	45.3	**n.a.**
NSVT	4(2.6)	17(4.3)	77.0	**0.043**
Atrial arrhythmias/SVT	4(2.6)	35(8.8)	158.5	0.656

Table 4. Arrhythmia Events during the Use of WCD by Disease Etiology for > 90 Days of Total Wear

ICM Events	Patients, n(%)	Events (mean events/patient)	Event Rate Per 100 Patient-Years	P-value for ≤90 Days vs. > 90 days
All Sust. VT/VF	7(1.9)	16(2.3)	10.6	**0.001**
Sust VT no treatment	5(1.3)	2(0.4)	1.3	0.074
Sust VT treated	2(0.5)	14(7)	9.3	**<0.001**
NSVT	5(1.3)	12(2.4)	7.9	0.063
Atrial arrhythmias/SVT	17(4.6)	80(4.7)	52.9	0.844
NICM Events				
All Sust. VT/VF	5(1)	27(5.4)	13.4	0.314
Sust VT no treatment	4(0.8)	26(6.5)	12.9	0.543
Sust VT treated	1(0.2)	1(1.0)	0.5	0.055
NSVT	7(1.4)	69(9.9)	34.3	0.541
Atrial arrhythmias/SVT	26(5.3)	266(10.2)	132.3	0.760
C/I Events				
All Sust. VT/VF	1(0.9)	1(1)	2.0	**0.003**
Sust VT no treatment	1(0.9)	1(1)	2.0	**0.013**
Sust VT treated	0(0)	0(0.0)	0.0	**n.a.**
NSVT	4(3.4)	5(1.3)	10.1	**0.043**
Atrial arrhythmias/SVT	3(2.6)	57(19)	115.4	0.656

Abbreviations: VT/VF = ventricular tachycardia/ventricular fibrillation; Sust. = sustained; NSVT = non sustained ventricular tachycardia; ICM = ischemic cardiomyopathy; NICM = non-ischemic cardiomyopathy; C/ I= congenital/inherited.

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Long-Term Outcomes of Cardiac Resynchronization Therapy in Patients with Higher Left Ventricular Ejection Fraction

Background: We have shown benefit of cardiac resynchronization therapy with defibrillator (CRT-D) in mild heart failure (HF) patients with higher ejection fraction (LVEF >30%) with reduction in HF events. However, long-term outcomes of mortality are not known.

Objectives: We aimed to assess long-term outcomes in mild HF patients by LVEF 30% in MADIT-CRT.

Methods: We analyzed, among 1274 patients with left bundle branch block (LBBB), long-term effects of CRT-D vs. ICD-only, and echocardiographic response to CRT-D (LVESV percent change ≥ 35% at 1-year), on all-cause mortality and HF or death for the LVEF ≤30% and LVEF>30 subgroups using Kaplan-Meier and Cox analyses.

Results: During long-term follow-up, CRT-D vs. ICD was associated with similar reduction in all-mortality in patients with LVEF>30% and LVEF≤30% at baseline (HR=0.47, 95% CI: 0.25-0.85, p=0.036 vs. HR=0.69, 95% CI: 0.49-0.98, p=0.013, interaction p=0.26). The efficacy of CRT-D vs. ICD-only to reduce HF/Death was similar in those with LVEF above and below 30% (HR=0.39, 95% CI: 0.27-0.58, p<0.001 vs. HR=0.52, 95% CI: 0.41-0.67, p<0.001; interaction p= 0.23). Patients with high CRT-D induced echocardiographic response had significant mortality reduction when compared to ICD, with either LVEF>30% or LVEF≤30% (HRs 0.17 and 0.39), but not in those with

low echocardiographic response. However, HF events were reduced in both echocardiographic high and low responders vs. ICD-only, in both LVEF subgroups.

Conclusions: In MADIT-CRT, LBBB patients with higher LVEF>30% derive long-term benefit from CRT-D vs. ICD-only with reduction in all-cause mortality and HF events, as do patients with lower LVEF.

Table 1. Long-Term Effect of CRT-D vs. ICD-only on Death and HF, Stratified by Baseline LVEF Subgroups

A. Death

	Hazard Ratio	95% CI	p-value	Interaction p value
CRT-D vs. ICD-only for LVEF ≤ 30%	0.69	0.49 - 0.98	0.036	0.261
CRT-D vs. ICD-only for LVEF >30%	0.47	0.25 - 0.85	0.013	

B. Heart Failure

	Hazard Ratio	95% CI	p-value	Interaction p value
CRT-D vs. ICD-only for LVEF ≤ 30%	0.46	0.35 - 0.61	<0.001	0.342
CRT-D vs. ICD-only for LVEF >30%	0.36	0.23 - 0.55	<0.001	

Abbreviations: LVEF; left ventricular ejection fraction. HF; heart failure. CI; confidence interval. LVESV; Left Ventricular End Systolic Volume.

Table 2. Long-Term Effect of CRT-D vs. ICD-only on A. Death, B. HF alone for Baseline LVEF ≤30% and LVEF>30% Sub-groups , Stratified by 1-year Reverse Remodeling in a Landmark Analysis (Follow-up starts at 1-year, at the time of echo assessment.)

A. Death

LVEF≤30%	Hazard Ratio	95% CI	p-value
CRT LVESV change <35% vs. ICD	0.82	0.52 - 1.31	0.410
CRT LVESV change ≥35% vs. ICD	0.39	0.20 - 0.78	0.007
CRT LVESV change ≥35% vs. CRT LVESV change< 35%	0.48	0.23 - 0.98	0.045
LVEF>30%			
CRT LVESV change <35% vs. ICD	0.63	0.27 - 1.48	0.287
CRT LVESV change ≥35% vs. ICD	0.17	0.04 - 0.72	0.017
CRT LVESV change ≥35% vs. CRT LVESV change< 35%	0.26	0.06 - 1.25	0.093

B. HF Alone

LVEF≤30%	Hazard Ratio	95% CI	p-value
CRT LVESV change <35% vs. ICD	0.56	0.38 - 0.84	0.005
CRT LVESV change ≥35% vs. ICD	0.23	0.11 - 0.45	<0.001
CRT LVESV change ≥35% vs. CRT LVESV change< 35%	0.40	0.19 - 0.84	0.015
LVEF>30%			
CRT LVESV change <35% vs. ICD	0.44	0.22 - 0.88	0.020
CRT LVESV change ≥35% vs. ICD	0.17	0.07 - 0.44	0.0003
CRT LVESV change ≥35% vs. CRT LVESV change< 35%	0.39	0.14 - 1.14	0.086

Abbreviations: LVEF; left ventricular ejection fraction. ICD; Implanted Cardioverter Defibrillator. CRT-D; Cardiac Resynchronization Therapy with Defibrillator. LVESV; Left Ventricular End Systolic Volume. HF; heart failure. CI; confidence interval.

Figure 1. Kaplan–Meier Estimates of the Long-term Cumulative Probability of Death by Treatment Arm with A. LVEF ≤ 30%, B. LVEF > 30%.

A. LVEF ≤ 30%
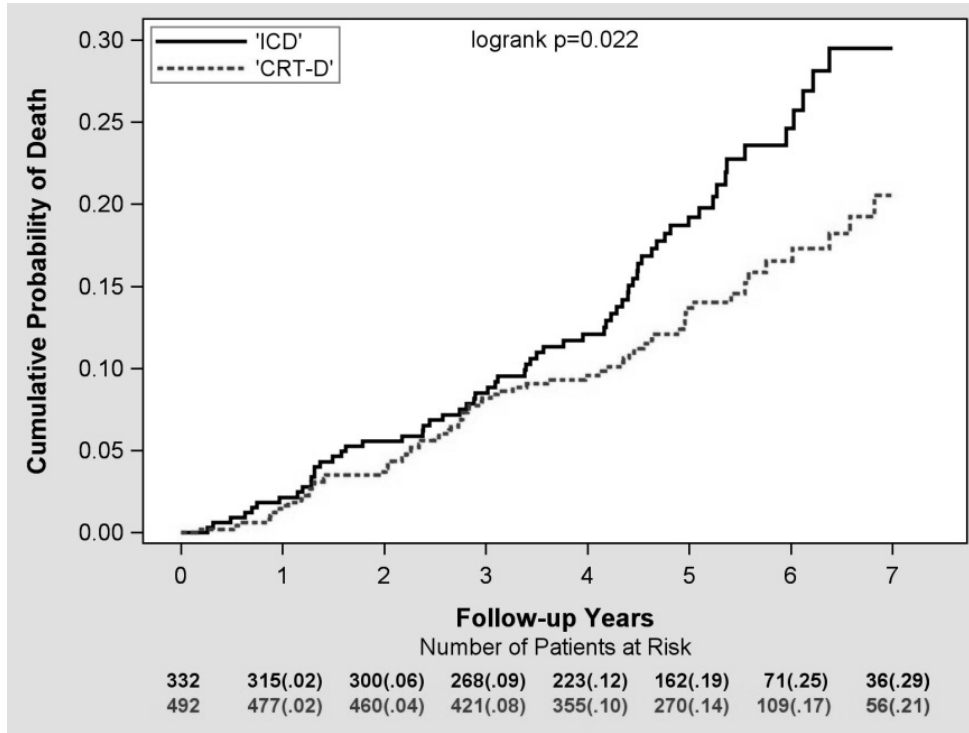
B. LVEF > 30%
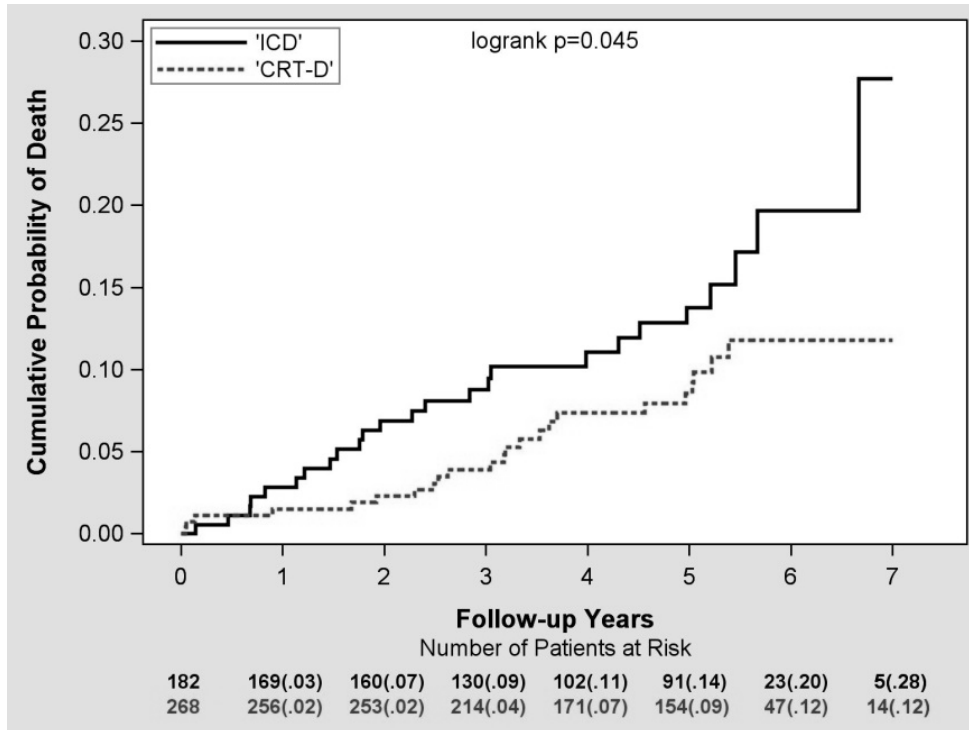
Figure 2. Kaplan–Meier Estimates of the Long-Term Cumulative Probability of A. Death, B. HF-only, Stratified by 1-year Reverse Remodeling to CRT-D

A.

B.

Vu, Giap

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A Comparison of Outcomes of First-Time Lower Extremity Revascularization with Infrainguinal Bypass and Percutaneous Transluminal Angioplasty for Chronic Limb-Threatening Ischemia in Insulin-Dependent Diabetic Patients

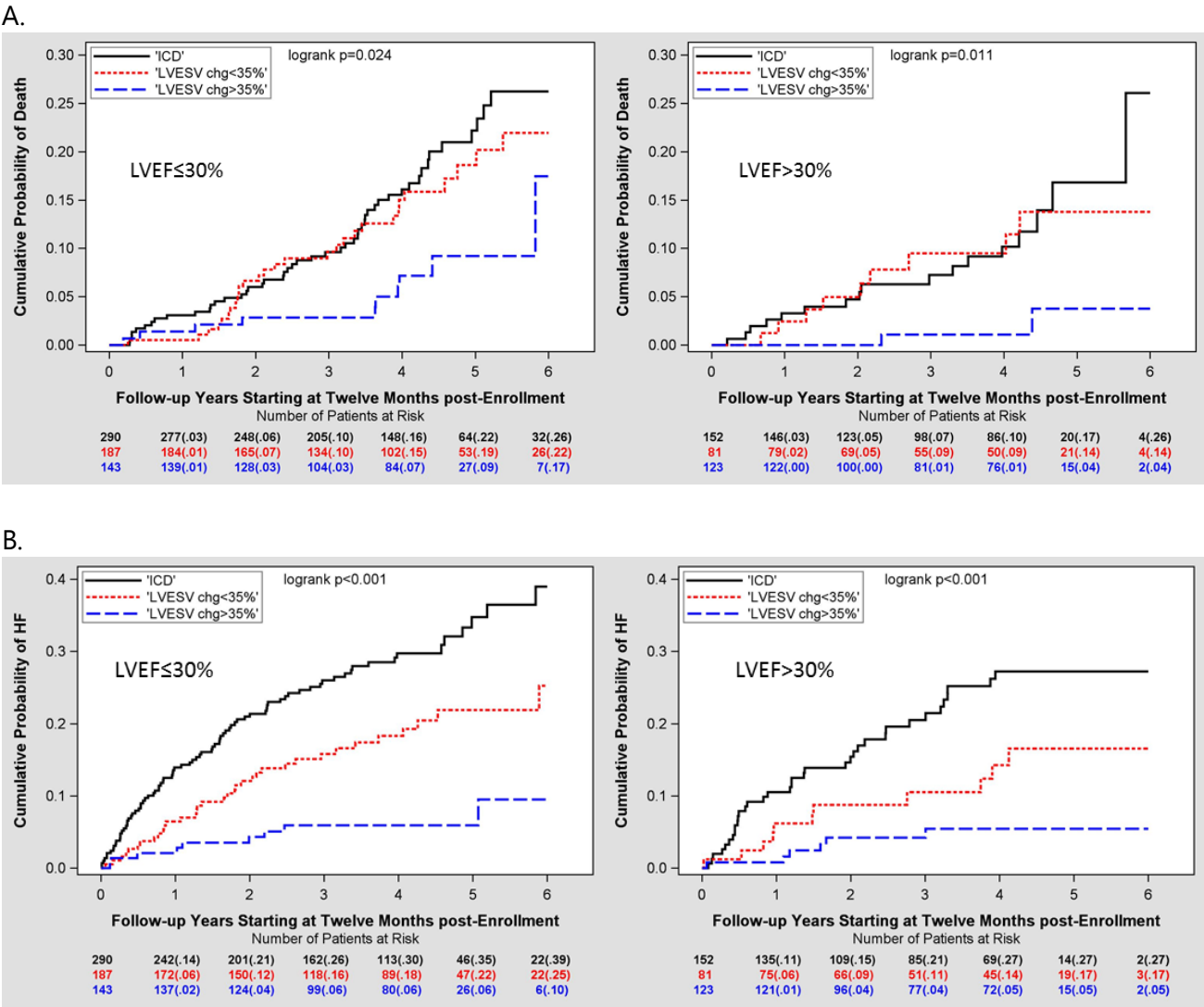**Objectives:** Historically, open surgical bypass provided a durable repair among diabetic patients with chronic limb-threatening ischemia (CLTI). In the current endovascular era, however, the difference in long-term outcomes between first-time revascularization strategies among patients with insulin-dependent diabetes (IDDM) is poorly understood.

Methods: We reviewed all limbs with IDDM undergoing a first-time infrainguinal bypass (BPG) or percutaneous transluminal angioplasty (PTA/S) for CLTI at our institution from 2005-2014. We defined IDDM as insulin administration at baseline to control blood glucose levels, and recorded the most recent HbA1c value available within 6 months pre-procedure and fasting blood glucose (FBG) levels on the day of procedure. We compared rates of wound healing, restenosis, re-intervention, major amputation, and mortality between BPG and PTA/S in our population using Chi-square, Kaplan-Meier, and Cox regression analyses. As a sensitivity analysis, we calculated propensity scores and employed inverse probability weighting to account for nonrandom assignment to BPG versus PTA/S.

Results: Of 2,869 infrainguinal revascularizations from 2005-2014, 703 limbs (343 BPG, 361 PTA/S) in 682 patients fit our criteria and underwent a first-time revascularization for CLTI. BPG patients, as compared to PTA/S, were similar in age (69 vs. 68 years; P=.51), rates of tissue loss at presentation (87% vs. 91%; P=.055), and dialysis-dependence (25% vs. 28%; P=.34), were less likely to be hypertensive (84% vs. 93%; P<.01), and were more likely to be current smokers (21% vs. 14%; P=.02). There were no differences between BPG and PTA/S in regards to mean HbA1c levels (7.9 vs. 8.0; P=.52) or mean FBG levels (152 vs. 156; P=.47). Although total hospital length of stay was significantly longer among BPG patients (11 vs. 8 days; P<.01), perioperative complications did not differ, including acute kidney injury (20% vs. 23%; P=.26), hematoma (7.3% vs. 4.2%; P=.07),

acute myocardial infarction (1.5% vs. 2.2%; P=.46), and mortality (3.8% vs. 2.8%; P=.45). PTA/S had significantly higher unadjusted 6-month rates of incomplete wound healing (51% vs. 59%) and 5-year rates of restenosis (48% vs. 64%) and re-intervention (49% vs. 60%) (all P<.05). After adjustment, multivariable analysis suggested PTA/S-first intervention to be significantly associated with higher risk of restenosis (Hazard Ratio (HR), 1.6; 95% Confidence Interval [1.1-2.4]) and re-intervention (2.0 [1.3-3.0]); these results remained robust following inverse probability weighting.

Conclusion: Among patients with CLTI, insulin-dependent diabetes is associated with a high risk of adverse events. Ultimately, our data suggest that a bypass-first approach may best serve appropriately selected, anatomically suitable patients within this vulnerable population.

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Natural Progression of Visual Field Deficits after Stroke

Background: Stroke damage to V1 is a significant cause of vision loss, presenting as homonymous hemianopsia. While prior studies have demonstrated visual field changes after other causes of homonymous hemianopsia, none examined the progression after stroke. The current gold standard for measuring visual field loss is Humphrey perimetry. We used Humphrey visual fields to analyze the natural progression after stroke.

Methods: Medical records of stroke patients at Strong Memorial Hospital were reviewed to exclude any patients with confounding conditions affecting their visual fields, generating a cohort of 38 patients with 97 Humphrey visual fields (HVFs). HVFs and several metrics, including perimetric mean deviation (PMD) were calculated by the Humphrey STATPAC software. Composite binocular HVFs were generated in MATLAB by averaging luminance detection thresholds (dB) from monocular HVFs at identical test locations between both eyes. Natural-neighbor interpolation was applied between test locations with 0.1 degree^2 resolution to create composite visual fields. Visual fields were categorized by weeks since stroke: 0-2, 2-4, 4-8, 8-12, 12-24, and >24. Statistical significance was determined using Mann-Whitney U test to compare across timepoints. Difference fields were calculated between each timepoint of every patient. Change was defined as areas of improvement or worsening of ≥6 dB between fields.

Results: At 0-2 weeks, the area improved was 221 ± 85.9 deg^2 (n=10), whereas by >24 weeks, the area improved was 41.9 ± 16.5 deg^2 (n=22), showing significant decrease (p<.05). Similarly, at 0-2 weeks, the area worsened was 4.3 ± 4.3 deg^2 whereas by >24 weeks, the area worsened was 82.9 ± 36.5 deg^2, showing significant increase (p<.01). Perimetric mean deviation (PMD) differences between timepoints showed significant decrease over time, with 2.77 ± 0.88 at 0-2 weeks and -0.49 ± 0.44 at >24 weeks (p<.01).

Conclusion: These findings suggest an early spontaneous recovery in visual field within the first weeks after stroke, followed by worsening of the visual field further out from the stroke.

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Design and Validation of a 3-D Printed Simulator for Posterior Cervical Laminectomy

Introduction
Development of technical skills for a cervical laminectomy are traditionally acquired through intraoperative learning and cadaveric courses. These methods provide little objective assessment, involve financial and biohazard considerations, and may not incorporate desired pathology. We aim to develop and assess face, content, and construct validity of a high-fidelity, inexpensive cervical laminectomy simulator.

Methods
A spondylotic cervical spine model was generated and 3D printed into negative molds, which were filled with multilayer polyvinyl alcohol hydrogels, plaster, and fiber glass to replicate neck tissues. A pressurized balloon placed in the spinal canal and connected to a pressure transducer to measure potential cord manipulation. Twelve surgeons (novice designated by prior laminectomy case load <100) performed a "skin-to-skin" C4-C6 posterior laminectomy simulation. Surveys assessed face and content validity using a 5 point-Likert scale. Construct validity was assessed by comparing procedural metrics (thecal-sac pressure wave count, amplitude, slope, time of elevated pressure, operative time, blood loss, incision length, complications) between groups.

Results
The simulator received an average face and content validity rating of 4/5. Significant differences between experts and novices were found in total intra-thecal pressure wave count (84 vs 153, $p = 0.023$), amplitude (4% vs 12% >2SD above expert mean, $p < 0.001$), area under curve (4% vs 11% >2SD above expert mean, $p < 0.001$), and procedure time (35 vs 69 min $p = 0.003$). Insignificant differences were found in mean pressure wave slope or blood loss. There was a significant difference in complication rate between novices (3 incorrect levels decompressed, 1 dural tear) and experts ($p = 0.03$).

Conclusions

This full procedural cervical laminectomy simulator received excellent validity ratings and was successfully able to measure operator performance. Further studies are needed to determine the role of physical simulators in the training and maintenance of surgical skills.

Figure 1. Pressure wave curve excerpt and data analysis. A. Excerpt of pressure wave curve from simulation. Waves coincide with Kerrison use. Frequency, amplitude (measured in volts and converted to mmHg) and slope (mmHg/s) were measured. A decrease in baseline pressure was seen with progression of decompression. **B.** Probability distributions of the characteristics of novice and expert intra-thecal pressure waves. Distributions of amplitude, slope, and area under curve of each pressure wave found in the intra-thecal pressure logs for experts and novices. Significant difference was seen between experts and novices in the amplitude of pressure waves (mmHg) and the area under curve (mmHg/s^2). An insignificant difference was seen in the slope of the onset of each pressure wave (mmHg/s).
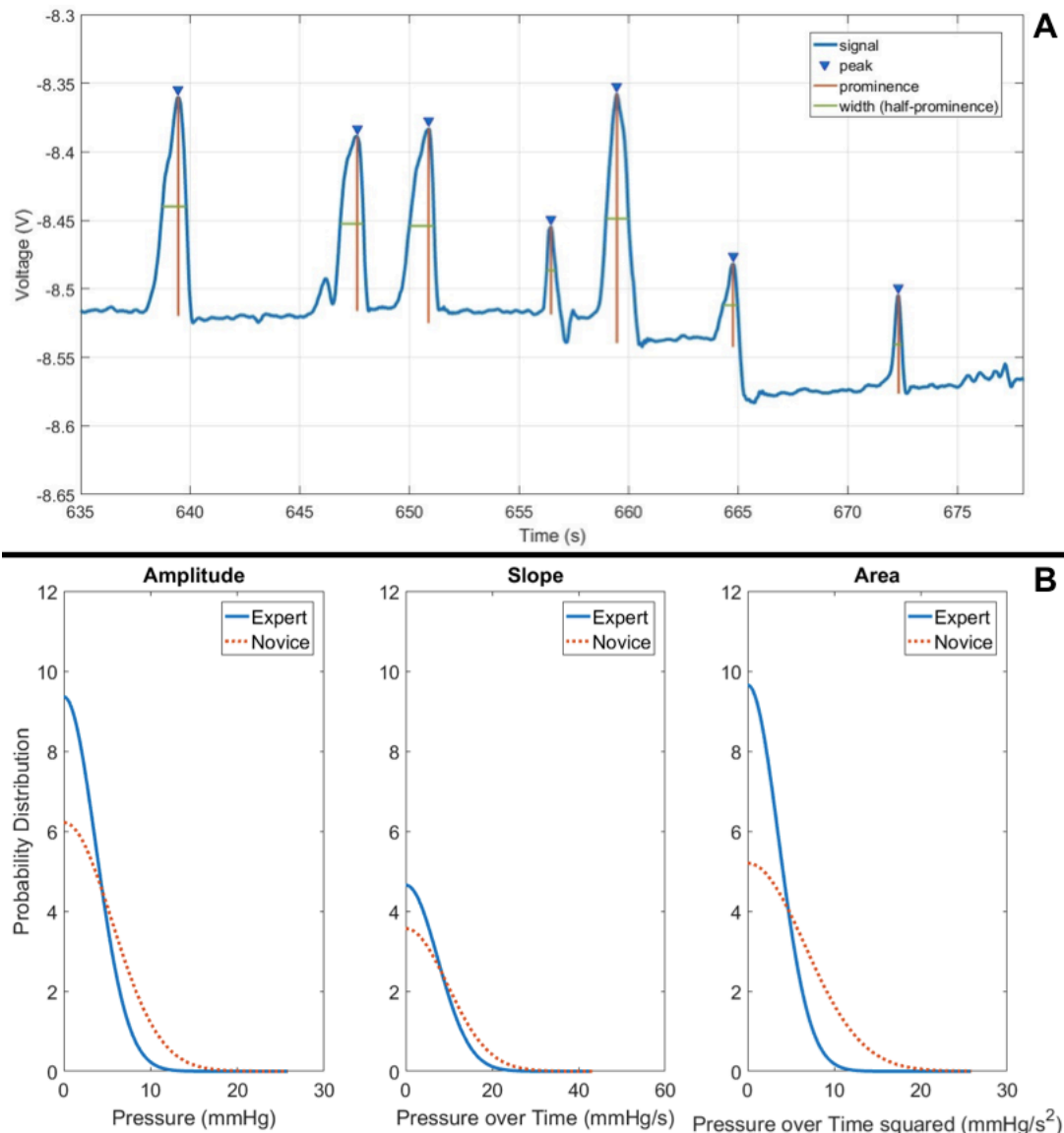
Figure 2. Photograph of Simulator. Intraoperative view of lamina exposure following vertical incision, fascial and subperiosteal dissection prior to bony decompression.
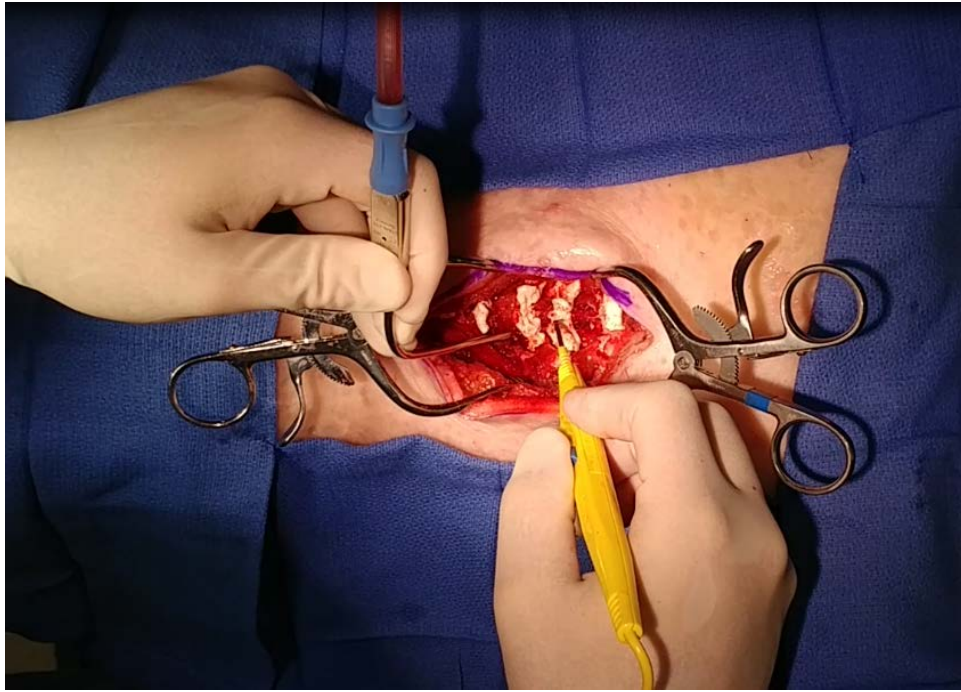
Keywords: Posterior Cervical Laminectomy, Surgical Simulation, 3D Printing, Surgical Education

Study Design: Validation Study

Learning Objectives:
1. Understand how 3D printing can be used to create high fidelity low cost surgical simulators.
2. Discuss various forms of validation for simulation and describe how to conduct a simulation study.
3. Recognize how the incorporation of sensors into simulation permits the evaluation of technical performance.

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Complication and Mortality Rates amongst Patients Who Underwent Surgical Management of Extradural Spine Tumors in New York State

Introduction:
Extradural spinal tumors are spine tumors that grow outside of the dura, in bone. There are 18,000 new cases of spine tumors diagnosed each year in North America. Of those, 70% are among patients with a history of cancer in other systems.[1] The skeletal system is the third most common site of metastasis and within the skeletal system the spine is the most common site.[2] Metastases typically spread via the hematogenous route and contain common histology associated with the lung, breast, renal cell, lymphoma, thyroid, and prostate.[2] Spine surgery for spine tumors is often palliative in nature and complications associated with it can further compromise the time a patient has left. There is very little evidence reporting hospital and patient demographics being associated with postsurgical outcomes in extradural spine patients. In addition, there has not been a statewide evaluation of the complication and mortality rates amongst post-surgical extradural spine tumor patients. The purpose of this study was to evaluate the complications and mortality associated with patients who underwent surgical management of extradural spinal tumors in New York State.

Methods:
The Statewide Planning and Research Cooperative System (SPARCS), was utilized to identify patients based on the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) with extradural spinal tumors (diagnosis codes 198.3, 198.4 and 198.5) that underwent surgical management (procedure codes 03.0, 03.4, 03.09, 81.0, 81.00-81.08) in New York State from 2001 to 2015. Multivariate analysis was performed to analyze the association of patient demographic and hospital characteristics with mortality and complication outcomes. Models were adjusted for 29 pre-existing comorbidities using the Elixhauser AHRQ-Web ICD-9-CM coding algorithm. Logistic regression models were estimated with robust standard errors to account for the clustering of outcomes within hospitals. Two-tailed tests with $p < 0.05$ were used to indicate statistical significance.

Results:

5,190 patients were identified, the majority of patients were male (55.8%), white (69.4%), and not of Spanish/ Hispanic origin (90.4%). The median age was 61 (IQR [Interquartile Range]: 51 – 69). The complication rate was 22.8% and the mortality rate within 30 days of discharge was 12.3%. Pulmonary (7.9%), and urinary and renal (6.3) complications were the most common complications reported. Multivariate analysis showed the odds of complications were higher in males compared to females (OR [Odds Ratio]: 1.25; 95% CI [95% Confidence Interval]: 1.08 – 1.45), African Americans compared to whites (OR: 1.39; 95% CI: 1.11 – 1.74) and patients on Medicaid compared to patients on private insurance (OR: 1.50; 95% CI: 1.15 – 1.95). Analysis of hospital characteristics showed lower volume hospitals (OR 1.42; 95% CI: 1.01 – 2.01) and urban hospitals (OR: 2.49; 95% CI: 1.91 – 3.24), have higher odds of complications compared to high volume hospitals and rural hospitals, respectively (Table 1). In addition, multivariate analysis showed higher odds of mortality within 30 days of discharge in patients of older age (OR: 1.02; 95% CI: 1.01 – 1.03), low volume hospitals compared to high volume hospitals (OR: 1.60; 95% CI: 1.33 – 1.94), hospitals with low bed size compared to high bed size (OR: 1.45; 95% CI: 1.12 – 1.87) and urban hospitals compared to rural hospitals (OR: 3.85; 95% CI: 2.76 – 5.38) (Table 2).

Discussion:

This study provides a statewide perspective on patient and hospital risk factors for complications and mortality after extradural spinal tumor surgery in New York State. Patient and hospital characteristics can significantly predict the odds of a complication and mortality following surgery. This study showed that males, African Americans and patients on Medicaid are more likely to experience a post-operative complication. In addition, low volume hospitals, and urban hospitals can also increase the odds of a complication. Age, low volume hospitals, low bed size hospitals and urban hospitals were more likely to cause mortality within 30 days of discharge. Both complications and mortality can impact the quality and length of the already limited time these patients have left. Additionally, this study highlights major public health concerns for certain populations.

Significance/clinical relevance:

An understanding of the patient and demographic risk factors associated with increased complications and mortality may provide important insight when recommending surgical management for extradural spinal tumors.

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Table 1. Logistic regression results for complication outcome

Variables	OR (95% Confident Interval)	P-value
Age at Admissions (y)	1.01 (1.00-1.02)	0.08
Sex		
Female	1 [Reference]	0.00*
Male	1.25 (1.08-1.45)	
Race		
White	1 [Reference]	
Black or African-American	1.39 (1.11-1.74)	0.00*
Asian	0.69 (0.44-1.09)	0.11
Other/Unknown	1.02 (0.79-3.2)	0.86
Ethnicity		
Spanish/Hispanic Origin	1 [Reference]	
Not of Spanish/Hispanic Origin	1.10 (0.78-1.54)	0.58
Unknown	0.77 (0.46-1.27)	0.30
Insurance Status		
Private	1 [Reference]	
Medicare	1.06 (0.86-1.30)	0.54
Medicaid	1.50 (1.15-1.95)	0.00*
Other	0.72 (0.45-1.16)	0.18
Hospital Volume		
Quartile 4	1 [Reference]	
Quartile 3	1.42 (1.01-2.01)	0.04*
Quartile 2	1.27 (0.93-1.73)	0.13
Quartile 1	1.17 (0.83-1.64)	0.37
Hospital Bed Size		
Quartile 4	1 [Reference]	
Quartile 3	1.06 (0.72-1.56)	0.78
Quartile 2	1.03 (0.74-1.44)	0.86
Quartile 1	0.91 (0.59-1.39)	0.66
Hospital Location		
Rural	1 [Reference]	
Urban	2.49 (1.91-3.24)	0.00*
Hospital Teaching Status		
Medical School Affiliation	1.21 (0.86-1.69)	0.27
No Medical School Affiliation	1 [Reference]	
Adjusted for Elixhauser comorbidities		
*Indicates significance at the **α** = 0.05 level		
N = 4931		

Table 2. Logistic regression results for mortality outcome

Variables	OR (95% Confident Interval)	P-value
Age at Admissions (y)	1.02 (1.00-1.02)	0.00*
Sex		
Female	1.02 (0.85-1.22)	0.82
Male	1 [Reference]	
Race		
White	1 [Reference]	
Black or African-American	0.99 (0.72-1.36)	0.96
Asian	0.84 (0.48-1.46)	0.54
Other/Unknown	1.07 (0.79-1.44)	0.66
Ethnicity		
Spanish/Hispanic Origin	1 [Reference]	
Not of Spanish/Hispanic Origin	1.33 (0.82-2.15)	0.25
Unknown	1.59 (0.86-2.94)	0.14
Insurance Status		
Private	1 [Reference]	
Medicare	0.86 (0.70-1.06)	0.15
Medicaid	1.39 (0.95-2.04)	0.09
Other	1.10 (0.75-1.61)	0.62
Hospital Volume		
Quartile 4	1 [Reference]	
Quartile 3	1.35 (1.09-1.67)	0.01*
Quartile 2	1.60 (1.33-1.94)	0.00*
Quartile 1	1.21 (0.96-1.52)	0.10
Hospital Bed Size		
Quartile 4	1 [Reference]	
Quartile 3	0.98 (0.77-1.25)	0.87
Quartile 2	1.01 (0.81-1.26)	0.93
Quartile 1	1.45 (1.12-1.87)	0.00*
Hospital Location		
Rural	1 [Reference]	
Urban	3.85 (2.76-5.38)	0.00*
Hospital Teaching Status		
Medical School Affiliation	1 [Reference]	
No Medical School Affiliation	0.87 (0.54-1.43)	0.59
Adjusted for Elixhauser comorbidities		
*Indicates significance at the α = 0.05 level		
N = 4931		

Wilson, John

Preceptor
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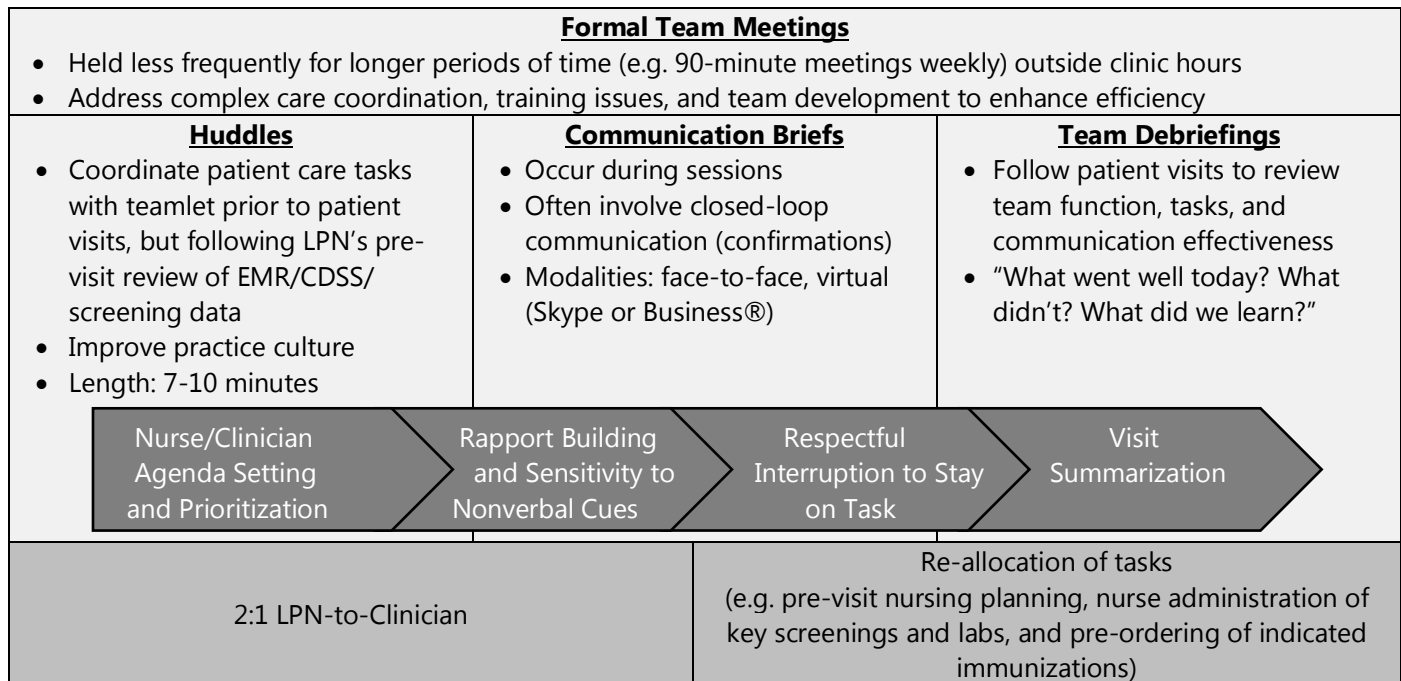Department of Public Health Sciences
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The Patient – Teamlet Communication Model in Community Health Centers: Facilitators and Barriers to Implementation

Background: Improving primary care practice within federally qualified health centers (FQHCs), the largest provider of healthcare to underserved populations in the U.S., represents a practical way to improve healthcare quality and reduce health care disparities. While the science of teamwork offers potential for improving patient outcomes by optimizing limited encounter time and fostering collaboration among providers, its application and evaluation in the primary care setting is understudied. The present study aims: (a) to refine and pilot the Patient-Teamlet Communication (PTC) Model, an interventional model derived from existing theoretical frameworks, within a federally qualified health center (FQHC) undergoing practice transformation; (b) to pilot key patient-centered outcomes research (PCOR) measures relevant to facets of the PTC Model; and (c) examine key facilitators and barriers to implementation of the PTC Model, using alternate healthcare sites affiliated with the FQHC as a comparison group.

Methods: The study employed mixed quantitative and qualitative measures for team functioning/performance and health outcomes among staff members and patients, respectively. We partnered with a FQHC in a moderately sized city in Upstate New York in accordance with community-based participatory research (CBPR) principles; the agency is the largest and oldest FQHC in the region, serving roughly 30,000 patients at ten sites. We integrated Bodenheimer's Teamlet Model with Mauksch's Patient-Centered Communication Model to devise the PTC Model; the model leverages the efficiency and power of teamwork with the critical elements of patient-centered communication to improve patients' voice and value (see Figure 1, below.) Study PCOR variables included the Team Effectiveness Questionnaire, the Primary Care Teamwork Scale, Mauksch's Patient Centered Observation Form, sociometric badges capturing body movement and audiometric data, healthcare quality-of-care metrics (e.g., PHQ-9, HbA1c, and blood pressure), and visit efficiency. We conducted x2 and t-tests for categorical and continuous variables, respectively, to assess differences among the intervention and control sites for the aforementioned measures, as well as variations between baseline and follow-up using a difference-in-difference analytic approach.

Figure 1. The Patient-Teamlet Communication Model: Key elements of team development, team communication, and team support.

Formal Team Meetings		
• Held less frequently for longer periods of time (e.g. 90-minute meetings weekly) outside clinic hours • Address complex care coordination, training issues, and team development to enhance efficiency		
Huddles	**Communication Briefs**	**Team Debriefings**
• Coordinate patient care tasks with teamlet prior to patient visits, but following LPN's pre-visit review of EMR/CDSS/ screening data • Improve practice culture • Length: 7-10 minutes	• Occur during sessions • Often involve closed-loop communication (confirmations) • Modalities: face-to-face, virtual (Skype or Business®)	• Follow patient visits to review team function, tasks, and communication effectiveness • "What went well today? What didn't? What did we learn?"
Nurse/Clinician Agenda Setting and Prioritization	Rapport Building and Sensitivity to Nonverbal Cues	Respectful Interruption to Stay on Task	Visit Summarization
2:1 LPN-to-Clinician	Re-allocation of tasks (e.g. pre-visit nursing planning, nurse administration of key screenings and labs, and pre-ordering of indicated immunizations)	

Results: The project resulted in refinement and piloting of the PTC Model. This included refinement in tasks delegated to the LPN, refinement in huddles practices (e.g., LPN leads each huddle), and changes to equipment use during encounters. The self-report measure of teamlet teamwork significantly discriminated between the intervention and non-intervention (comparison) sites, with teamlets from the intervention site reporting higher goal clarity, more frequent huddles, and more efficient huddles. Observation ratings discriminated between the intervention sites and non-intervention sites. Moreover, sociometric data revealed that LPNs spoke most frequently and that huddles were interactive, with all team members contributing to the dialogue. Patient experience-of-care measures showed improvement, though impacts were limited by ceiling effects. Quality metrics, including cancer screening (breast, cervical, and colorectal) and alcohol (AUDIT), showed statistically greater improvements. Visit efficiency increased by 20% at the intervention site.

Conclusions: The project resulted in refinement and piloting of the PTC Model, piloting of key teamwork measures, and preliminary assessment of the PTC Model and lessons learned based on the pilot. While the success of the PTC Model was facilitated by engaged agency leadership, frequent refinement, and employee support, challenges included CMS medical record documentation and reimbursement regulations, time for training/debriefing, and an efficient implementation plan for the PTC Model. Additional implications will be discussed.

Basic Science, Clinical & Translational Research

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There is a plethora of reconstructive procedures performed to correct large skeletal defects. Free tissue transfer has become the standard of care for such defects; however, there are several disadvantages with this method including the following: a 3-15% failure rate, donor site morbidity, long-invasive operative times, and prolonged post-operative rehabilitation. Decellularized allografts have osteogenic properties, but lack long term integrity with an approximate 60% ten year postoperative failure rate due to restricted integration and remodeling. Recent studies showed promising allograft augmentation with tissue engineered periosteum (TEP) through the delivery of mesenchymal stem cells (MSCs). Previous studies indicated that the growth factors bone morphogenic protein (BMP) and vascular endothelial growth factor (VEGF) temporarily promote bone formation. These small molecules suffer several limitations with systemic delivery, including: poor temporal control of factor availability, rapid degradation, and supra-physiologic doses to elicit benefit. The aim of this work is to develop a sustained release of BMP2 mimetic peptide from our acellular TEP in critical sized defects. This study assessed the purity and thiol functionalization of several BMP2 peptide mimetics. We successfully synthesized several variations of BMP2 peptides with a Liberty Peptide Synthesizer— BMP2-native (positive control), BMP2-scrambled (negative control), 4KBMP2-NRL1, 4KBMP2-NRL2, 4KBMP2-NRL1Tail, 4KBMP2-NRL2Tail. We also synthesized SDL, a Matrix Metalloproteinase (MMP) degradable linker, and RGD, which increases integrin binding and therefore promotes cellularization of the TEP. Matrix Assisted Laser Desorption Ionization-Time of Flight (MALDI-ToF) confirmed peptide molecular weight. UV-Vis spectroscopy evaluatedt the peptides purifies. Ellman's Assay determined the free thiol content of the peptides to indicate potential incorporation into the hydrogel scaffolds. The BMP bimetic peptides will be conjugated two peptides to our poly-ethylene glycol (PEG) hydrogels via biodegradable linkers using a photocatalyzed reaction. Once synthesized, the peptide potenial will be assessed by measuring the TEP mechanical properties, and determining the *in vitro* cellular interactions, such as capacity to promote osteogenic and angiogenic behavior in the MSCs.

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Assessing Opinions of Methadone Maintenance Treatment among Individuals with Opioid Use Disorders in Upstate New York

Introduction: The rural counties of Upstate New York have significantly reduced access to medication-assisted treatment for opioid addiction. Strong Recovery, an addiction services clinic run by the University of Rochester Medical Center, plans to address this shortage by opening additional Opioid Treatment Programs (aka methadone clinics) in Upstate New York. Methadone is commonly prescribed drug used to treat opioid addiction. Although Methadone has been proven to be an effective treatment for opioid addiction, there is a lot of misinformation about methadone treatment that exists in both the general public and in the substance abuse community.

Objective: To understand the knowledge and opinions of methadone treatment held by individuals with an opioid addiction that are currently receiving non-methadone based care.

Methods: Study participants were recruited from treatment centers and clinics located in Allegany, Livingston, Steuben, Ontario, Wayne, Yates, Chemung, Seneca, and Cayuga counties that are registered with the New York State Office of Alcoholism and Substance Abuse Services. Participants met the following inclusion criteria: 18 years of age or older, currently seeking treatment for misuse of prescription opioids or heroin, and not currently receiving methadone maintenance treatment. The survey asked participants about their opinions on the health effects of methadone treatment, the effectiveness of methadone as a treatment for opioid addiction, and the stigma associated with methadone treatment.

Results: A total of 85 individuals completed the survey. Participants represented 11 treatment centers located in 7 counties in Upstate NY. The average age was 31 years. 76.5% of participants had received treatment with Buprenorphine, 29.2% with Naltrexone, and 76.3% had participated in a 12-Step recovery program. Participants expressed a diverse range of opinions and knowledge about methadone treatment. A strong consensus was not reached for a number of survey questions. However, two statements elicited strong opinions. 65% of individuals agreed or strongly agreed with the statement "I cannot take methadone if I am pregnant". Furthermore, 74%

of participants either agreed or strongly agreed with "I would be worried about becoming addicted to methadone".

Conclusions: Survey participants expressed concerns about specific aspects of methadone treatment. The greatest concern expressed was for the potential of developing an addiction to methadone. This was a belief held by 74% of respondents. Furthermore, 54% of respondents believe that using methadone is simply replacing one addiction for another. Despite the fear of developing an addiction, 48% did agree that with methadone treatment it is possible to get off illegal drugs. However, only 14.1% of participants agreed that methadone is the best treatment for opioid addiction. Participants did not report a significant concern of being stigmatized by friends, family, and other addicts for using methadone. The survey responses indicate that it is important to provide patient education that addresses the concern of developing an addiction to methadone. Overall, the results indicate that although individuals have significant concerns about the risk of addiction with methadone, individuals are not opposed to considering methadone treatment.

Table 1. Assessing opinions and knowledge of methadone treatment using a 5 point Likert scale					
Survey Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
It is safe to take methadone	21.2%	21.2%	31.8%	16.5%	9.4%
Methadone is bad for your health	4.7%	22.4%	27.1%	27.1%	18.8%
I cannot take methadone if I am pregnant	9.9%	7.4%	17.3%	28.4%	37.0%
I would be worried about becoming addicted to methadone	7.1%	9.4%	9.4%	23.5%	50.6%
Taking methadone is only replacing one addiction with another	8.2%	20.0%	15.3%	16.5%	40.0%
Methadone takes away the craving for opioids	10.6%	8.2%	27.1%	32.9%	21.2%
With methadone you can eventually get off illegal drugs if you want to	14.1%	9.4%	28.2%	34.1%	14.1%
Methadone is proven to be the best way of quitting heroin and opioids	31.8%	23.5%	30.6%	8.2%	5.9%
Withdrawal from methadone is worse than opioids	5.9%	10.6%	32.9%	24.7%	25.9%
You need high doses of methadone for it to be effective	9.5%	32.1%	40.5%	11.9%	6.0%
I would be afraid to tell my family and friends that I am using methadone	18.8%	23.5%	20%	23.5%	14.1%
Opioid users who are not on methadone look down on those who are	15.3%	34.1%	27.1%	17.6%	5.9%
Methadone programs help decrease illegal drug problems	15.3%	16.5%	20.0%	27.1%	21.2%

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Herschbein, Lauren
McHugh, Sarah

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Project Contributor
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URWell: St. Joseph's Neighborhood Center

Background:
In Rochester, New York, between 7.9% and 10.2% of the population is uninsured, and many others struggle to pay their co-pays and deductibles. In order to improve healthcare access in this city, medical students from the University of Rochester formed the UR Well Clinics to reach these underserved populations. The URWell Clinics at St. Luke's Tabernacle Community Church and Asbury First Methodist Church are free, walk-in clinics that are held weekly. The URWell organization also provides after hours health care once a week at St. Joseph's Neighborhood Center (SJNC). All three clinics provide physical exams, acute care, specialty care, and lab work to the uninsured or underinsured people of Rochester.

Three student interns designed summer projects to better serve the URWell patient community. The first project, the Care Plan, was designed to streamline the navigation of SJNC's EMR system, Greenway. It was determined that having a single location for frequently reviewed patient health information such as vitals, BMI, ASCVD risk, pap smear results, and lab work would be beneficial to providers.

The second project included revamping and updating a 'Homeless and Hunger Guide' (HHG). The HHG is a comprehensive document that contains information about Rochester area resources and programs catering to low socioeconomic status residents.

Methods:
Background research was performed on health maintenance measures from USPSTF, ACOG, the Institute of Medicine and the CDC. This information was then taken to the staff at SJNC to determine what measures they thought were most clinically relevant to them. To validate this data we consulted results from a previous project, "Implementing Measurable Metrics." This project was done by a medical student to address the major health care concerns of SJNC's population

and how to track patient data regarding these issues. Then, the URWell Summer Interns worked closely with the IT team to determine how to track these measures in Greenway and make them easily to accessible to providers.

For the HHG, information about various programs was collected from program websites and by contacting the agencies directly to confirm information. Information collected included: contact information, hours, fees, if a referral is needed, and type of service provided.

Results:
We were able to design Care Plans in Greenway that track patient data such as immunizations, cancer screening dates, and recent blood work and compile it in one place for providers to reference. Unfortunately, due to limitations in Greenway, we were not able to have a way to alert providers when patients were due for immunizations or screening tests.

At the end of the summer internship, the HHG was not yet completed. A fourth year medical student took over the project for their Community Health Improvement Course.

Future Implications:
We hope that the Care plans will help with time management for providers as Greenway is a challenging EMR to use. It also allows for the consolidation of health information to streamline the process of preparing for a patient visit. As the HHG was last updated 2004, reviewing the resources available to patients allows the clinics to give accurate information to patients in need.

We are looking to implement similar screening tools to the Care plans at the other two URWell clinics and make the HHG available at St. Luke's and Asbury as soon as it is finished.

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Street Outreach Summer 2017: New Landscape, New Connections

### Background: Rochester Medical Students Hit the Streets

Street Outreach is a student organization with the mission of directly contacting the homeless population in Rochester in order to them with longitudinal support and advice. The support takes the form of medical and hygiene supplies, and the goal of the advice is to identify each client's obstacles to achieving their health care goals and working with them to find paths around these obstacles.

According to recent estimates, the homeless population in Monroe County is approximately 700-800 individuals, and has risen consistently from 2007 to 1015 (source: NY State Comptroller), a number which does not reflect mobility into and out of the population. Because this population is heterogeneous, the Street Outreach mission includes needs-based assessment as the basis of our interaction with homeless persons.

Summer Goals: Rebuild, Maintain, and Expand

Rebuild: Every winter a large portion of the homeless population in Rochester consolidates in shelters, and as the weather warms, many homeless people return to tent-camping on the street. Also, the landscape in Rochester evolves as "roadwork" season begins- a process which includes police and Department of Transportation raids upon homeless encampments, resulting in forced migration. Our primary goal of direct contact is best served by using the late spring and early summer to explore new areas and neighborhoods, and to edit and add new detail to our map of sites that we visit.

Additionally, as many people begin camping on the streets in the summer, they may lose access to hygiene supplies and medical attention, which we
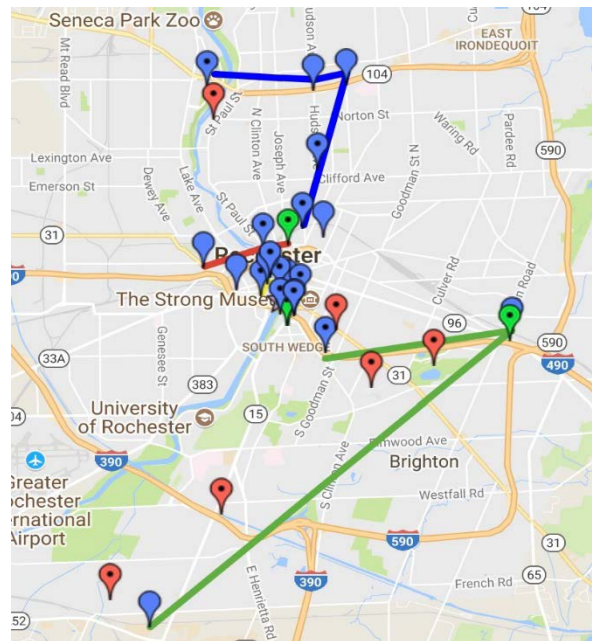
hope to help them replace, in order to rebuild their prospects of housing prior to the arrival of cold weather.

Maintain: The traditional practice of Street Outreach is to lead teams of students to homeless shelters and encampments. This summer we were able to use the RedCap database to track how many clients we served, including 18 outreach expeditions of which 14 were logged, and 234 recorded interactions in which medical or social interventions were discussed and/or hygiene supplies were provided.

As part of maintaining our mission, we continued to work with St Peter's Kitchen, which provided us with food for us to distribute every week, as well as physicians Drs. Cicilline, Holub, and Loomis. These physicians were on-call every time we went out, and were a valuable resource in advising both students and patients.

Expand: During this summer we were able to recruit students to go on rounds twice a week, and to recruit physicians to join us on rounds over the months of June and July. At the House of Mercy homeless shelter, we developed an educational relationship with Dr. Swanger, who brings a mobile clinic there every other Wednesday- we would interview patients before they consulted Dr. Swanger, and if allowed by the patient, we would assist with the exam.

Furthermore, we were fortunate to work with thirteen Family Medicine residents at Highland Family Medicine, who went on rounds with us five times throughout the summer. These physicians were able to directly evaluate and treat subcritical complaints, provide expert medical and psychiatric advice for treating complex, difficult, and emergent complaints, and at the same time they were able to both benefit from the experience with this patient population and also educate the medical students.

Challenges: New Avenues of Outreach and Fundraising Hurdles

New Avenues: This summer we had multiple meetings with the social work department at Strong Hospital with the goal of providing needs-based assessment and longitudinal care to patients who check-in to the Strong ED and identify themselves as homeless. However, we had to delay implementing this plan due to lack of student participants. It is now our goal to identify how we can increase student enrollment or implement a scaled-down version of this plan. At our meetings we also discussed bringing social workers out on our rounds, and hope to continue recruitment at future meetings.

Fundraising Hurdles: In the past, Street Outreach has depended on grants from the Genesee Valley Medical Association and direct donations of supplies. Our goal for this summer was to continue to develop these resources, but add to them by engaging desirable segments of the community through publicity in the Catholic Courier and in the University of Rochester Alumni Association. We hope to achieve these goals during the school year, and to use incoming financial resources to deliver higher quality services to our client base. If we can raise enough funds, we plan to continue turning our sponsored van into a mobile clinic, through which we can provide increased levels of medical and social care to the community.

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Family Planning in an Islamic Society: Morocco as a Case Study

Background: Last year, in a televised speech in Istanbul, Turkish President Recep Erdogan declared that "no Muslim family can understand and accept" family planning.[1] Family planning has long been a controversial subject in Muslim communities. Muslims currently have the highest fertility rate of any religious group in the world.[2] Further, the contraceptive usage rate in Muslim countries (<50%), lags far behind that in less developed non-Muslim majority countries (63%).[3]

Much of the debate around family planning stems from varied interpretations of Qur'anic edicts regarding the subject. As a result, family planning initiatives in many Muslim-majority countries have been met with resistance. Morocco, however, has been considered a success story.[4] Between the years 1980 and 2011, the contraceptive usage rate rose from 19% to 67%, while the fertility rate fell from 5.6 births per woman to 2.6 births per woman. The rate of unmet need, 11%, was one of the lowest in the Arab world.

Few studies have examined the perspectives of health workers and women in the country. The goals of this study were therefore to explore through qualitative measures the impact of religion on the following areas: (a) the development of family planning initiatives and the delivery of care, and (b) family-planning decision-making.

Methods: This study was conducted at the Moroccan Association for Family Planning (AMPF) in Rabat, one of the leading family planning organizations in the country. Study procedures included semi-structured interviews with health workers and women who utilize AMPF services, as well as clinical observations at three AMPF clinics in Rabat. Data was coded and analyzed using grounded theory principles.

Results and Discussion: Twenty-two subjects were enrolled in this study, 7 health workers and 15 women. The health workers we interviewed felt that religion had heavily influenced the development of family planning initiatives in the country, the delivery of care, and the services offered. In fact, they attributed many of their successes in part to the strong partnerships they had formed with local religious leaders.

Religion also influenced the views of the women on pregnancy and childbirth, family planning decisions, and the methods they were willing to use. However, women had varied views on how religion impacted their decisions. Some common themes found were that to them, Islamic family planning meant: (a) raising children within financial means, (b) fulfilling a duty to God and to community, and (c) trusting in God and not interfering with His creation.

The results from this study may provide valuable insights on how family planning initiatives can succeed in a Muslim-majority country without compromising Islamic values.

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Early Motherhood and Infant Survival at High Altitude

While medical interventions have contributed to decreased infant mortality rates in several countries, they typically fail to address the socioecological factors that can greatly influence reproductive health, especially in resource-poor communities without access to comprehensive health care. This is evident in Ladakh, an isolated district in the northern Indian state of Jammu and Kashmir. Nestled between Himalayan Mountains on the western end of the Tibetan plateau, this high-altitude desert is arid and sparsely populated. Most Ladakhis live in small villages scattered amount expansive deserts and massive mountains, with more than half of Ladakhi settlements being at or above 3,000 meters in altitude. Numerous stresses, including cold temperatures, ultraviolet radiation, harsh terrain, and, perhaps most importantly, hypoxia, all infringe upon human biology and, consequently, reproduction. In recent decades, globalization and climate change have dramatically changed Ladakh, both socially and ecologically. Though national public health campaigns and medical interventions are often the focus of investigation, this study shifts the gaze to the sociocultural factors that may simultaneously have contributed to changes in maternal and infant health and survival. By gathering reproductive histories and ethnographic interviews from 42 women in and around the capital of Leh, we aimed to explore maternal attitudes and behaviors surrounding pregnancy, childbirth, and early child rearing with a qualitative approach. These collected data will be analyzed with anthropological methods to sift the narratives into a thematic framework. Our preliminary results will be presented here in narrative format, giving voice to the experience of the mothers in these mountains.

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Investigating the Efficacy of the Novel Yantaló Clinic in Delivering Quality Healthcare to its Community in the Peruvian Amazon

The town of Yantaló is located in the Peruvian Amazon, a historically underserved area of the country especially in terms of access to healthcare. While there is a small medical post offering free care directly in the town square, it is often short-supplied and generally only capable of dealing with basic clinical cases. The Adelina Soplin, Yantaló Clinic and Diagnostic Center (Yantaló Clinic) is a state-of-the-art facility that opened a year ago in coordination with the Yantaló Peru Foundation (YPF) in order to address these healthcare deficits. Our study set out to investigate and evaluate the impact that the Yantaló Clinic has had on the local area. To this end, we solicited the opinions of members of the community regarding the clinic through the use of surveys. Our results indicate that approximately 79% of individuals surveyed considered that the clinic has had a positive impact on the community and 77% considered that the clinic has had a positive impact on their own life. And while 68% of participants were satisfied with the level of care provided by foreign healthcare workers, a common theme was the issue of a language barrier between patient and provider. Furthermore, 27% of participants disagreed with the pricing of medical services provided at the clinic and 10% of participants found it difficult or very difficult to gain physical access to the clinic. With that being said, none of the participants responded that the clinic has had a negative impact either on the community or on their own lives.While these results suggest a positive impact of the clinic, the lack of correlations within our dataset suggests further evaluations should be conducted as the clinic expands its services and influence in the community.

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Childhood Vaccination Practices and Perceptions in Rural Malawi

Background

Immunization is a successful and cost-effective health intervention used to reduce maternal and child mortality and combat disease, yet an estimated 19.4 million infants worldwide miss out on vaccination and 2.5 million children under five years old die yearly from vaccine preventable diseases.[1] In Malawi, infant and under-5 mortality rates have declined (from 76/1000 and 133/1000 live births in 2008 to 44/1000 and 67/1000 live births in 2013, respectively), which the Malawian Ministry of Health partially attributes to increased vaccination rates and consequently lower incidence of vaccine-preventable diseases[2]. These data suggest that vaccination strategies outlined in the Ministry of Health's health sector strategic plan may be effective.

Objectives

Beyond improved coverage at a national level, most recent available regionally-stratified data suggests that the Ntcheu district in rural central Malawi has a relatively high rate of vaccine coverage compared to other districts.[3] Given rural demographic trends correlating more barriers and poorer vaccination coverage with living in rural areas[4], we questioned to what extent the reported general improvements in coverage were evident in the Gowa catchment area of Ntcheu. Moreover, while the extant literature focuses primarily on structural and demographic variables, less is known about how caregiver perceptions and knowledge about vaccination may influence decisions to vaccinate their children or not.[5]

Methods

This cross-sectional study examined mothers' (*n* = 40) and health surveillance assistants' (HSAs; *n* = 5) perceptions and practices regarding childhood immunization in the Gowa catchment area over a five-week period using semi-structured interviewing. Questions were developed from previous research[6] and preliminary observation, and assessed the following: vaccination knowledge and health education, personal experiences at Under Five clinics, and relationships between mothers and HSAs.

Results

Despite significant barriers (e.g., walking distance to clinic, waiting times, limited vaccination supplies, high HSA workload and fatigue), vaccination coverage was high. All mothers verbally reported full coverage for their children under five years old; however, among children for whom documentation was shown, four were missing one vaccination. Moreover, 45% of mothers reported knowing someone who did not vaccinate her children. Regarding vaccination knowledge, 100% of mothers identified prevention of disease as a reason behind vaccination, and 60% of mothers could name at least one disease prevented by vaccines. Most mothers (93%) reported trusting HSAs, and identified HSAs as a source of reliable information and support for their children. HSAs reported similarly positive relationships with mothers, but emphasized the burden of increasing population size and lack of concordant increase in supplies and staff/supervisory support.

Discussion

In sum, all mothers knew that vaccines prevented disease, yet few mothers had an accurate understanding of the specific diseases prevented, the mechanism by which a vaccine works, and potential side effects. Despite these knowledge gaps, mothers expressed confidence regarding the importance of vaccination and emphasized their trust in HSAs' competence and motivation to do what is best for children. Notably, vaccination coverage was extremely high among mothers interviewed, but no mothers who did not vaccinate her children were reached.

Thus, rather than investing efforts into improving vaccination knowledge, it may be useful to focus on building trustworthy relationships between healthcare providers and community members when it comes to encouraging positive health habits. The sample size of this study was small; however, the depth of qualitative information gathered provides a better understanding about the variety of sociocultural factors at play in the context of vaccination practices. Such data offers insight as to why vaccination efforts may or may not be effective in rural Malawi and thus inform future vaccination efforts.

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Living with Spinal Deformities in Ethiopia:
A Study on Health-Related Quality of Life

Introduction: Spinal deformity is a common medical disorder with significant and measurable impact on those living with the disease. In Ethiopia, there is a countless caseload of spinal deformity with a predominance of congenital and early onset kyphoscoliotic deformity.[1] However, there is no surgical service available in the whole country offering a scoliosis deformity corrective procedure. Spinal deformities are quite debilitating with regard to quality of life. The main issues concerning spinal deformity are disability and pain. Several health-related quality of life (HRQoL) instruments, including the Scoliosis Research Society Quality of Life Survey 22 (SRS-22) and the Oswestry Disability Index (ODI), are widely used to standardize the evaluation of spinal deformities. These outcomes instruments are clinically important in that they can accurately reflect the clinical values of surgical intervention. This study assesses changes in SRS-22 and ODI scores between preoperative and postoperative spinal deformity patients.

Methods: Preoperative and postoperative spinal deformity patients were given two self-completed questionnaires (SRS-22 and ODI) to assess disability and quality of life. Differences in scores between the two cohorts were analyzed using t-tests. Significance was set at p less than 0.05. All calculations were performed using Stata 13.1 (StataCorp, College Station, TX).

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[1] Konieczny, M.R. et al. "Epidemiology of adolescent idiopathic scoliosis" Journal of Child Orthopaedics. V.7(1); 2013 Feb

Results: Spine patients with corrective surgery showed significant improvements on self-reported level of disability (ODI). Postoperative patients also reported significantly higher scores on the SRS-22, particularly in the categories of Self Image and Mental Health. There was no statistically significant improvement between the preoperative and postoperative cohorts with regard to Satisfaction in the SRS-22 questionnaire.

Table 1. Patient Demographics

Demographics	Total N=59 N (%)	Preoperative Spine Patients N=29 N(%)	Postoperative Spine Patients N=30 N(%)
Male (%)	28/59 (47.5)	13/29 (44.8)	15/30 (50)
Age (Mean±SD)	21.8±5.1	21.8±5.1	20.5±2.3

Table 2. Comparisons of Scores

SRS-22 Categories	Preoperative SRS-22 Score Means[1]	Postoperative SRS-22 Score Means[2]	p-value (1) vs. (2)
Total	2.74	3.70	*<0.01*
Function	2.90	3.60	*<0.01*
Pain	2.88	3.60	*<0.01*
Self Image	2.45	3.97	*<0.001*
Mental Health	2.73	3.65	*<0.001*
Satisfaction	4.04	4.42	0.13
Oswestry Disability Index	Preoperative ODI Score Mean[1]	Postoperative ODI Score Mean[2]	p-value (1) vs. (2)
Total	36.65	23.08	*<0.01*

Significance at p<0.05

Conclusions: Improved SRS-22 scores across preoperative and postoperative cohorts indicate that quality of life can markedly be improved by receiving corrective surgical procedures. As the ODI and SRS-22 studies are not widely used in Ethiopia, these findings also elucidate specific areas

in which health outcomes can be improved. Spine patients with corrective surgery showed the greatest improvement in the Self Image and Mental Health categories. These results suggest that providing surgical treatment to Ethiopian spine deformity patients may improve social outcomes related to mental health and self-image in addition to their physical disability. The insignificant difference in patient's views of satisfaction in regards to their medical care across the two populations may be explained by the lack of access to sound healthcare and treatment in Ethiopia.

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The Impact of Seasonality on Exclusive Breastfeeding Rates in Rural Malawi

Background
Exclusive breastfeeding has been well documented at improving morbidity and mortality for children under the age of 6 months old, yet rates continue to be low in both the developed and developing world[1]. In Malawi, these trends are also true, with rates as low as 4-7%[2,3]. Numerous studies have been conducted in Malawi to find an explanation for low exclusive breastfeeding rates, however, few studies have examined the role of seasonality. Seasonality has a major impact on most aspects of life in rural villages in the developing world and affects infant morbidity and mortality[4,5]. This study aimed to determine the role seasonality had on exclusive breastfeeding rates in rural Malawi.

Methods
A mixed methodology study was conducted in Gowa, Malawi between October 2016 and June 2017. Mothers with four and five month old babies were recruited at Under 5 Clinics held by the Gowa Health Center. A survey was then conducted at the mother's home by the authors of this study, using a Chichewa interpreter. The survey included collecting demographic information, birthing history, and a 24-hour dietary recall. The diet recall was used to categorize feeding patterns as exclusive breastfeeding, predominant breastfeeding, and supplemental feeding.

Findings
Of 179 mothers interviewed, 16 (8.9%) exclusively breastfed their child. Exclusive breastfeeding rates remained low across all seasons, at 12.5% in the cool-dry season, 11.1% in the hot-dry season, and 5.8% in the rainy season (p=0.3496). Of the 16 exclusively breastfed infants, only 1 was 5 months old (6.3%, p=.0061). 84.4% of the 179 mothers interviewed correctly knew to exclusively breastfeed their child until the age of 6 months.

Interpretation

Most of our sample knew that children should be exclusively breastfed until the age of 6 months. However, exclusive breastfeeding rates continue to be low. There was no statistically significant change in exclusive breastfeeding rates across seasons in this sample, showing seasonality does not currently impact exclusive breastfeeding rates. Our study shows that lack of knowledge is not currently a cause of low rates of exclusive breastfeeding, as past studies have suggested. Future work should focus on mother's decision making process in introducing supplemental foods, despite knowing health recommendations.

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Higher Food Insecurity Scores Associated With Depressive Symptoms in Post-Partum Women with 4 and 5 Month Old Infants

Background
Common mental disorder is prevalent in developing countries, although its impact on health and livelihood has not been extensively studied in these areas. African countries were found to have depression prevalence rates higher than those found in high-income countries[1]. Maternal depression has been suggested to have an impact on the health and well-being of their children[1,2,3,4]. Postnatal depression in Malawi was estimated at 30.4%[5]. Several factors have been identified as impacting rates of depression, including education, marital status, number of children, and socioeconomic status[5]. Hadley also identified food insecurity a notable factor contributing to depression and anxiety rates in rural Tanzania[6]. In Malawi, livelihood is greatly impacted by seasonality and food insecurity, as the majority of residents are rural subsistence farmers. The impact of this on depression prevalence in rural Malawi has not been extensively studied, particularly with regard to mothers. The aim of the present study is to examine the relationship between food insecurity and depressive symptoms in post-partum women with 4 and 5 month old infants. It was hypothesized that (1) depression symptoms are associated with higher food insecurity and (2) this relationship is impacted by seasonality, with higher rates of depression in the rainy or "hunger" season.

Methods
This study involved female mothers with infants aged 4 to 5 months old. Recruitment was conducted at the weekly Under 5 Clinics in Gowa, as well as the monthly outreach clinics in 4 outlying villages under the Gowa Mission catchment area in the Ntcheu District in the central region of Malawi. Mothers who were 16 years or older and had lived in Malawi for at least the past 6 months were eligible to participate. Surveys were conducted between October 2016 and June 2017. Mothers were interviewed privately at their home. Questions were asked verbally

through the use of an experienced Chichewa-speaking Malawian translator. The survey included questions on demographics, household, infant care and well-being, and a validated 20 question depression screen.

Findings
Of the 175 women sampled, 19.43% were found to have depression scores of 8 or higher. The prevalence of depression and food insecurity did not vary across the different seasons. The correlation between food insecurity and depression scores is 0.44 (p<0.0001), and this correlation is 0.516 (p<0.0001) in the dry season and 0.369 (p=0.0004) in the rainy season.

Interpretation
Results show that food insecurity does have a significant impact on depression scores in mothers with 4 and 5 month old infants. Seasonality does not impact the depression scores, as the prevalence of high depression scores (8 or greater) is the same for both the dry season and rainy season. However, results do show that food insecurity and depression are more strongly correlated in the dry season. Overall, the research does show the need to consider food insecurity when examining the psychological health and intervention in these areas. This can ultimately provide population health improvements for both mothers and their children in the area.

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A Descriptive Study of Social Determinants of Maternal Mortality in Three Provinces in the Dominican Republic

Introduction: Maternal mortality has decreased markedly in the Dominican Republic, but the Maternal Mortality Ratio (MMR) remains higher than the average in Latin America, which is unexpected considering its position as the largest and fastest growing economy in Central America and the Caribbean[1]. Many of the factors associated with maternal mortality have improved in the DR, such as decline in fertility[2], increased use of contraceptives, virtually universal prenatal care[3], near universal deliveries in hospitals or healthcare facilities, high percentage of births attended by doctors or trained birth attendants[4], etc. Despite these favorable conditions, the DR boasts a higher than expected MMR, prompting some researchers to refer to this phenomenon as the "Paradox of the Dominican Republic". In addition to the divergence from the inverse relationship between GDP and MMR seen on a global level[5], the picture within the DR with regards to economic and social indicators is not very clear. For example, Elias Piña is the province with the highest percentage of impoverished households (82%) and the highest rate of illiteracy,

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but it also had one of the lowest maternal mortality rates of the 31 provinces and the National District[1]. The tendencies for certain indicators to not follow economic lines as is often observed in other countries and for social indicators within the country to not always follow clear socioeconomic lines beg the question what role social determinants may play in maternal mortality in the Dominican Republic. The purpose of this study is to describe the cases of maternal mortality in three provinces in the DR in 2016 in order to describe the population of women who died and explore the social determinants of health related to maternal mortality.

Methods: Information about cases of maternal mortality that occurred in the provinces of Peravia, San José de Ocoa, and San Cristóbal in the Dominican Republic in 2016 was obtained. Family and friends of these women were recruited, consented, and interviewed individually in Spanish using open-ended and closed-ended questions adapted from the WHO verbal autopsy guide.

Results: A total of 17 adults (ages 18+, 4 males, 13 females) participated regarding 14 cases of maternal mortality out of an estimated total of 16 cases in the three provinces. The average age of this group of women is 27.2 years, with one under the age of 18 and two age 40 or over. All were born in the provinces of their residence, except for three women who were born in Haiti. The most commonly reported skin tones were brown (41%) and white/light (35%). Fifty-three percent reported the patient being in a common law marriage, and 41% reported the patient as single. Only one woman was legally married. For 36% of the cases this was their first child, although not necessarily first pregnancy. They had 1.8 children on average. The average age of first delivery was 19.2 years, with six having their first kid before age 18. Everyone named at least one person that the patient would go to for support. Twenty-one percent of the women went to doctor appointments alone. Education of the patients spanned from no formal education to university education (36%, who were all notably from the same province of San Cristóbal). Twenty-one percent spoke only Haitian Creole and had no functional knowledge of Spanish. Sixty-five percent reported that the patient was employed or worked in some capacity. The average monthly income of the woman and her partner, if she had one, was 12,345 Dominican pesos, though many of the jobs were menial and not particularly stable or steadily salaried. Ninety-four percent reported that the women went often or regularly to prenatal care visits during this pregnancy. Ninety-three percent of the women went to public health facilities and received free care. Forty-seven percent reported travel via public transportation, 29% on foot, and 18% reported access to private transportation. The average commute to prenatal care facilities was 21 minutes, with one being 1 hour away and another choosing to travel 6 hours, and average cost of commute of 33 Dominican pesos each one way. The average commute to the hospital to deliver was 39 minutes and an average cost of 71 Dominican pesos each one way. Fifty-three percent reported no preexisting conditions, while 12% reported preexisting hypertension and 18% reported sickle cell disease or carriers of sickle cell trait. Fifty-nine percent died after delivery, 21% died during delivery, and only one patient died during pregnancy. Fifty-nine percent reported that the patient died suddenly. Of

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[1] Indicadores de salud 2011.indd - Indalud2011.pdf. https://www.bvs.org.do/bvs/htdocs//local/File/Indalud2011.pdf. Accessed 1/27/2017, 2017.

those who died after delivery, 36% reportedly died within 24 hours, 18% died between 24 hours and 7 days after delivery, 27% between 7 days and 21 days after delivery, and 18% after about a month. Half were transferred to other hospitals before, during, or after labor and delivery. Sixty-four percent of the patients had a Cesarean section. Twenty-four percent received medication to control blood pressure while in the hospital. Fifty-three percent responded that the pregnancy was full term, 27% reported 8 months, and 45% only reached 6 months. Ten of the fourteen babies in these pregnancies were still alive at the time of the interview. Forty-seven percent responded that they were dissatisfied with the treatment the patient received in the hospital, 40% were satisfied, and 13% were unsure. Twenty-nine percent reported that they attributed the deaths to hospital and doctor error. Thirty-five percent reported that they had no idea of the cause of death.

Discussion: It is notable that these women represent a stable group who were rooted in their communities and that only three Haitian women were affected, considering their comparatively low SES. Skin tone might not accurately reflect race but be biased by societal attitudes towards race. This group of women were either single or had a common law marriage. There was a range of reproductive history. It is notable that quite a few were highly educated. Of the women who did work, jobs were generally low paying and not stable. Access to care did not seem to be a major issue, as care was free at public clinics and hospitals, transportation costs were low, and they generally did not live far away. They were generally healthy before the delivery, and interestingly three patients had sickle cell disease or was a carrier. The large proportion that died after the delivery may suggest issues with care or complications following labor and delivery. The high rate of transfer could suggest the severity of the case or the ill preparedness of the more local hospital and doctors. Most of the pregnancies reached 8-9 months, but almost half only reached 6 months, which could raise a variety of questions. Despite the maternal deaths, many of the infants survived, perhaps suggesting either a good standard of care for infants or a poor quality of care for mothers. It is remarkable how many were unhappy with the care given in the hospitals and notable how there seems to be a perceived lack of diligence among the doctors and a total lack of understanding of the cause of death on the part of the families.

Conclusions: The group was heterogeneous with regard to background, SES, and social factors. The good access to care, the high education level of some, and the overall lack of migration in this small group are not conclusive as to the role of social determinants of health in maternal mortality. This small study cannot conclude that social determinants are predictive in this group. Furthermore, the racial diversity, marital and relationship status, the early onset of reproduction, and some other factors are quite consistent with the rest of the population. Further studies, such as a case control study, could compare this group to other women of childbearing age in their respective communities in order to determine if there are any factors that set the maternal deaths apart. Attitudes of loved ones towards the doctors and hospitals may suggest a quality of care or communication issue. Lack of understanding of the cause of death by the families may be a potential point of intervention or improvement in medical education in the DR.

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Assessing Women's Health Needs in the Underserved Island Communities of Vanuatu

Introduction: Vanuatu is a developing nation comprised of 80 islands with a population of less than 300,000 people whose official languages are Bislama, French, and English. As a small nation with dispersed, isolated communities and limited resources, healthcare provision and population health data is greatly lacking. The present study partnered with a recently established clinic in Vanuatu, the Family Care Centre, to conduct a health needs assessment of women in the surrounding community.

Objectives: The study aimed to accomplish the following objectives:
 a) To provide up-to-date information on the health status of local women, which would help the Family Care Centre staff better implement their antenatal program.
 b) To establish baseline data for longitudinal tracking of health outcomes by the Family Care Centre.
 c) To identify other health needs that would facilitate development of future programs and allocation of resources by the Family Care Centre.
 d) To contribute to the limited research on Ni-Vanuatu populations and the health status of women through collaboration with the Vanuatu Ministry of Health.

Methods: Sixty women between the ages of 17 and 66 years old and who have previously given birth were individually interviewed in their native language. Each participant provided verbal responses to 30 questions targeting family health needs, pregnancy experiences, and barriers to care. Frequencies or medians were calculated for each question.

Results: Of the 156 reported common health concerns of participants and their families, 28% were related to upper respiratory infections, 22% were related to pain, and only 2.5% were related

to genitourinary issues. Further, thirty percent of women reported never having a pelvic exam. Only 43% of women reported knowing what an STI was, and only 38% currently knew of a place that offered HIV testing. Of the 24 women who reported current use of contraception, two-thirds used injectable contraceptives. All but one woman reported receiving prenatal care while pregnant with their last child; 66% saw a nurse most of the time, and 34% saw a doctor most of the time. The median number of prenatal care visits was 5. All but one woman gave birth at the state hospital, but only 32% reported having a physician assist in the delivery. While 77% of women were given information about HIV/AIDS during their prenatal check-ups, only half of these women were offered an HIV screening test. Of the 51 women who were able to read, 84% preferred to read in Bislama.

Conclusions: While there was great variation in levels of previous gynecologic and prenatal care, it was evident that general knowledge and prioritization of women's health was greatly lacking in the community. Thus, the present study supports the idea that the Family Care Centre's implementation of their prenatal care program would be greatly beneficial to the surrounding community. In addition, education programs targeting sexual health and pain management might also be beneficial to this community. Given that Bislama was the preferred language of survey respondents, any healthcare interventions should be in this language.

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Provider Adherence to Collaborative Depression and Hypertension Management in Rural Chinese Primary Care Clinics

Introduction

Depression and hypertension (HTN) are common, costly, crippling conditions that are often comorbid among older adults. Previous studies have demonstrated improved outcomes in these chronic conditions when disease screening and management take place in primary care settings (Bruce et al., 2004; Gilbody et al., 2006; Phillips et al., 2004; Unutzer et al., 2002) and incorporates psychosocial into medical and psychiatric aspects of care (Katon et al., 2010). However, until recently, these studies have either failed to include more complex patients with comorbid medical and psychiatric conditions (Wolff and Boult, 2005) or have been conducted only in western industrialized nations (Katon et al., 2010; Bruce et al., 2004). In China, depression and HTN are poorly recognized and thus inadequately treated (Prince et al., 2012; Zhang et al., 2008).

To examine the effectiveness of an integrative model in addressing this healthcare disparity, the NIMH-sponsored Chinese Older Adults – Collaborations in Health (COACH) randomized control trial was performed in rural villages of Zhejiang Province. COACH compared care-as-usual with collaborative care involving village primary care providers (PCPs), Aging Workers (AWs; members of the Village Aging Associations), and psychiatrist consultants.

Following study completion, a supplemental NIMH-funded project was conducted to assess the experience of key players in COACH and their continuation of intervention practices. This included administration of a survey to all PCPs in the intervention group as well as several focus groups held separately for PCPs, AWs, and psychiatrists. Results of the survey are reported here. Qualitative data from the focus groups will be reported elsewhere, together with results of the

COACH study. We aimed to (1) determine COACH adherence after conclusion of study participation and (2) discern differences in adherence by PCP demographic characteristics.

Methods

After completion of the COACH intervention in the first three enrollment groups ("cohorts"), a survey was administered to all intervention group PCPs (n = 65) in villages of Tonglu County, Zhejiang Province. The survey aimed to assess continued utilization of the COACH model of patient care past the study period. The four topic areas in the survey included depression screening, collaboration with psychiatrists, antidepressant treatment, and collaboration with AWs.

Overall COACH adherence in these areas was reflected in the following questions:

Question 1: Does your clinic provide depression screening for patients now?
Question 2: How often on average do you communicate with a psychiatrist regarding issues related to a patient?
Question 3: Do you have patients who currently take antidepressants?
Question 4: Do you continue to collaborate with the Aging Worker in caring for patients with depression?

The characteristics analyzed with these four questions were demographic factors of the provider, their practice, and locale. These variables included:

- Cohort (year of completion of COACH): Cohort 1 (2014), Cohort 2 (2015), and Cohort 3 (2016)
- Age (years): < 40 and ≥40
- Sex: male and female
- Education level: below Bachelor's Degree and bachelor's Degree and above
- Occupation: doctor, nurse, and other (pharmacists, none, and not specified)
- Monthly salary (RMB): < 3000 and ≥3000
- Number of clinic providers: 1 and ≥1
- Village population: <1600 and ≥1600
- Native status: native and non-native
- Workplace setting: rural and urban

The above questions tested with these characteristics provide a comprehensive assessment of COACH adherence in the post-study implementation phase as a mark of COACH utility in treating comorbid depression and HTN in the primary care setting in Tonglu County, Zhejiang Province.

Overall adherence was measured using percentage of provider adherence to each question. Chi-square analysis of the variables along the four adherence questions were conducted using SPSS 23. Significance was measured at p-value < 0.05.

Results

Of the 65 intervention group PCPs who received the survey, 59 returned completed responses. High proportions of participants endorsed ongoing adherence with practices embedded in the COACH intervention up to three years after discontinuing their study completion in terms of

depression screening (83.0%), antidepressant treatment (93.2%), and collaboration with AWs (100.0%) (Figure 1). While all PCPs continued to communicate with psychiatrists at least 2-3 times per year, only 11.8% reported communicating once per month as directed by study protocol.

Figure 1. Percentage of PCPs adherent to COACH measures for each question
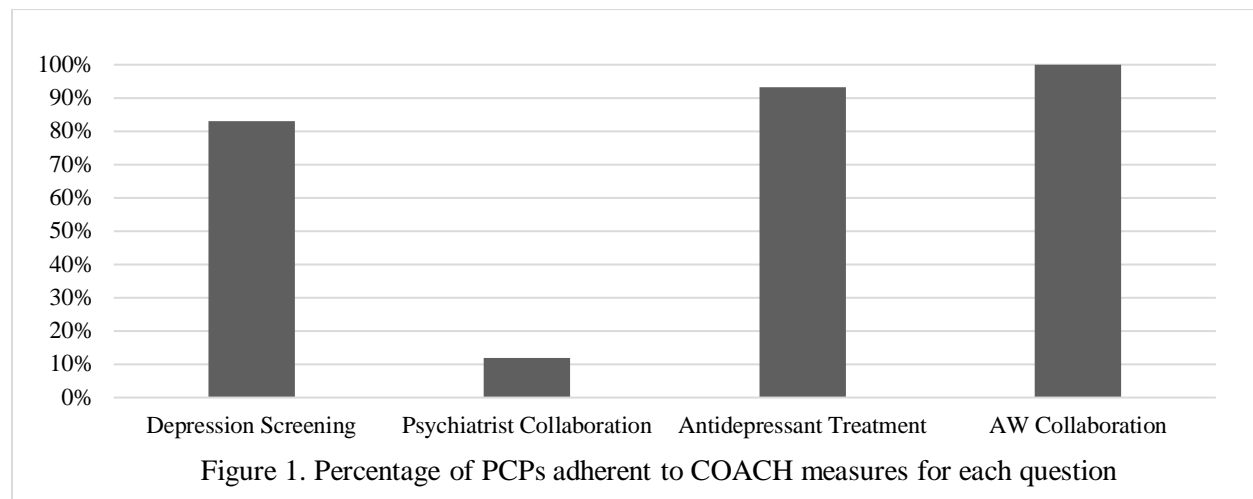
Bivariate comparison of adherent and non-adherent practices revealed that education level (χ2 = 6.5, p = 0.01) and monthly salary (χ2 = 4.11, p = 0.04) distinguished groups in terms of providing depression screening. Regarding frequency of communication with a psychiatrist, the groups differed based on cohort (χ2 = 22.93, p < 0.05), education level (χ2 = 15.64, p < 0.05), occupation (χ2 = 14.00, p < 0.05), and monthly salary (χ2 = 12.69, p < 0.05). Number of clinic providers (χ2 = 3.88, p = 0.05) and native status (χ2 = 3.88, p = 0.05) distinguished groups in terms of antidepressant treatment. Bivariate comparison of adherent and non-adherent practices was not able to be performed for responses regarding collaboration with AWs, since all PCPs endorsed continued collaboration with AWs. Except for difference in frequency of psychiatry consultation between groups based on monthly salary, chi-square and p-values for all other comparisons are tentative due to low sample sizes.

Discussion
In the evaluation of overall COACH adherence, it is evident that the COACH intervention is having an impact on mental health provision in the primary care setting in Tonglu County. Demonstrably, providers are continuing to adhere to the model that the COACH intervention introduced into their practice. However, although all PCPs continued to collaborate with psychiatrists at least 2-3 times per year, the majority did not do so monthly as required by study protocol. Nevertheless, improved maintenance of this PCP-psychiatrist relationship compares favorably to before the intervention, when there was no direct referral or transfer mechanism between PCPs and mental health specialists.

Analyses of characteristics are separated by variable:
Cohort: Screening for depression, collaboration with AWs, and the use of antidepressant therapy are maintained whether COACH intervention ended one, two, or three years prior. However,

collaboration with psychiatrists varies among cohorts. It is possible that the lack of training reinforcements affects collaboration with psychiatrists, a non-standard practice pre-COACH study.

Age: Providers of the different age groups screen for depression, use antidepressant treatment, and collaborate with AWs in a similar fashion. However, members of these age groups differ with respect to collaboration with a psychiatrist, such that providers who are less than 40 years old are collaborating with psychiatrists more. We posit that an understanding and awareness of the influence of patients' mental health over their physical health, a relatively newer belief in rural medicine in China, is an underlying factor contributing to this discrepancy.

Sex: In all categories of COACH adherence, male and female providers show similar adherence patterns. The lack of difference in adherence patterns is consistent with the notion that China strives to train and respect female labor equally as male labor.

Education level: All providers with at least a bachelor's degree education continue to screen for depression, whereas approximately half of those with less than a bachelor's degree education conduct the screening. Low education level predicts less frequent collaboration with a psychiatrist than higher education level. Antidepressant treatment and collaboration with AWs are similar at all levels of education. These findings suggest that higher education predicts a more invested adherence. This difference could be due to increased awareness of the relationships between mental and physical health with more advanced medical training.

Occupation: The occupation of the health care professional determines whether providers have been trained in and feel responsible for screening for depression. Given that mental health care has been newly introduced to professional health care training in rural villages in China, minimal difference among various levels of the health care team in depression screening, antidepressant use, and collaboration with AWs can be expected. However, there is a difference in collaboration with psychiatrists among the various levels of providers, with nurses and other providers collaborating with psychiatrists more frequently than doctors collaborate with psychiatrists. Doctors may feel more confident than other levels of care providers in managing their patients' mental health concerns.

Monthly salary: Differences in salary significantly impact depression screening and collaboration with a psychiatrist. This discrepancy makes sense as salary can signify job satisfaction, time availability, quality of patient-doctor relationships, and willingness to improve quality of care for patients. Surprisingly, fewer doctors who are paid above 3000 RMB per month are screening for depression than those who are paid less. More of the doctors who are paid less than 3000 RMB are consulting with psychiatrists more frequently than those who are paid more. However, collaboration with AWs and use of antidepressants do not vary with pay. It is possible that higher pay coincides with a healthier patient population that does not warrant as much mental health care. This would at least partly explain a decreased need felt by more highly-paid doctors to screen for depression and collaborate with psychiatrists.

Number of clinic providers: Whether the PCP runs the clinic alone or with another provider does not change the level of COACH guidelines in any of the topic areas. There appears to be neither diffusion of responsibility nor existence of higher accountability among clinic members, possibly due to clear understanding of roles.

Village population: Whether the village population is less than 1600 or 1600 or greater does not reflect differences in providers' adherence to COACH guidelines. This suggests that patient load does not necessarily threaten implementation of COACH in the primary care setting.

Native status: Whether the provider is native or non-native to the clinic community does not influence COACH adherence in any of the four guideline categories. Since both native and non-native providers have built rapport and strong ties with their patient communities, a lack of significant difference in mental health care delivery in this characteristic is reasonable.

Workplace setting: Whether providers work in urban or rural clinics does not signify differences in any of the four COACH areas. This is likely due at least partly to the same COACH intervention model being delivered at both the urban and rural setting.

Limitations in this study include small sample size and potential for errors in translation from Mandarin Chinese to English. Larger sample size would grant more confidence in making statements about the predictors of non-adherence as well as in conducting multivariate analyses. Further exploration of the potential confounding factors between variables is required and can be completed through logistic regression. Proprietary translation services would help minimize potential differences in meaning when translating from one language to the other. Other limitations include low response rates and potential for biased sampling.

Conclusion

The results of the survey demonstrate overall adherence in all categories of the COACH intervention for up to three years following PCP participation in the study. These findings underscore providers' investment in learning about mental health care and caring for mental health needs of their patients using this model. Hence, demonstrated COACH adherence indicates an upward trend toward comprehensive mental health care in addition to other chronic disease management for the aging population in rural China. This study indicates preliminary evidence for COACH utility and success in the primary care setting in rural China. The results inspire COACH sustainability and motivation for moving the intervention model forward to bringing it to national scale.

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Homeless Voices: Stories from the Streets of New York City

Homeless Voices: Stories from the Streets of New York City is an online collection of narratives and photographs of individuals who are homeless in Manhattan. This project serves as a platform for a vulnerable and stigmatized population to share their diverse stories. I approached dozens of individuals on the street, and with their consent, recorded each person's narrative. Over twenty-five people agreed to share a wide variety of experiences, ranging from childhood memories to future aspirations. Many spoke of factors that lead them to homelessness, as well as their positive and negative interactions with aid organizations. Others discussed aspects of their lives that have nothing to do with their housing status: past careers, football teams, their children, world travels, and favorite recipes. When asked, many had very specific suggestions on how healthcare providers can best care for homeless populations. Some allowed me to photograph them, their belongings, or simply the street on which we spoke.

I believe that our society's oversimplified and stigmatized view of homelessness creates a barrier of "otherness" between "the homeless" and society, which protects "us" from discomfort and insulates "their" struggles from our own. Upon speaking with individuals who are homeless, many echoed a sentiment of not having a voice and feeling invisible or segregated from the rest of society. My project aims to shed light on the incredible life stories of those who are homeless, both to give this population a voice and to strip down the "us" versus "them" mentality. While I could not possibly capture a universal experience of homelessness, as I do not believe that one overarching narrative exists, the collection invites readers to see aspects of themselves within each story by sparking connection and empathy.

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Healthcare Navigation for Disadvantaged Women with Depression: Secondary Analysis of Utilization and Outcomes

Background: Disproportionate exposure to adversities such as poverty, intimate partner violence (IPV), and single parenthood status are associated with socioeconomic disadvantage (SD) among women in the US. The co-occurring experiences of depression and chronic stress among women's health patients with SD dramatically exacerbate one another. Decontextualized care fails to respond to the real-life priorities of patients, resulting in low satisfaction, poor engagement, and poor outcomes. It is critical to incorporate personalized interventions that fit patients' identified needs.

Project ROSE, a Patient Centered Outcomes Research Institute (PCORI) funded project, aimed to evaluate two interventions among women's health patients with SD and depression: Enhanced Screening and Referral (ESR), a systematic screening intervention with facilitated referral, and Personalized Support for Progress (PSP), a patient navigation intervention tailored to patient's priorities. Primary aims were to determine satisfaction among patients receiving PSP and ESR and compare outcomes of PSP to ESR for depression and quality of life (QOL).
Primary results showed that the 225 participants in both arms found the intervention highly satisfactory and demonstrated improvement in depression, with PSP participants reporting greater satisfaction compared to ESR.

Objectives: We aimed to evaluate differences in health care utilization between PSP and ESR participants in a secondary analysis. Our overarching goals were to determine which intervention was more effective for improved engagement with providers and associated with appropriate usage of healthcare services. The specific aims were to:
Aim 1: Assess differences in medication prescribing patterns of providers at study requirement sites for narcotics, anxiolytics and antidepressants.

Aim 2: Compare differences in healthcare costs between groups.

Aim 3: Compare differences in healthcare engagement measured by visit status (complete, no show, cancelled).

Aim 4: Determine baseline and post intervention diagnoses of depression and anxiety of participants.

Design/Methods: We conducted a retrospective chart review of Project ROSE participants by abstracting URMC medical record data for the following time periods: six months prior to the intervention, during the intervention (four months), and six months after the intervention. Data variables included individual data for the following: (1) total costs of all visits, hospitalizations and labs; (2) new prescriptions for anxiolytics, antidepressants, or narcotics from a provider at the study recruitment site (Lattimore Women's Health Practice and Culver OB/GYN); (3) New diagnoses of depression or anxiety (extracted from Flowcast report of top three diagnoses addressed in a medical visit); (4) Frequency of complete, cancelled, and no show visits at Culver OB/BYN, Lattimore Women's Health, Psychiatry, and Chemical Dependency visits; and (5) Frequency of Emergency Department visits.

Results: Due to the volume and complexity of the data only initial results for diagnoses and costs have been assessed at this time. This study is ongoing and will include bivariate correlations in a generalized linear model for medications, depression and anxiety scores assessed with validated surveys before and after the intervention (Patient Health Questionnaire-9 and GAD7 Anxiety Test Questionnaire) as well as Pearson's chi-squared analysis for visit status data.

Costs: Differences in healthcare costs between groups were assessed with independent and paired t-tests. There were no significant differences in costs between groups before or after the intervention, however, healthcare spending significantly decreased for both groups post-intervention compared to baseline (ESR: pre-intervention: \$5,115 + 882, post-intervention: \$2,303 + 381, t(110)=-3.262, p=0.001) (PSP: pre-intervention: \$5,860 + 863, post-intervention: \$2,685 + 527, t(109)=-4.613, p<0.001).

Diagnoses: Differences in new depression and anxiety diagnoses between groups were assessed with Pearson's chi-squared analysis. Anxiety: Baseline differences in anxiety diagnoses were detected between groups with PSP participants more likely to have a new anxiety diagnosis six months prior to the intervention (ESR: 1.8%, PSP: 9.1%; X2 (1, N=221) = 5.71, p=0.017). When this baseline difference was controlled for in analysis of anxiety diagnoses during the intervention, there were no differences between groups (ESR: 3.6%, PSP: 8.2%; X2 (1, N=221) =2.092, p=0.123). Participants in the PSP group had a significant overall decrease in anxiety post-intervention and had similar anxiety rates as the ESR group post intervention (ESR: 1.0%, X2 (1, N=111)=-0.045, p=0.636; PSP: 1.1%; X2 (1, N=110)= 0.194, p=0.042). Depression: ESR participants were more likely to have a new depression diagnosis during the intervention compared to the PSP group (ESR: 14.4\$, PSP: 7.3%; X2 (1, N=221) = 4.17, p=0.041. There were no significant differences in depression diagnoses at baseline (ESR: 14.4%, PSP: 7.3%, X2 (1, 211) =-0.115, p=0.088) and after the intervention between the two groups (ESR: 22.2%, PSP: 14.5%, X2 (1, 221) =-0.92, p=0.172).

Conclusions: Preliminary findings suggest that identifying resources or providing personalized support for women experiencing both SD and depression may decrease healthcare costs. Given that women in the PSP group had decreased overall rates of anxiety may suggest that personalized support assists women in reflecting on their needs and engaging with healthcare providers for mental health support. Further analysis will determine broader impacts of the intervention on healthcare utilization.

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"It Matters but It Doesn't Matter": Perspectives of Girls of Color on Conversations with Primary Care Providers about Weight, Eating, and Exercise

Purpose: This study aimed to assess the perspectives of girls of color on conversations with their primary care providers (PCPs) about weight, eating, and exercise.

Methods: We recruited participants who were scheduled to see their primary care provider at the Golisano Children's Hospital Pediatric Practice at the University of Rochester Medical Center. Participants were English speaking, African American and Hispanic girls ages eleven through fourteen of both normal and over weight (based on body mass index percentile). After their visit, using a semi-structured interview guide, we conducted open-ended interviews about their perspectives on conversations with their primary care provider (PCP) about weight, eating, and exercise. Questions included "what do you remember your doctor saying about weight / eating / exercise," "how much does what your doctor said matter to you," and "how did that conversation make you feel?" Interviews were audio recorded for transcription. Three coders performed line-by-line coding with no *a priori* codes. The coders completed iterative revisions until the group came to a consensus. The codes were grouped into overarching themes. Results are reported in aggregate form.

Results: The analysis included seven girls, ages twelve through fourteen; four girls were overweight and three girls were normal weight. Five of the girls were African American and two were Hispanic. Girls remembered having positive conversations with their PCPs; they often perceived health behavior advice as affirming. Most participants remembered being asked about their fruit and vegetable consumption and exercise habits. Many identified these behaviors as important for their health. However, participants were ambivalent about the behavior change advice their PCPs provided. Most participants expressed self-acceptance, especially with respect to weight. They derived confidence from qualities other than weight, such as leadership and uniqueness. Participants often brought up peer judgment in the context of weight, but rejected

it, identifying it as something that they do not consider. Many participants implied that they have control over their weight. The participants who were concerned with weight, reported pre-formed fears about developing weight-related health conditions. Participants who remembered hearing weight change messages, revealed some evidence of miscommunication in the delivery of those messages. For example, participants latched on to messages that likely did not represent the entirety of what the PCP was trying to convey. Additionally, some expressed that they didn't feel that their PCP recognized their attempts at behavior change, or that their PCP made false assumptions about their eating habits. One girl felt that her PCP focused too much on weight change.

Conclusions: Our findings suggest that conversations with girls of color about weight, eating, and exercise could be improved with communication that: sends clear messages that appropriately affirm positive behaviors in which girls already engage, consider girls' individual preferences and situations, and inspire girls to be engaged with the behavior change advice. Motivational interviewing could help PCPs improve conversations in each of these ways.