



Methods

74,814 patients from National Surgical Quality Improvement Project Database between 2005-2014 were studied, with specific readmission/reoperation data from 2011 onwards

Multi-variate analysis was conducted on complications: post-operative (directly related to the procedure) and non-operative (not associated with the procedure), with co-morbidities controlled

Results

Postoperative Complications in Patients Undergoing Primary THA

Variables	Odds Ratio (95% CI)	P-Value
Superficial SSI	1.07 (.887, 1.29)	.885
Deep SSI	0.00	.996
Organ Space SSI	5.41 (1.27, 23.13)	.023
Wound Dehiscence	5.52 (.712, 42.79)	.102
Pneumonia	2.66 (1.01, 6.98)	.047
	0.00	.996
	.88 (251, 14.08)	.539
Failure to	(4.44, 43.14)	<.001
	(18.90)	.434
Progressive Renal Insufficiency		<.001
Urinary Tract Infection		.021
Cardiac Arrest Requiring Resuscitation	1.66	.517
Myocardial Infarction	5.94	<.001
Transfusion	1.984	
Deep Vein Thrombosis	2.56 (.76, 8.8)	
Sepsis	3.18 (2.16, 4.7)	
Non-Home Discharge	0.00	
Reoperation	2.63 (.663, 10.44)	
Readmission		

*Comorbidities that were controlled for on regression analysis
 all comorbidities that had p-value of <0.200 on analysis

Results

Patient demographic at highest risk for preoperative transfusion (determined by univariate analysis): BMI (p<0.001)

Medical co-morbidities at highest risk for preoperative transfusion (determined by univariate analysis, p<0.001): Chronic obstructive pulmonary disease (COPD), Hypertension (HTN) on medication, Congestive Heart Failure (CHF), chronic steroid use, and widespread cancer

Conclusions

Patients receiving blood products prior to primary THA are at increased risk for complications (both operative and non-operative)

Future medical decision making should include careful risk-benefit analysis of transfusion and potentially include higher threshold to transfuse preoperatively

Preoperative anemia management should focus on alternative methods to transfusion, such as peroperative tranexamic acid, iron therapy, and EPO



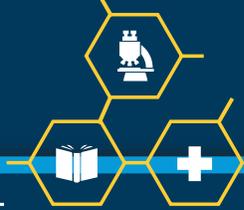
GW RESEARCH DAYS

— WEDNESDAY, APRIL 10, 2019

HEALTH & MEDICINE RESEARCH DAY

THE GEORGE WASHINGTON UNIVERSITY

WASHINGTON, DC



GW RESEARCH DAYS

2019

HEALTH & MEDICINE RESEARCH DAY

WEDNESDAY, APRIL 10, 2019

MARVIN CENTER

800 21ST STREET, NW

- 8:00-11:30 a.m. Registration**
(Third Floor Lobby Adjacent to Grand and Continental Ballrooms)
- 8:00-11:30 a.m. Poster Setup**
(First Floor Great Hall, Third Floor Grand and Continental Ballrooms)

LISNER AUDITORIUM

730 21ST STREET, NW

- 8:00-8:50 a.m. Continental Breakfast**
- 9:00-9:05 a.m. Welcome to Research Days 2019**
Jeffrey S. Akman, MD
Vice President for Health Affairs and Dean School of Medicine and Health Sciences
- 9:05-9:10 a.m. Introduction of Keynote Address**
Anjeni Keswani, MD
Assistant Professor of Medicine School of Medicine and Health Sciences
- 9:10-10:00 a.m. Keynote Address**
Monica Kraft, MD
Chair, Department of Medicine; and Deputy Director, Asthma and Airway Disease Research Center University of Arizona College of Medicine - Tucson
- 10:00-10:20 a.m. Coffee Break**
- 10:30-11:30 a.m. Research Presentations**
William Beaumont Research Awards
Maria Abigail Cerezo
Sharjeel Chaudhry
Neil Almeida
Speck Endowed Prize
Sarah McCormack
"Antigen-Specific T Cell Immunotherapy for Cancer"

MARVIN CENTER

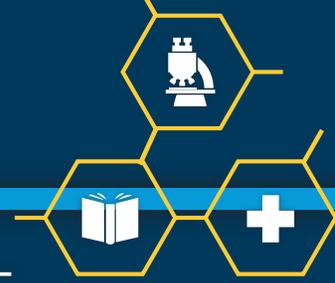
800 21ST STREET, NW

- 12:30-3:00 p.m. Poster Presentations and Judging**
(First Floor Great Hall, Third Floor Grand and Continental Ballrooms)
- 3:00-3:30 p.m. Poster Retrieval**
(First Floor Great Hall, Third Floor Grand and Continental Ballrooms)
- 3:30-4:15 p.m. Awards Ceremony and Oral Presentations by School of Medicine and Health Sciences and Institute for Biomedical Sciences Presenters**
(Third Floor Amphitheater)

MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

950 NEW HAMPSHIRE AVENUE, NW
1ST FLOOR CONVENING CENTER

- 4:30-4:40 p.m. Welcome to Research Days 2019**
Adnan A. Hyder, MD, MPH, PhD
Senior Associate Dean for Research Professor of Global Health Milken Institute School of Public Health
- Welcome to Milken Institute School of Public Health & Introduction of Keynote Address**
Lynn R. Goldman, MD, MS, MPH
Michael and Lori Milken Dean Professor of Environmental and Occupational Health Milken Institute School of Public Health
- 4:40-5:20 p.m. Keynote Address**
Anselm Hennis, MD, MSc, PhD, FRCP, FACP
Director, Department of Noncommunicable Diseases and Mental Health Pan American Health Organization/World Health Organization
- 5:20-5:30 p.m. Poster Award Winners Announced**
Adnan A. Hyder, MD, MPH, PhD
- 5:30 p.m. Refreshments and Posters**



GW RESEARCH DAYS

APRIL 10, 2019

3:30–4:15 p.m.

AWARDS CEREMONY

School of Medicine and Health Sciences and the Institute for Biomedical Sciences

POSTER AWARD WINNERS ANNOUNCED

Medical Students
Institute for Biomedical Sciences Students

GRADUATE MEDICAL EDUCATION RESEARCH COMPETITION WINNERS

Moderator: **Harold A. Frazier, II, MD**
Interim Associate Dean for Graduate Medical Education, School of Medicine and Health Sciences

Case Report:

Sasan Fazeli, MD, Endocrinology Fellow
"Salutary Response to Targeted Therapy in Anaplastic Thyroid Cancer with Two Novel Mutations"

Clinical Science:

Talal Alzahrani, MD, Cardiology Fellow
"Heart Rate in Patients with Heart Failure and Preserved Ejection Fraction"

Basic Science:

Raul Sebastian, MD, General Surgery Resident
"Improved Pedicle Skin Flap with Hypoxia-Inducible Factor (HIF) DNA Plasmid"

RESIDENT ORAL PRESENTATION

Moderator: **Harold A. Frazier, II, MD**
Interim Associate Dean for Graduate Medical Education, School of Medicine and Health Sciences

Talal Alzahrani, MD, Cardiology Fellow
"Heart Rate in Patients with Heart Failure and Preserved Ejection Fraction"

INSTITUTE FOR BIOMEDICAL SCIENCES

Moderator: **Alison Hall, PhD**
Associate Dean for Workforce Development and Professor, School of Medicine and Health Sciences

Julie Ahn
"CNS Specific B cell Ablation Reduces Microglial Reactivity and Disease Severity in Models of Multiple Sclerosis"

SCHOOL OF MEDICINE AND HEALTH SCIENCES, DONALD H. GLEW PRIZE

Moderator: **Katherine Chretien, MD**
Assistant Dean for Student Affairs, School of Medicine and Health Sciences

Abigail Pepin
"Evaluating Racial Disparities in Breast Cancer Referrals for Hereditary Risk Assessment"

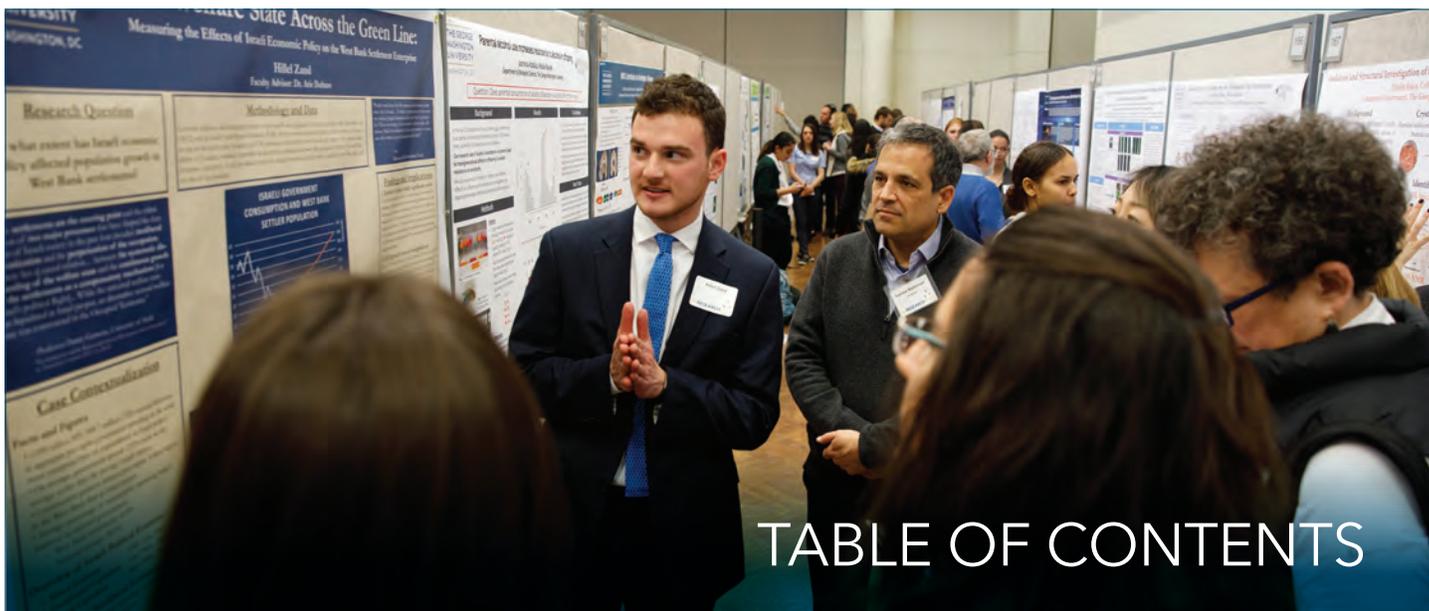


TABLE OF CONTENTS



Basic Biomedical Sciences
Page 5



Cancer/Oncology
Page 20



Cardiology/Cardiovascular Research
Page 45



Clinical Specialties
Page 62



Drug Abuse
Page 100



Education/Health Services
Page 103



Environmental and Occupational Health
Page 116



Epidemiology and Biostatistics
Page 142



Exercise and Nutrition Sciences
Page 157



Global Health
Page 171



Health Policy and Management
Page 188



Health Sciences
Page 193



Health Services
Page 205



HIV/AIDS
Page 208



Immunology/Infectious Diseases
Page 211



Neuroscience
Page 220



Obesity
Page 236



Prevention and Community Health
Page 239



Psychiatry/Mental Health
Page 278



Quality Improvement
Page 282



Rehabilitation and Recovery
Page 302



Women/Child Health
Page 305

BASIC BIOMEDICAL SCIENCES



INSTITUTE FOR BIOMEDICAL SCIENCES

Investigating HDAC Regulation Through Tyrosine Phosphorylation

Histone deacetylase enzymes (HDACs) catalyze the removal of acetylation from their histone and non-histone substrates, thereby influencing the regulation of gene transcription and cellular processes. The dysregulation of HDACs can therefore contribute to the development of various diseases. HDACs can be regulated by different post-translational modifications (PTMs), including phosphorylation. In contrast to the extensive characterization of serine phosphorylation in regulating HDAC activity, interactions, and subcellular localization, there is a deficit in understanding as to how tyrosine (Tyr) phosphorylation may regulate HDACs. To address this gap in this research, several putative tyrosine phosphorylation sites on HDAC1 were identified by database query and tyrosine-to-phenylalanine mutant plasmids were generated to mimic the loss of phosphorylation at the sites of interest. Through an analysis of several mutants, it was found that the expression of the HDAC1 Tyr-72 mutant protein was less compared to WT HDAC1, suggesting that tyrosine phosphorylation of HDAC1 may regulate its protein stability. Interestingly, the Tyr-72 residue in HDAC1 is evolutionarily conserved and is also conserved amongst the Class I HDACs, indicating that this residue may be of some functional significance. Additionally, treatment of PC-9 cells, a non-small cell lung cancer cell line, with the epidermal growth factor receptor (EGFR) tyrosine kinase inhibitor gefitinib resulted in a reduction in HDAC1 and HDAC2 expression, further supporting the hypothesis that tyrosine phosphorylation may regulate HDAC protein stability. Further studies are ongoing to determine the relationship between EGFR signaling and HDAC stability, as well as to investigate the underlying mechanism. This research is important not only for understanding the molecular basis of the regulation of HDAC1, and possibly other HDACs, but also for clarifying its role in the development and progression of diseases such as cancer.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

FAM210A and SOST Polymorphisms are Associated with Musculoskeletal Phenotypes in Healthy Young Adults

Recent research has suggested that genetic variants associated with bone mineral density (BMD) and fracture risk may also predict the rate of bone acquisition and peak bone mass. Genetic variants in the muscle-specific FAM210A (rs4796995) and the bone-specific SOST (rs4792909) have been shown to be associated with total BMD and fracture risk in adults. The purpose of this study is to explore the influence of these genetic variants on musculoskeletal phenotypes in three previously developed cohorts of children and young adults. Applied Biosystems Taqman allelic discrimination assays and the QuantStudio 7 Flex Real-Time PCR System were used to perform genotyping. Hardy-Weinberg equilibrium was assessed. Phenotypes were tested in sex-specific cohorts with an additive model using analysis of covariance (ANCOVA) methods. Where applicable, post hoc pair-wise comparisons were performed and the resulting p-values adjusted using the Sidak method. Statistically significant associations were found between variants of rs4796995 and dominant arm baseline bone volume ($p=0.005$) and baseline cortical bone volume (dominant $p=0.004$, non-dominant $p=0.018$) in Caucasian males from an exercise cohort. Associations were also found between rs4796995 variants and the left hand isometric grip strength ($p=0.007$) in African American women and VO₂ max ($p=0.037$) in Caucasian males from a cohort assessing inherited markers of metabolic syndrome. We have demonstrated that variations in the FAM210A gene in healthy young adults are strongly associated with markers of musculoskeletal fitness. These findings suggest that individuals with the minor allele, particularly Caucasian males, may be at risk for developing lower peak bone mass and muscle strength at skeletal maturity. Early identification of genetic variants associated with BMD and fracture risk has the potential to aid the development of personalized medicine strategies designed to mitigate long term fracture risk by maximizing the use of appropriate fitness, nutrition, and other health maintenance strategies.

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BASIC BIOMEDICAL SCIENCES



INSTITUTE FOR BIOMEDICAL SCIENCES

Platelet mRNA Splicing Landscape and its Effect on Platelet Activity: An ACCOuNT Consortium Study

Cardiovascular disease (CVD) is responsible for >630,000 deaths in the U.S. every year and is the leading cause of death both in the U.S. and worldwide. Aberrant platelet activity has been linked to an increased risk of CVD, including thrombosis, arteriosclerosis, stroke, heart attack and pulmonary embolism. Differences in platelet activity have been linked to polymorphisms in platelet-related genes, but little research has investigated the role of differential alternative splicing on platelet activity.

Platelet RNA-Seq data from public repositories (i.e. Gene Expression Omnibus, N = 55) and diverse cohort of healthy volunteers (N = 25 of both European and African Americans) were analyzed to catalog mRNA splicing events. Analysis of public RNA-Seq data identified approximately 7,300 genes that were expressed in at least 75% of samples. These 7,300 genes were associated on average with 5 expressed variants per gene. Clusters of unique splicing patterns could be identified in small subsets of healthy volunteers. For example, isolated mRNA splicing patterns for the *ARRB1*, *GP6*, *ITGB3* and *TBXAS1* genes were identified in <5% of healthy volunteers. These unique splicing events portend protein isoforms leading to aberrant platelet activity and the functional consequences of these isolated splicing events are currently under investigation.

We have also generated RNA-Seq data from the platelets of healthy African Americans (AAs) and European Americans (EAs) in order to define population-enriched or -specific splicing events (i.e., the Splicing Landscape). This approach has the potential to identify splice variant biomarkers of platelet dysfunction and CVD disparities that may be leveraged for the future development of therapies. In addition, a comparison of the splicing landscape in platelets from EA or AA was initiated to identify population specific splice variants. Preliminary analysis of the RNA-Seq data identified 225 genes exhibiting differential RNA splicing between the two populations.

This study reveals that the mRNA splicing landscape varies between individuals, and these differences may affect platelet function and serve as biomarkers to identify CVD risk.

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BASIC BIOMEDICAL SCIENCES



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Sex Differences in the Peripheral Immune Response to Social Isolation Stress

Social isolation (SI) increases susceptibility to neuropsychiatric illnesses such as depression and anxiety. Various homeostatic imbalances, changes in neurological development, and changes in neurotransmitter release from social isolation stress likely contribute to the behavioral changes seen in such disorders. However, current therapies for these different psychological disorders are inadequate, highlighting the lack of complete understanding of the intricate pathways involved in the pathophysiology of such neuropsychiatric disorders.

There is increasing evidence for the influence of immunological networks and inflammation on psychiatric disorders, but the exact mechanisms are not yet well understood. In the current study, using a rodent model of SI stress we characterized the peripheral immune response to social isolation stress. We hypothesized that SI stress would alter the peripheral immune cellular profile which would be influenced by biological sex.

Male and female mice underwent two weeks of SI stress in which they were singly housed in standard cages. Control mice were housed in standard cages in groups of five mice per cage. Following SI, they were then tested in a battery of behavioral tests that assay social interaction, anxiety, and stress coping behavior. Brain, spleen, and blood samples were collected from all mice. Splenocytes were isolated and stained with adaptive immune cell markers (CD3-APC, CD4-FITC, CD62L-PE, CD45-PerCP-Cy5.5, CD44-PE-Cy7, CD8a-APC-Cy7, CD19-APC-Cy7) and innate markers (CD11b-Pacific Blue, CD11c-APC, F4/80-PE-Cy7) for fluorescence activated cell sorting (FACS). Effector memory cells were characterized as either CD3+/CD4+/CD44+/CD62L- or CD3+/CD8+/CD44+/CD62L-, and central memory cells were characterized as CD3+/CD4+/CD44+/CD62L+ or CD3+/CD8+/CD44+/CD62L+. FlowJo v10 software was used for analysis of data obtained from FACS.

FACS analysis showed no SI stress or sex differences in populations of CD3+, CD3+/CD4+, CD3+/CD8+, CD11c+, or B-lymphocytes. However, when we examined effector memory cells, the male SI group had increased percentage of CD4+ effector memory cells (44.38%) compared to male controls (32.36%) while the female SI group had a decreased percentage of effector memory cells (39.91%) compared to female controls (46.20%). We observed similar differences in CD8+ effector memory cells (male SI stress (27.65%) vs male control (15.61%) and female SI stress (15.75%) vs female control (25.48%)).

These data suggest a shift towards an inflammatory immune profile (increased effector memory cells) following SI stress that is sex dependent. The impact an immunological memory (effector vs central) shift has on the neurobiological response to SI is not clearly understood. Further studies are needed to examine this neuroimmune cross-talk.

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CHILDREN'S NATIONAL MEDICAL CENTER

Characterization of IL-4 Effects on Urothelial Cell Cycling

IL-4 is a potent cytokine which is involved in a myriad of immune functions, including tissue repair. Previous studies have shown that urothelial cells express IL-4 receptors and that IL-4 receptor signaling is important in type 2 inflammation in the bladder. A single study has suggested that IL-4 reduces apoptosis in urothelial cancer cells. However, little is otherwise known regarding whether IL-4 directly mediates urothelial effects. We hypothesize that IL-4 will polarize the immune system toward a tissue reparative phenotype by inducing cell cycle and urothelial cell proliferation.

Urothelial cells were cultured with IL-4 at various concentrations (10 ng/mL, 100 ng/mL, and 1000 ng/mL) and subjected to cell cycle and CFSE analysis after 48 hours of incubation. For cell cycle analysis, the cells were treated with propidium iodide, and their DNA quantified by flow cytometry to distinguish cells in different phases of the cell cycle. To measure cell proliferation, cells were stained with CFSE dye and then analyzed by flow cytometry to evaluate for cell proliferation as quantified by dye intensity.

Cell cycle analysis revealed that at increasing concentrations of IL-4, there was a statistically significant increase of cells within the G2+M phases of cell division. CFSE analysis also similarly showed a statistically significant increase in proliferation of cells at an IL-4 concentration of 100 ng/mL.

IL-4 affects urothelial cells by driving both cell cycle alterations and urothelial cell proliferation. There was an IL-4 concentration-dependent increase in urothelial cell proliferation up to 100 ng/mL, but not at higher concentrations. This may indicate that there is an optimum concentration at which IL-4 mediates its effects of urothelial function. Further studies are needed to characterize the downstream transcriptional function of IL-4 on urothelial cells. Our results suggest that IL-4 directly mediates urothelial effects, including induction of cell proliferation and driving cell cycle. This points to a direct role for this central cytokine in modulation of urothelial biology.

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BASIC BIOMEDICAL SCIENCES



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Counting Angels on the Head of a Pin—a New *In Vitro* Model for the Study of Biofilm Formation on Urinary Catheters

Catheter-associated urinary tract infections (CAUTIs) are one of the most common nosocomial infections, resulting in over 560,000 infections, 8,000 deaths and about one billion dollars in medical costs yearly in the US. CAUTIs involve biofilm formation on non-vital catheter surfaces which are not treatable with antibiotics alone. Despite several decades of research, a urinary catheter engineered to inhibit biofilm formation continues to elude clinical adoption. One reason for this poor track record relates to the *in vitro* models employed for urinary catheter biofilm research, which have mostly relied upon defined media, and laboratory bacterial strains. These *in vitro* models poorly mimic *in vivo* conditions under which CAUTIs develop, and lead to failed therapeutic candidates in the clinical domain. We propose a novel *in vitro* model, using urinary tract infection (UTI) patient urine samples to more closely mirror *in vivo* biofilm formation conditions. We have previously reported that biofilms grown up in our *in vitro* model are far more scant and heterologous than those customarily produced under standard laboratory conditions. This makes the traditional microscopy-based means for quantitating bacterial biofilms less accurate. To this end we have employed ddPCR-based 16S enumeration as a more accurate means for quantifying biofilms.

Patients with symptoms and laboratory finding consistent with UTI were enrolled in the study, and 50-100 cc of urine was collected. Within one hour of collection, 5 mL aliquots of urine were pipetted into 3 wells of a sterile plate. Silicone tablets was placed into each of the 3 wells. Plates were then incubated at 36C with rocking at 80rpm for 96 hours. Silicone tablets were then removed, washed, stained with Syto-9 and imaged with an epifluorescence microscope. DNA was then extracted from the silicone tablets using a commercial DNA extraction kit (MP Bio), and ddPCR was used to amplify and quantify bacterial 16S.

46 subjects were enrolled; ddPCR-based 16S results largely mirrored image-based assessment of biofilm burden, however, in a far more quantifiable manner.

This new technique will make it possible to screen potential anti-biofilm modalities in a model that much more closely reflects the conditions faced by uropathogens in the harsh environment of the urinary bladder. Using this approach, identifying antibiofilm strategies that can work is more likely. ddPCR-based quantification of biofilm 16S is a more precise tool for quantifying biofilms, making comparisons between treatments and controls more meaningful.

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INSTITUTE FOR BIOMEDICAL SCIENCES

Characterization of a Mouse Model of Facioscapulohumeral Muscular Dystrophy

Facioscapulohumeral muscular dystrophy (FSHD) is an autosomal dominant disorder caused by aberrant expression of the double homeobox 4 (*DUX4*) gene. Aberrant expression of *DUX4* has been shown to affect critical molecular pathways, which results in muscle pathologies and weakness in FSHD. Because *DUX4* is toxic to somatic cells when ectopically expressed, developing an adequate animal model that expresses *DUX4* and presents with similar clinical characteristics that are described in patients poses a challenge. The newest mouse model for FSHD, FLExDUX4, is designed to allow for various levels of *DUX4* expression to recreate different muscle pathologies. The purpose of this study is to characterize the disease phenotypes of FLExDUX4 mice that have a basal *DUX4* expression level. We followed a cohort of animals from 4 months of age until 12 months of age and monitored several phenotypic parameters, including body weight, muscle weights, histology and grip strength testing. Additional mice were examined for muscle pathologies at 1 and 2, 4 and 8 months old. Our results showed that the body weights of the FLExDUX4 mice were significantly lower. Correspondingly, the muscles of the FLExDUX4 mice were significantly smaller than their wild type litter mates. Male mice are generally more severely affected and showed weight differences earlier than the female mice. Functional testing using grip strength analysis showed functional deficits in both the forelimb and hindlimb of the mice. Pathological examinations showed age-dependent changes, including fibrosis in all age groups and lesions in type IIB myofibers in the one-year-old FLExDUX4 mice. These findings suggested that the FLExDUX4 model presents with functional deficits and pathologies that are similar to FSHD, which can be used for testing treatments in preclinical studies for FSHD.

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BASIC BIOMEDICAL SCIENCES



SCHOOL OF MEDICINE AND HEALTH SCIENCES

A Machine Learning Approach to Mapping Co-Regulated Variant Loci and Gene Expression over Time

We developed a machine learning analysis pipeline to discover functional gene variants by examining the effect of RNA containing single nucleotide variants (SNVs) on gene expression at cis- and trans- genomic locations over time. This reflects a hypothesis of genetic co-regulation where, as the relative presence of a particular variant allele seen in RNA transcription changes over time (due to changing cellular requirements), gene expression elsewhere in the genome is affected as a result. We believe this analysis pipeline can give novel mechanistic insights into a wide range of basic and translational cell biology questions, particularly on the evolution of drug resistance in cancer cells.

In order to measure changing cellular requirements in cancer cell lines, we conducted paired-end RNA sequencing on human melanoma cell line WM164 under 4 experimental conditions: with and without histone deacetylase (HDAC) inhibition, and with and without IFN-gamma treatment. This was done over 8 time points each, for a total of 32 samples. We then aligned the RNA-sequencing reads to the human genome and called variants.

Our pipeline starts with clustering in Graphia Professional, which uses a graph-based approach to build relationships between genes. Each VAF or gene expression “time-course” groups with another if it meets a minimum Pearson correlation of 0.96. As a result, genes with similar expression trends and VAF trends are connected to each other in a structured graph. We then used a machine learning method called the Markov Cluster algorithm (MCL) to partition the graph into formal clusters by looking for packs of highly interconnected genes. We then built custom R modules to scan through the clusters to find pairs of VAF and gene expression profiles that cluster together in two samples or more. Once found, each pair was categorized as a cis- relationship if they were less than one million base-pairs apart, and trans- otherwise.

All 60,963 VAF and gene expression profiles were clustered into 3,730 clusters, where each cluster represents a certain pattern of RNA regulation through time. Using custom R scripts, we discovered 440 co-regulated VAF containing positions and gene expression profiles. Further work will include Protein-Protein Interaction (PPI) analyses to validate findings, especially in a larger data set.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Targeting Sphingosine-1-Phosphate Reduces Latent HIV Infection

Sphingosine-1-phosphate (S1P) is an established modulator of cell cycle and chemotaxis and the therapeutic targeting of this pathway has been the subject of investigation for the treatment of multiple sclerosis and other autoimmune diseases. In the context of Human Immunodeficiency Virus 1 (HIV-1) infection, alterations in the expression of S1P receptor 1 in thymocytes as well as impaired S1P signaling in CD4+ T cells have been described. Recently agonists of the S1P receptor 1 have been shown to reverse HIV latency. Here, we sought to determine the role of the S1P in the establishment of latent HIV infection.

We examined whether targeting Sphingosine Kinase (SPK) would alter the establishment of the latent reservoir in memory CD4+ T cells using a primary cell model. Briefly, we isolated naïve human CD4+ T cells from HIV-negative donors, activated and expanded them, and infected them with NL4-3 virus by spin infection. Three days later, cells were treated with either N,N-dimethyl sphingosine (D.M.S.), a SPK inhibitor; or FTY720, a S1P receptor modulator. We quantified the effects of these inhibitors on latent infection by measuring the frequency of cells harboring total and integrated HIV DNA by qPCR and the ability to reactivate virus from latency following T cell receptor stimulation by intracellular HIV Gag.

Treatment with D.M.S. reduced the establishment of latent HIV infection in a dose dependent manner as measured by the frequency of cells producing HIV Gag upon T cell receptor stimulation (6 μ M n=9, 95% reduction, p=0.0067; 600 nM n=8, 38% reduction, p=0.0236; 60 nM n=5, 23.3% reduction, p=0.2). Moreover, FTY720, which is used in the clinical setting for the treatment of multiple sclerosis, recapitulated this effect (100nM n=7, 70% reduction, p=0.0425). These inhibitors reduced latent infection during or before reverse transcription since the treatments reduced to a similar extent both total (D.M.S. 600 nM n=4, 34% reduction; FTY720 100nM n=4, 52% reduction) and integrated HIV DNA (D.M.S. 600 nM n=4, 29.5% reduction; FTY720 100nM n=4, 57% reduction).

Our results show that targeting S1P has an effect on latent infection. Mechanistically, D.M.S. and FTY720 force CD4+ T cells into a G0 state of the cell cycle as measured by expression of Ki67. Our research suggests that the therapeutic targeting of this pathway early in infection may aid in the development of strategies to promote a functional cure by preventing the establishment of the latent reservoir.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Association of *WNT16* and *FAM3C* SNPs with Bone and Muscle Phenotypes in Young Adults

Peak bone mineral density (BMD) acquired in adolescence is postulated to be a predictor of future risk of osteoporosis and bone health disease. Studies have shown single-nucleotide polymorphisms (SNPs) at the *WNT16* locus influence total BMD. One study demonstrated that polymorphisms in rs3801387 on *WNT16* and rs917727 on the nearby *FAM3C* gene are associated with lower BMD. The purpose of this study is to explore musculoskeletal phenotypes associated with rs917727 and rs3801387 in three cohorts of children and young adults. The Applied Biosystems Taqman allelic discrimination assays and the QuantStudio 7 Flex Real-Time PCR system were used to genotype samples from the three cohorts. After being tested for Hardy-Weinberg equilibrium (HWE), the data was stratified by sex. Genotype-phenotype association was analyzed using analysis of covariance (ANCOVA) with an additive model. Where appropriate, post hoc pair-wise comparisons were performed and adjusted for multiple comparisons via Sidak method. Analysis demonstrated a significant association between variants in rs917727 and baseline isometric strength in both non-dominant (ND) ($p=0.0469$) and dominant (D) ($p=0.022$) arms, and one-repetition maximum (1-RM) strength in the D arm ($p=0.0271$) of males in an exercise cohort. Analysis of rs3801387 variants demonstrated significant associations with baseline isometric strength ($p=0.027$ ND arm, $p=0.0341$ D arm) in the same group. In a pediatric fracture cohort, rs3801387 variants were associated with total body BMD in males only ($p=0.0388$) but lumbar BMD among males ($p=0.0300$) and females ($p=0.0388$). This study supports prior results suggesting that variants of *WNT16* rs3801387 are associated with lower BMD in males, but not females. This suggests a sexually dimorphic role for this variant. We also found that variants for *FAM3C* rs917727 and *WNT16* rs3801387 are associated with muscle strength phenotypes, consistent with the tight and complex relationship between muscle and bone.

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Molecular Mechanisms Underlying the GRK4 65L-Mediated Hypertension in Mice

The genetic causes of salt sensitivity and hypertension in humans are not completely understood. The kidney plays a preeminent regulatory role in blood pressure (BP) homeostasis and water and electrolyte balance. The renal dopamine receptors, D₁R and D₃R, engender natriuresis via the inhibition of renal Na⁺ transport, whereas the angiotensin II type 1 receptor (AT₁R) does the opposite. The renal paracrine inhibition of Na⁺ transport by dopamine is impaired in salt-sensitive rats, mice, and humans. Agonist activation promotes the phosphorylation of D₁R and D₃R by the G protein-coupled receptor kinase type 4 (GRK4), whose gene variants impair D₁R and D₃R activity. The global expression of *GRK4 65R>L* in transgenic mice results in salt-sensitive hypertension, in part, due to increased endogenous GRK4 and AT₁R expression. To demonstrate the specific renal causal mechanisms in GRK4 65R>L-mediated hypertension, we heterologously expressed the *GRK4 65R>L* vs. *GRK4 wild-type* (WT) transgenes in the kidneys of *Grk4* knockout mice on normal salt diet. The transgenes were delivered selectively into the renal tubules by the bilateral retrograde ureteral infusion of AAV-9 vectors. The expression and distribution along the entire nephron of the *GRK4 WT* and *GRK4 65R>L* were similar in both groups. However, the renal tubule-restricted expression of *GRK4 65R>L* increased the BP (117±4 vs. 93±1 mm Hg, P<0.05, n=4), while that of the *GRK4 WT* only tended to increase the BP (105±6 vs. 96±2 mm Hg, n=5), indicating that the presence of the GRK4 variant in the kidney caused the increase in BP. We next evaluated the renal expression profiles of select genes. We found that the pro-natriuretic D₁R (0.81±0.01 vs. 1.28±0.04, P<0.01) and D₃R (0.44±0.02 vs. 1.27±0.07, P<0.01) were decreased whereas the anti-natriuretic Na⁺/K⁺-ATPase (1.14±0.024 vs. 1.0±0.007, P<0.05) and α-ENaC (1.4±0.14 vs. 1.0±0.11, P<0.05) were increased, demonstrating the mechanistic changes that underlie the hypertension in these mice. Interestingly, we also observed that the proximal tubule Na⁺ transporters NaPi2 (0.81±0.02 vs. 1.04±0.02), SGLT2 (0.89±0.03 vs. 1.07±0.05), NBCe2 (0.50±0.07 vs. 1.15±0.03), and the AT₁R (0.82±0.02 vs. 1.02±0.02) were decreased, which may represent insufficient compensatory mechanisms against the increase in BP. Our results highlight the underlying and compensatory renal mechanisms for the hypertension that developed in mice with either kidney-restricted or globally expressed *GRK4 65R>L*.

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Angiotensin Type 1 Receptor (AT₁R) Inhibition Disrupts Reconsolidation of Conditioned Auditory Fear

Recent studies demonstrate that consolidated memories temporarily return to a labile state following retrieval. This window of reconsolidation presents a potential therapeutic target for treatment of psychiatric disorders such as PTSD. The renin-angiotensin system contributes to memory consolidation processes in rodent models of Pavlovian conditioning; however its role in reconsolidation of auditory fear conditioning has not been investigated.

Twenty-four hours after fear conditioning, C57Bl/6 mice were subjected to a single cue retrieval to initiate memory reconsolidation. Retrieval was followed by intraperitoneal injection of the AT₁R antagonist losartan (10mg/kg) or saline. Freezing responses to the conditioned stimulus were assessed 24hr and 1wk post-retrieval. Additionally, cue-dependent mean arterial pressure (MAP) and heart rate (HR) responses were recorded in freely moving animals via surgically implanted radiotelemeters.

Twenty-four hours following retrieval, a significant reduction in freezing behavior was observed in the losartan group versus control ($F(1, 22) = 5.756, p = 0.025, n=12$), as well as a trend for sustained reduction at 1wk ($F(1, 21) = 2.883, p = 0.104, n=12$). Cue presentation in the home cage elicited similar MAP and HR increases between groups 24hr after retrieval (Saline: $\Delta\text{MAP} = 24\text{mmHg} \pm 7, \Delta\text{HR} = 140\text{bpm} \pm 54, n=4$; losartan: $\Delta\text{MAP} = 20\text{mmHg} \pm 8, \Delta\text{HR} = 131\text{bpm} \pm 3, n=3$).

These findings suggest that AT₁R inhibition disrupts the reconsolidation of conditioned fear, and identify renin-angiotensin signaling as a contributor to memory restabilization. Furthermore, AT₁R antagonism following memory retrieval may result in modified behavioral reactions to previously consolidated memories independent of alterations in conditioned MAP or HR responses.

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Cytoskeletal Protein Radixin Activates Integrin α IIb β ₃ by Binding to its Cytoplasmic Tail

Recognition of the integrin cytoplasmic tail by talin, via its phosphotyrosine binding (PTB) domain within its FERM-homologous head region, directly activates the integrin receptor. The talin is the only known PTB-domain-containing protein that can promote integrin activation. The F₃ subdomain of talin is homologous to the PTB domain, a structure that exists in many cytoskeletal and signaling proteins, and represents the principal binding site within talin for the integrin cytoplasmic domains. Indeed, the PTB/F₃ domain has equivalent integrin activating activity to the entire talin protein.

To see if other FERM-domain-containing proteins are also capable of activating integrins, we previously reported interactions between radixin and integrin α M β ₂. Here we studied talin PTB/F₃ and radixin activate integrin α IIb β ₃.

Expression of recombinant radixin in E.coli. To express the radixin N-ERMAD (1-298) and C-ERMAD (281-584) both as glutathione S-transferase (GST) fusion proteins in E.coli, we amplified their corresponding cDNAs by RT-PCR from total RNA prepared from murine macrophages. Establishment of Chinese hamster cells (CHO) expressing both integrin α IIb β ₃ and radixin. To express both α IIb β ₃ and radixin in CHO cells, cDNAs encoding N-ERMAD and C-ERMAD were inserted individually into the expression vector MGIN. Cell aggregation assays and FACS analysis were performed.

The ability of the radixin FERM domain to interact with the α IIb β ₃ receptor is demonstrated by pull-down assays using total cell lysates. Most importantly, we found that expression of radixin in α IIb β ₃-bearing cells significantly enhances its aggregation activity.

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GlyGen: Computational and Informatics Resources and Tools for Glycosciences Research

Although ongoing technical advances are accelerating the pace and sophistication of data acquisition in glycoscience, the transformation of these data to glycobiology knowledge, insight, and understanding is slowed by the limited number of tools that facilitate their integration with biological knowledge. Thus, to fill in the critical gaps, there is a need for a broadly relevant and sustainable glycoinformatics resource that can provide tools and data to address specific glycoscience questions. GlyGen is an integrated, extendable and cross-disciplinary glycoinformatics resource that will facilitate knowledge discovery in basic and translational glycobiology by integrating multidisciplinary data and knowledge from diverse resources. It will address glycobiology questions that can currently be answered only by extensive literature-based research and manual collection of data from disparate resources. The aims of the GlyGen project includes integrating and exchange of up-to-date glycobiology-related information and data with partnering data sources such as EMBL-EBI, NCBI, UniProt, UniCarbKB, and others; creating an intuitive web portal to search and browse for glycoscience knowledge that will also include off-line data analysis, data exploration, and mining. Furthermore, the GlyGen project includes the development of essential new information resources, namely the Glycan Microarray Database that will provide key information about the interactions of glycans with other biomolecules and a Glycan Naming Ontology (GNOme) that facilitates interpretation of incomplete structural information in the context of biological functions. GlyGen's comprehensive data integration framework and valuable user's feedback will provide unprecedented support for complex queries spanning diverse data types relevant to glycobiology, extending its scope beyond the mapping of glycan data to genes and proteins. The resource would be publicly available and will facilitate the sharing and dissemination of glycobiology knowledge. It will provide new opportunities for a systems-level understanding of glycobiology in disease and development, even for scientists who do not specialize in glycobiology.

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Association of *SREBF1* and *TOM1L2* Polymorphisms with Bone and Muscle Phenotypes

The mechanostat hypothesis suggests that bone homeostasis is altered by local mechanical elastic changes. Studies have shown that bone mineral density (BMD) increases in response to muscle use, but the genetic variants influencing these relationships are not fully understood. In this study, we focused on single nucleotide polymorphisms (SNPs) rs1889018 on *SREBF1* (associated with muscle strength) and rs7501812 on *TOM1L2* (associated with BMD). Our goal was to explore their effects on musculoskeletal phenotypes in three cohorts which included children and young adults. Phenotype data was available from our three cohorts. The cohorts were genotyped using Applied Biosystems Taqman allelic discrimination assays and the QuantStudio 7 Flex Real-Time PCR System. After testing for Hardy-Weinberg equilibrium (HWE), data was stratified by sex and race, and analyzed using an additive model with analysis of covariance (ANCOVA). Where appropriate, *post hoc* pair-wise comparisons were performed and p-values adjusted for multiple comparisons via Sidak method. Total body (height adjusted z-score, without head) BMD was statistically associated with *TOM1L2* rs7501812 variants in African American males ($p=0.0159$) in a pediatric fracture study group. VO2 max was statistically associated with *TOM1L2* rs7501812 variants in Caucasian males ($p=0.0099$) recruited from a cohort recruited to study markers of metabolic syndromes, while right-hand grip strength was statistically associated with *SREBF1* rs1889018 variants in Caucasian females ($p=0.0282$) from the same cohort. Our data confirm that variants in rs7501812 and rs1889018 are associated with musculoskeletal phenotypes including total body BMD, grip strength, and VO2 max, in both Caucasians and African Americans. Our data supports the results of previous studies by showing an association between muscle phenotypes and *SREBF1*, as well as bone mineral density and *TOM1L2*. Further studies are needed to confirm these results and explore the differences found amongst cohorts based on sex and race.

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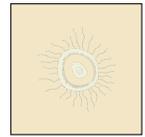
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Enhancing the Effect of Immunotherapy by Inhibiting Tumor Promoting Effect of HDAC6

Histone deacetylases (HDAC) perform diverse functions beyond remodeling of chromatin landscape. It ranges from regulating the cellular-health to immune-diseases like cancer, positioning the HDAC inhibitors (HDACi) at a crucial junction of immunotherapy. The toxicity among pan-HDACi has led to the development of selective inhibitors, which helped to understand the roles of specific HDACs in immune responses. For example, HDAC6 promotes the pro-tumorigenic STAT3 pathway. By using specific HDAC6i, the downstream immunomodulatory pathways of STAT3, such as PDL1, could be targeted. HDAC6 has been associated with numerous structural functions, including cellular motility, shape, and intracellular transport through the acetylation of tubulin and cortactin. This function suggests that HDAC6 could also be a regulator of metastasis. We found that the selective HDAC6i NextA was able to reduce the primary tumor growth and the appearance of spontaneously metastatic nodules in the murine Triple Negative Breast Cancer (TNBC) tumor model 4T1. Additionally, the *in vitro* use of NextA in multiple murine and human breast cancer cell lines was found to reduce invasion and modulate multiple EMT-specific genes without exhibiting excessive cytotoxicity. PDL1 expression was also reduced, as described previously in melanoma models. *In vivo*, NextA reduced both the primary and secondary tumor progression. Given that 4T1 is a TIL-infiltrated tumor, we tested the efficacy of α PD-1 immune checkpoint inhibitors (ICI) and found a lower dose of α PD-1 to be more effective than the higher doses to reduce primary and secondary tumor growth. However, the expression of IFN γ & PD-L1 were enhanced with the monotherapy. In an *in vitro* setting, we were able to nullify the upregulation of PD-L1 by α PD-1 with either NextA or IFN γ neutralization. To apply this insight *in vivo*, we tested the combination of NextA and α PD-1 to find a significant reduction in tumor growth, both in primary & secondary nodules. Analysis of the effector molecules revealed a reduction in intra-tumoral PD-L1 and IDO1 as well as a reduction in several key EMT signature genes, including cMYC, MMP9, vimentin, and twist. We identified E-cadherin, a negative regulator metastasis, upregulated *in vivo* with NextA. This was corroborated by *in vitro* observations in several murine and human breast cancer cell lines, irrespective of hormonal receptor status. In conclusion, we propose that combining HDAC6i along with ICI such as α PD-1 may offer a novel avenue to enhance the efficacy of immunotherapy, and alter tumor-intricate physiology, without incurring unnecessary toxicity.

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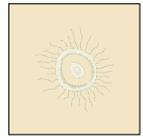
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Hypomethylation of Retroelements in High-Grade Serous Ovarian Cancer

Hypomethylation of retroelements in human DNA is a typical pattern observed in transformed cells. However, how this hypomethylation affects cancer progression remains unknown. This project aims to determine the time point at which retroelements become hypomethylated in primary human fallopian tube secretory epithelial cells (FTSECs). FTSECs were either mock-infected as a control, immortalized, or immortalized and transformed with viral vectors to model the progression of high-grade serous ovarian cancer, a gynecologic malignancy that accounts for 70-80% of ovarian cancer deaths. DNA, RNA, and protein will be extracted from all three conditions, and methylation and expression of retroelement components will be examined from each. Once a timeline of hypomethylation is established, we can begin to silence these elements to determine their effects on cancer progression.

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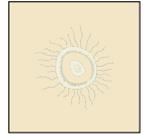
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Comprehensive Genomic Analysis Uncovers Novel Histone Mutations in Pediatric Midline Gliomas

In order to define the mutational landscape across histone genes in pediatric CNS cancers, we surveyed 1,000 patients from the Children’s Brain Tumor Tissue Consortium (CBTTC) cohort, representing 1,100 samples from 35 studies. We also amassed genomic data from an additional 139 pediatric glioma specimens, representing both upfront biopsies and autopsy samples. Using existing and newly generated genomic data, we comprehensively mapped the histone mutation landscape in pediatric gliomas. We identified previously unknown and novel histone mutations, mostly associated with midline gliomas (pontine and thalamic). Mutations were classified as protein damaging (causing an amino acid change or frameshift), rare (present in less than 0.01% of the population), and somatic by comparison to matched germline DNA or to a large panel of normal brain samples (n=40) from the CBTTC cohort. Mutations were identified in both linker and core histone genes, validated by Sanger sequencing, and defined in the context of their clinical impact. The majority of these mutations are expected to decrease protein stability and perturb post-translational modifications (particularly methylation or phosphorylation) at the protein level. Novel histone mutations were identified in tumor samples harboring K27M in H3.3 and H3.1, as well as in tumors classified as histone wild type (due to absence of K27M mutation). Subjects harboring novel mutations were found to have higher overall mutational load, and to harbor co-occurring mutations in DNA damage repair genes. In vitro studies are underway to define the biological role of novel histone mutations in tumorigenicity.

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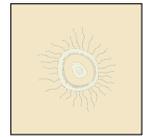
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NCI Multi-omics Mislabeled Challenge: A Machine Learning Approach

Sample mislabeling is a pervasive problem in biomedical research, especially large-scale multi-omics studies, contributing to errors and leading to false conclusions. The Food and Drug Administration (FDA) and the National Cancer Institute Clinical Proteomic Tumor Analysis Consortium (NCI-CPTA) have launched a data science challenge to address this problem. We developed a novel machine learning based approach that combines traditional machine learning with learning from cancer genomics literature to identify mislabeled tumors in the NCI-CPTA Multi-omics Mislabeled Challenge.

The training data contained a sample of a tumor from 80 different patients, each containing features on gender, microsatellite instability (MSI) status, and proteomics data for up to 4119 proteins. Competition organizers systematically mislabeled 10% of the data, which lead to incorrect gender or MSI status, relative to proteomics data, for most mislabeled samples.

To create a model to identify mislabeled samples, we used proteomics data to predict both the correct gender and MSI and compare predictions to the the given data. This would identify mislabeled instances of sample swapping and, potentially, duplication and shifting as well. Gender mislabeling was predicted using genes unique to the y chromosome and associated with cancer. We turned these genes into dummy variables (present/not present) and evaluated each protein's predictive value using kappa statistics. Two genes far outperformed the rest, DDX3Y and RPS4Y1, which together gave us the gender prediction in our test set. MSI was predicting by applying dimensionality reduction and a logistic regression classifier. First, we conducted an F-test with an adjusted p-threshold of 0.05 to identify 31 proteins that are dysregulated in unstable tumor genomes (high MSI) compared to stable tumor genomes (low MSI). In addition, 38 proteins in our dataset were identified in medical literature to be associated with MSI and were included in our dataset. We used these 62 proteins in a logistic regression model to predict MSI.

When comparing the prediction of gender and MSI by our model to the actual prediction, any mismatches were therefore invalid. Results on the unseen test set yielded a sensitivity of 0.83 and a specificity of 0.50.

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The EGFR-Tyrosine Kinase Inhibitor, Erlotinib, Induces Dermatitis that is Enhanced by Co-Existing Mg-Deficiency and Attenuated by Neurokinin-1 Receptor Blockade in a Rodent Model

Approximately 85% of patients treated with erlotinib (Tarceva®) and other EGFR-TKIs develop skin rash consisting of papulo-pustular eruption, xerosis, pruritus, and hair/nail changes. Drug dose reductions (in 60% of patients) or discontinuation (32%) by oncologists have been reported, which may diminish therapeutic benefits.

Using a Sprague-Dawley rat model, we found that prolonged treatment with erlotinib caused: moderate hypomagnesemia, elevated levels of the pro-inflammatory neuropeptide, substance P (SP), and enhanced systemic oxidative/nitrosative stress and that the SP (neurokinin-1 or NK-1) receptor blocker, aprepitant (Emend®), significantly prevented erlotinib-mediated hypomagnesemia and attenuated oxidative/nitrosative stress. Aprepitant has been clinically used in short-term to prevent chemotherapy-induced nausea and vomiting in cancer patients, but benefits from longer use have not been considered.

Nine week old rats were divided into 5 groups: Mg-sufficient (MgS, 100% RDA for Mg in diet, control), (MgS+erlotinib, MgS+erlotinib+aprepitant, Hypomagnesemic (MgD₄₀, or 40% RDA) and (MgD₄₀+erlotinib). Erlotinib (10 mg/kg/day) ± aprepitant (2 mg/kg/day) were administered with diet concurrently.

Erlotinib caused significant decline in plasma Mg levels (14%, $p < 0.01$) and significant rise in plasma SP levels (65%, $p < 0.01$); plasma Mg declined 20% in MgD₄₀ rats and 31% in the MgD₄₀ + erlotinib group, while SP levels were 27% and 85% higher, respectively, vs controls.

Visual dermatological changes (+ to ++) were observed by 4-5 weeks in all erlotinib treated rats, which worsened (++ to +++) by weeks 8-11. Patchy alopecia on face and trunk, superficial skin reddening, pruritis, scabbing and/or crusting around nose, and rough coat were observed. Co-treatment with aprepitant diminished these adverse effects on the skin. Substantial upregulation of NK-1 receptors was observed in the epidermal cells and hair follicles of facial skin from 12 week erlotinib-treated rats; and aprepitant treatment attenuated this upregulation. Mg-restriction alone caused some elevation in epidermal cell and follicle NK-1 receptors, which was more pronounced in the MgD₄₀ + erlotinib group. Treatment with aprepitant during prolonged erlotinib therapy (12 weeks) attenuated cutaneous side effects and hypomagnesemia. Thus, the SPR (NK-1R) blocker, aprepitant, attenuated the cutaneous and other systemic side effects of EGFR-TKI therapy with erlotinib, and might indicate a novel clinical intervention against these side effects during anti-cancer therapy.

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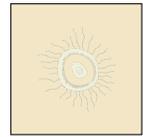
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Trends in Treatment and Comparison of Outcomes in Lymph Node Positive Bladder Cancer

While extensive research has assessed treatment outcomes in muscle invasive bladder cancer, lymph node positive disease (LN+) has traditionally been excluded from randomized studies or grouped with metastatic disease. Though still potentially curable if treated before systemic metastasis, treatment for LN+ disease is not standardized. This study seeks to compare outcomes and demonstrate trends in treatment for LN+ bladder cancer.

We performed a retrospective cohort study using the National Cancer Database (2006-2014) and identified 1869 cT2-4N1-3M0 bladder cancer patients treated with (1) radical cystectomy (RC), (2) neoadjuvant chemotherapy (NAC) + RC, (3) adjuvant chemotherapy (AC) + RC, (4) radiation + chemotherapy, (5) chemotherapy alone, or (6) no treatment/palliative care only. The primary outcome was survival by treatment, analyzed using Kaplan-Meier and multivariable Cox-proportional hazards regression. Secondary outcomes included pathologic down-staging, analyzed using univariable/multivariable logistic regression models. A univariable logistic regression model of treatment by year was used to identify treatment trends. Multivariable models were adjusted for confounding demographic, facility, and clinicopathologic variables.

Among 1869 patients (cN1, 48%; cN2, 44%; cN3 8%), 567 underwent RC, 418 underwent NAC, 591 underwent AC, 61 underwent radiation + chemotherapy, 136 underwent chemotherapy alone, and 96 had no definitive treatment. Overall survival did not differ between NAC and AC, but both had improved survival compared to RC alone. All other treatment groups had worse survival outcomes in comparison to NAC. When comparing NAC to RC alone, down-staging to pT0 (adjusted odds ratio [aOR]=26.39) and pN0 (aOR=6.88) was higher for NAC. Overall, utilization of NAC and no treatment has increased, use of AC and RC alone has declined, and use of chemotherapy and radiation without surgery has not changed.

Combined chemotherapy and RC is associated with improved outcomes for LN+ bladder cancer compared to RC or chemotherapy alone, although there is no significant difference between NAC and AC. Use of radiation and chemotherapy without RC has stayed consistent and is associated with worse oncologic outcomes compared to RC with perioperative chemotherapy, but no significant difference compared to RC or chemotherapy alone.

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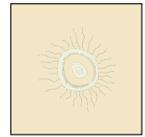
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Cytokine Microdialysis for Real-Time Immune Monitoring in Glioblastoma Patients Undergoing Checkpoint Blockade

Glioblastoma is the most common primary malignancy of the brain, with a dismal prognosis. Immunomodulation via checkpoint inhibition has provided encouraging results in non-CNS malignancies, but the prediction of responders has proven to be challenging in glioblastoma patients.

To determine the proportion of patients who have a measurable increase of interferon gamma levels in brain tumor tissue after their first dose of nivolumab, and to evaluate the safety of using brain tumor microdialysis to monitor for immune response while evaluating the safety of the combination of anti-programmed death 1 (PD-1) and anti-lymphocyte activation gene 3 (LAG-3) checkpoint inhibition.

The study design is a single-center, nonrandomized phase 1 clinical trial. Up to 15 adult patients with recurrent glioblastoma will be enrolled with the goal of 10 patients completing the trial over an anticipated 18 mo. Patients will undergo biopsy; placement of microdialysis catheters and lumbar drains; treatment with anti-PD-1 checkpoint inhibition; comprehensive immune biomarker collection; tumor resection; and then treatment with anti-PD-1 and anti-LAG-3 checkpoint inhibition until progression.

We expect interferon gamma levels to increase in the brain as measured via microdialysis in treated patients. Based on published reports, microdialysis in this patient population is expected to be safe, and anti-LAG-3 and anti-PD-1 combined will likely have a similar side effect profile to other checkpoint inhibitor combinations.

The failure of recent trials of immune therapies in glioblastoma underscores the need to appropriately measure response in the treated tissue. This trial may provide insight on indicators of which patients will respond to immune therapy.

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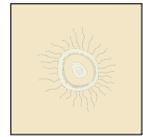
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Encapsulation of 5-Azacytidine in PEG-PLGA Nanoparticles for Improved Drug Delivery in the Treatment of Ovarian Cancer

Ovarian cancer is a deadly disease with extremely limited options for effective treatment. The development of ascites in the peritoneal cavity of the ID8 mouse model of ovarian cancer closely mimics late-stage ovarian cancer in women, thus making it a useful model. Preclinical research in this model shows that 5-Azacytidine (Aza) is an effective treatment as demonstrated by reduced tumor burden; however, this drug is rapidly metabolized and needs to be administered often. Designing nanoparticles for drug delivery can improve efficacy of a rapidly metabolized drug such as Aza, by increasing its bioavailability through sustained release. We aim to improve drug delivery of 5-Azacytidine by encapsulating it in PEG-PLGA nanoparticles. We investigated two different nanoparticle synthesis methods: emulsion evaporation and nanoprecipitation. Nanoparticles were then characterized for size/polydispersity and surface charge (zeta potential) using dynamic light scattering. UV-vis spectroscopy was additionally used to characterize encapsulation efficiency and drug loading. We observed that both methods of nanoparticle formation produced stable particles that were similar in size and polydispersity, but the nanoprecipitation method proved to be a more efficient process for nanoparticle synthesis. Nanoparticles will be tested *in vitro* with ID8 mouse ovarian cancer cells to assess release kinetics and validate effective Aza encapsulation. Specifically, we will use the ID8 p53^{-/-} mouse ovarian cancer cell line because p53-inactivating mutations are common for human ovarian cancer; additionally, this syngeneic model will allow us to later test the expected immune effects of Aza treatment within the tumor microenvironment. For *in vitro* testing using ID8 p53^{-/-} cells, we expect to see increased cell death with increased dosages of the Aza PEG-PLGA nanoparticles, but not with Blank PEG-PLGA nanoparticles. Further studies include assessing DNA Methyltransferase 1 (DNMT1) protein levels and 5-methylcytosine levels using the therapeutic, low-dose equivalent, of Aza PEG-PLGA nanoparticles used *in vitro*. Over the course of 5 days, we expect to see comparable levels of DNMT1 protein and 5-methylcytosine for cells treated with Aza PEG-PLGA nanoparticles once, in comparison to the standard 500 nM Aza dose for cells treated daily. In the clinic, Aza is also given daily, so sustained release would allow for less frequent injections, thus increasing patient comfort and compliance. Our encapsulation efficiency and drug loading studies demonstrate encapsulation of Aza, as determined by UV-vis spectroscopy. Our studies demonstrating nanoparticle size, polydispersity and stability show optimal values and consistency, as determined by DLS. *In vitro* studies demonstrating efficacy are currently ongoing.

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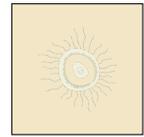
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The Effect of the Mutational Signature in Response to Immuno-Epigenetic Therapies in Melanoma

Melanoma is the deadliest type of skin cancer, and it is estimated to affect 96,500 people in the United States in 2019. Current treatments include targeted therapy (i.e., the BRAF inhibitor Vemurafenib), epigenetic modifiers, and immunotherapy, such as immune checkpoint inhibitors (ICI). Most of the preclinical evaluations for the above therapies have been done using mouse melanoma models, including B16 and SM1. Although the molecular mechanisms involved in the pathogenesis of melanoma have been elucidated using the B16 cells, this model is not suitable for the preclinical *in vivo* testing of combination therapies because its genetic alterations are not well defined and it does not resemble human melanoma histologically. Our group has previously studied the combination of histone deacetylase 6 inhibitors (HDAC6i) and ICI using the SM1, which is an immunogenic, BRAF^{V600E/N600E} mouse model, which resulted in a significant reduction of tumor growth. However, this model ignores the potential contribution of other relevant oncogenic mutations occurring in human melanoma (i.e., PTEN, P53). In this regard, HDAC6 has been reported to deacetylate PTEN and p53. Therefore, in this study, we aim to investigate the role of HDAC6 in these relevant oncogenic pathways. For this purpose, multiple isogenic mouse models were used: SM1, YUMM1.7 (BRAF^{V600E/wt}, Pten^{-/-}, Cdkn2a^{-/-}), YUMM3.3 (BRAF^{V600E/wt}, Cdkn2a^{-/-}), YUMM4.1 (Pten^{-/-}, Cdkn2a^{-/-}), and YUMM5.2 (BRAF^{V600E/wt}, Tp53^{-/-}). In this study, we assessed the cytotoxic properties of the HDAC inhibitors Panobinostat, Mocetinostat, and Nexturastat A, and Vemurafenib 48 hours post-treatment. We observed that YUMM5.2 cells are as sensitive to pan-HDAC inhibition as SM1, while more selective HDACi induce cytotoxicity in a dose-dependent manner. Furthermore, YUMM1.7 is more sensitive to BRAF inhibition than any other model. We also observed different basal expression of oncogenic proteins like c-jun and STAT3, and the immunosuppressive protein PD-L1 across all these isogenic cell lines. The expression of PD-L1 was further characterized using luciferase reporter assays, where we observed significant difference between the SM1 and YUMM models. Specifically, we found that YUMM cells have higher PD-L1 expression than SM1 models, suggesting that these isogenic cell lines are more immunosuppressive, and they may represent a more realistic model. Overall, these results indicate the role that the mutational signature may have on the response to epigenetic and targeted therapy, and suggests that the genetic alterations in a tumor should be considered prior to treatment administration in order to obtain a more personalized anti-tumor response.

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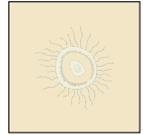
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Exosomal miRNAs May Modulate Chemoresistance in Triple Negative Breast Cancer

Triple-negative breast cancer (TNBC) is one of the most aggressive breast cancer subtypes. Chemoresistance leads to high mortality, and its underlying mechanisms are poorly understood. Extracellular vesicles (EVs), including exosomes, are nanoscale particles surrounded by phospholipid bilayers, act as efficient carriers of RNAs (including miRNAs), proteins and other bioactive molecules and also known to play a key role in cell-cell communication between cancer cells and adjacent microenvironments, accelerating pathological processes including immune suppression, angiogenesis, cell migration, tumor invasion, and drug resistance. The primary purpose of this study was to characterize the potential role of exosomal miRNAs in TNBC chemoresistance and to analyze their underlying mechanisms. Exosomes were isolated from drug-resistant TNBC cell lines (MDA-MB-231/ Epirubicin, Paclitaxel, Cisplatin) and their parental cell line using the Total Exosome Isolation kit (Invitrogen).

Exosome RNAs and proteins were isolated using the Total Exosome RNA and Protein isolation kit. Quantitative real-time reverse transcription-PCR (qRT-PCR) assays were used to detect the expression of several known miRNAs that are associated with drug-resistance or tumor invasions, such as miR-19b, miR-141, miR-181a, miR-181c, miR-196b, miR-197, miR-200b, miR-203, miR-222, miR-375, miR-638 and miR-671-5p in both cellular RNA and exosomal RNA. The expression of miR-181c, miR-203, miR-375, miR-638, and miR-671-5p was downregulated in most drug-resistant cell lines compared to the parental cell line. In particular, miR-671-5p was downregulated in all three drug-resistant cell lines in both cellular and exosomal RNA. Furthermore, target predictions using the miRanda algorithm (microRNA.org) showed that miR-181c, miR-203, and miR-671-5p collectively shared the same target gene, Annexin-6 (ANXA6), which is a calcium-dependent membrane and phospholipid binding protein implicated in membrane-related events along exocytotic and endocytotic pathways. Recently, EV-associated ANXA6 was found to be linked to breast cancer metastasis after treatment with neoadjuvant chemotherapy in mouse models and human breast cancer cell lines. Given that EV-associated ANXA6 may confer chemoresistance, we explored the expression of EV-ANXA6 in chemoresistant breast cancer cell lines via qRT-PCR. Primers for ANXA6 were designed using the Primer-BLAST. The expression of ANXA6 in both cellular and exosomal RNA was assayed by qRT-PCR. The expression of the ANXA6 gene in drug-resistant cell lines was upregulated in both cellular and exosomal RNA compared to that in the parental cell line.

These data suggest that the downregulation of miR-181c, miR-203, and miR-671-5p in exosomes may result in ANXA6 overexpression, leading to chemoresistance in TNBC. Targeting such miRNAs may be a new avenue to tackle drug resistance.

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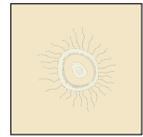
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Prediction of Tumor Histologic Grade in Small Clear Cell Renal Cell Carcinomas Using Texture Analysis and Machine Learning Classification

Clear cell renal cell carcinomas (ccRCCs) make up 75-85 percent of all renal cell carcinomas. Increased prevalence of cross-sectional imaging has led to increased detection of renal masses that are less than 4 cm. CT and MRI images can distinguish ccRCC from other renal masses and texture and machine learning algorithms have been used to differentiate those that are benign from those that are malignant.

Determination of tumor histologic grade, however, has required biopsy or excision. Renal mass biopsy is accurate for diagnosis, but underutilized due to its invasive nature. Additionally, biopsy can underestimate histologic grade due to intratumoral heterogeneity.

Given imaging efficacy in identifying ccRCCs and the limitations of biopsy, this study sought to predict the Fuhrman histologic grade of small ccRCCs using texture and machine learning analysis of the corticomedullary phase of CT images.

The Cancer Registry Database was queried to identify 26 surgically resected ccRCCs meeting inclusion criteria (i.e. size < 4 cm, T1a) and had pre-operative contrast-enhanced CT images in the corticomedullary phase. Fuhrman histologic grades 1/2 and 3/4 were grouped as "low-" and "high-grade."

Axial images from the superior, mid, and inferior aspects of the tumor poles were collected to yield 77 ccRCC image slices. Images were imported into Matlab and tumors were manually segmented. Six histogram features and 38 texture features were calculated for the images. Accuracy and receiver operating characteristic curves of texture features for histologic grade were calculated. K-nearest neighbor classification, a type of machine learning, of the combined 38 texture parameters was performed. Furthermore, 10-fold cross validation testing was performed to evaluate its image-based and patient-based accuracy.

There was no statistically significant individual texture feature predictive of Fuhrman histologic tumor grade. On a per image-based analysis, machine learning was 92.5 percent accurate in predicting "low" compared to "high-grade" tumor histology, and 93.8 percent accurate in predicting grade 2 compared to grade 3 histology. When per tumor-based analysis was done, there is was 77.7 percent accuracy in predicting "low" versus "high-grade" tumor histology in all three image slices. The accuracy increased to 99.2 percent when predicting "low" versus "high-grade" histology in two or more image slices.

Individual texture features of small ccRCCs were not predictive of tumor histologic grade, however, use of machine learning to integrate 38 features could accurately predict histologic grade.

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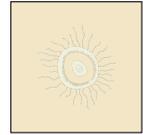
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Priming the Tumor Microenvironment with Epigenetic Modifiers to Overcome Resistance to Immune Checkpoint Inhibitors

Histone deacetylases (HDACs) are involved in diverse cellular regulatory mechanisms including functions outside the chromatin environment. Several publications have demonstrated that selective HDAC inhibitors (HDACi) can influence tumor immunogenicity and the functional activity of specific immune cells. In particular, the selective inhibition of HDAC6 has been reported to decrease tumor growth in several malignancies. However, there is still no clarity about the cellular components mediating this effect. In this study, we evaluated the immunological modulation of the HDAC6i Nexturastat A in combination with anti-PD-1 checkpoint blockade therapy and the use of this HDAC6i as a priming agent to facilitate the transition of the tumor microenvironment from “cold” to “hot” in order to more specifically augment immune check-point blockade therapies. This combination of Nexturastat A and anti-PD-1 therapy demonstrated a significant reduction of tumor growth in syngeneic melanoma tumor animal models. Additionally, we observed a complete neutralization of the up-regulation of PD-L1 and other immunosuppressive pathways induced by the treatment with anti-PD-1 blockade. This combination also showed that the pre-treatment with selective HDAC6i induced major changes in the tumor microenvironment such as enhanced infiltration of immune cells, increased central and effector T cell memory, and a significant reduction of pro-tumorigenic M2 macrophages. The evaluation of the effect of HDAC6i on individual immune components suggest that the in vivo anti-tumor activity of HDAC6i is mediated by its effect on tumor cells and tumor associated macrophages, and not directly over T cells. Overall, our results indicate that selective HDAC6i could be used as immunological priming agents to sensitize immunologically “cold” tumors and subsequently improve ongoing immune check-point blockade therapies.

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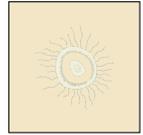
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Traveling from Uveitis to Thyroidectomy via the Mediastinum

Cystic mediastinal masses are most commonly benign congenital lesions. Rarely, a cystic mediastinal mass will prove to be malignant. The patient, a 50-year-old woman who initially presented with uveitis, was incidentally found to have a right paratracheal opacity on chest X-ray (CXR). Chest computed tomography (CT) demonstrated a 5cm right paratracheal hypodense cystic mass. The patient underwent a right robotic-assisted thoracoscopic resection of the mediastinal mass. Final pathology revealed a 4.5cm mass consistent with metastatic papillary thyroid carcinoma (similar histology in 2 excised lymph nodes). The patient subsequently had a total thyroidectomy with central and right neck dissections.

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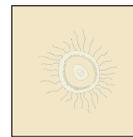
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Combined Nanoparticle-Based Photothermal Therapy and Epigenetic Immunomodulation for Melanoma

Melanoma is a severe skin cancer that grows and spreads rapidly when undiagnosed and accounts for a majority of skin-cancer related deaths. Since many melanoma tumors are superficially accessible, nanoparticle-based photothermal therapy (PTT) may provide an effective treatment approach. To extend the local benefits of PTT to sites of melanoma dissemination, which is associated with a poorer prognosis, we propose to engage the immune system by using epigenetic drugs in combination with PTT. Several recent studies have described the antitumor immune effects of epigenetic drugs, including histone deacetylase (HDAC) inhibitors. Our approach comprises a single nanoparticle platform based on poly(lactic-co-glycolic acid) (PLGA) nanoparticles that encapsulate indocyanine green (ICG), a photothermal agent, and Nexturastat A (NextA), an HDAC6 inhibitor, to administer the combined photothermal-epigenetic therapy to melanoma. We test the effects of the combined therapy (using ICG- NextA-PLGA nanoparticles; INAP) on melanoma *in vitro* and *in vivo*.

INAPs were synthesized using an emulsion-evaporation synthesis scheme. INAP size distributions and stability were determined using dynamic light scattering. NextA encapsulation efficiency/drug loading was determined through UV-Vis spectrometry, and the photothermal heating characteristics were evaluated by illuminating the INAPs with an 808 nm NIR laser, measuring temperatures via a thermal camera. B16-F10 and B16-OVA melanoma cells treated with INAPs (\pm PTT) were assessed for viability, expression of NextA target proteins, and expression of immunogenic markers. *In vivo* studies assessed the effect of INAP-PTT on the expression of tumor-specific immune markers, tumor growth, and survival.

Our optimized synthesis scheme yielded monodisperse and stable INAPs (200-300 nm, stable over 7 days) with 3-6% NextA drug loading. Illuminating INAPs with an NIR laser resulted in INAP concentration- and laser-power-dependent heating, achieving temperatures of 50-60°C. Functional assays demonstrated that encapsulated NextA retained effective HDAC6 inhibitory activity in INAP-treated melanoma cells. Further, INAP-PTT treatment resulted in increased MHC1 and MHC1/OVA expression in B16-OVA melanoma cells suggesting increased antigen presentation, important for breaking tumor tolerance. Finally, INAP-PTT generated slower tumor progression and increased survival in the B16-OVA murine melanoma model, suggesting the potential of the combined photothermal-epigenetic therapy to treat melanoma.

Our study demonstrates the feasibility of using nanoparticles to combine disparate, yet complementary therapies such as PTT and epigenetic immunomodulation to treat melanoma. Ongoing studies are investigating the effects of the INAP-PTT on potentiating robust systemic antitumor immune responses, eliciting immunological memory, and validating our *in vivo* findings in other models of melanoma (B16F10 and SM1).

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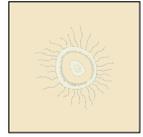
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Factors Related to PICU Admissions of Childhood Cancer Patients in MAX Hospital Saket

This study was performed to assess the predictive factors of Intensive Care Units (ICU) admission in newly diagnosed pediatric oncologic patients and in patients under ongoing oncologic treatment. Methods used to explore the research question included a retrospective analysis of children admitted to the ICU of the MAX Saket Superspecialty Hospital between March 1, 2013 and May 2018 in order to identify those patients with an oncologic condition who were admitted to an ICU. This subgroup was further evaluated for factors associated to ICU admissions, including: diagnosis, risk factors, complications leading to Pediatric ICU (PICU) admission, PICU therapy, and mortality outcome. Of the 258 total pediatric oncology patients in the 5 years analyzed, 149 patients (58%) were admitted to the ICU. The ICU with the highest number of admissions was the Neurosurgery-ICU (NSICU) with 54 episodes. Out of the 149 patients with ICU admissions, 66% were male and 44% were female. There were 27 (18%) ICU deaths reported. While demographic factors may not be entirely predictive of risk for ICU admission, the patterns identified through this analysis, particularly diagnostic indicators, can be used to guide planning and precautions for future patients. Other variables, including sex and country of origin, showed no significant predilection for ICU admission. Further exploration on factors associated with ICU mortality are of interest for future research.

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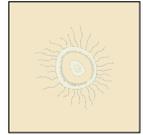
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Suppression of p38 α Promotes Fibroblast-Led Human Squamous Cell Carcinoma (SCC) Invasion through p38 δ -Dependent Mechanism

Cancer cell invasion is a hallmark of malignancy. Therefore, interfering with key signaling pathways that drive invasion would be expected to provide significant clinical benefits. To evaluate this approach, we are targeting stress-activated p38 kinases p38 α and p38 δ to modulate cancer cell motility and invasiveness. We recently found that in human squamous carcinoma cell lines SCC9 and SCC12, the rates of scratch wound closure were significantly reduced by pharmacologic or genetic inhibition of p38 α alone, or by p38 α /p38 δ co-inhibition. These data implicated both p38 α and p38 δ in control of cancer cell motility in two-dimensional (2D) monolayer culture of SCC cells. Here we used pharmacologic inhibitors and RNA interference to investigate the contributions of p38 α and p38 δ signaling to fibroblast-led SCC invasion in 3D organotypic invasion model in which tumor cells move through a collagen matrix remodeled by stromal fibroblasts. In both cell lines, inhibition of p38 α resulted in a highly invasive SCC tumor cell phenotype that was reversed by a co-inhibition of p38 δ . Furthermore, p38 α inhibition or depletion led to striking tissue fragility and a marked disruption of tissue architecture, phenotypes which were also largely ameliorated by co-inhibition of p38 δ . Weakened E-cadherin-dependent intercellular adhesion likely underlies this fragility as well as increased ability of SCC cells to invade a collagen matrix observed upon p38 α inhibition in organotypic, but not in monolayer cultures. Together, our data suggest that while p38 α functions to restrict SCC cell invasiveness in 3D organotypic invasion model, p38 δ is required for collective invasion of SCC cells. Therefore, blocking p38 δ could be a potential strategy to reduce SCC metastasis.

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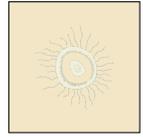
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Targeting p38 α and p38 δ Kinases Differentially Modulates Responses to Cisplatin and EGFR Inhibitor Therapies in Human Squamous Cell Carcinoma (SCC)

Cisplatin and EGFR inhibitors are frequently used as treatments for advanced stage cutaneous and head and neck SCC, however limited efficacy, toxicity, and development of resistance to these treatments restrict their clinical impact. Therefore, identifying targets for new therapies and designing strategies to overcome resistance are sorely required. p38 kinases orchestrate adaptive responses to stress and thus could function to promote the emergence of therapy-resistant phenotypes. Overexpression and/or activation of p38 α and p38 δ , the two main p38 isoforms in human SCC, suggest tumor-promoting functions for these kinases in squamous carcinogenesis. However, the specific contexts in which targeting them is beneficial for cancer therapy have yet to be elucidated. We recently showed that pharmacologic or genetic p38 α /p38 δ co-inhibition caused apoptosis in oral SCC9 and skin SCC12 cell lines, but not in normal human keratinocytes. Here we examined whether p38 α and p38 δ kinases function to modulate the responses of human SCC cells to treatment with cisplatin or EGFR inhibitor AG1478. Our data show that p38 α /p38 δ co-inhibition, but not p38 α inhibition alone, significantly attenuated growth-inhibitory effects of cisplatin in SCC12 cells, while enhancing those effects in SCC9 cells. Thus, p38 δ is pivotal to anti-cancer action of cisplatin in SCC12, yet promotes resistance to cisplatin in SCC9, via differential effects on ERK1/2, mTOR, and HSP90 signaling pathways in these cell lines. Furthermore, in combination with AG1478, p38 α /p38 δ co-inhibition, but not p38 α inhibition alone, led to a synergistic suppression of cell viability in SCC12 cells, suggesting that a combined blockade of the EGFR and p38 δ signaling holds promise to overcome EGFR targeted therapy resistance. Together, these data reveal disparate and context-dependent novel effects of targeting p38 signaling in human SCC.

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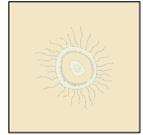
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Comparing Abbreviated Versus Full Breast MRI Protocol for Breast Cancer Screening

MRI is the most sensitive imaging modality currently available for the detection of breast cancer, but it is costly, time consuming, and uncomfortable for the patient. A full breast MRI protocol requires 45 to 60 minutes and results in several thousand images for interpretation. Recent studies have suggested that fewer imaging sequences, termed an abbreviated protocol, may be sufficient for interpretation. Resulting in a more cost-effective examination with an improved patient experience. The lower cost and shorter time would make MRI a more available and cost-effective examination, particularly in the screening or surveillance environment.

The purpose of this study was to compare an abbreviated and a full breast MRI protocol for screening high-risk women, comparing the average reading time for the two protocols and their impact on patient recall rates for additional evaluation following the MRI examination.

An abbreviated imaging protocol using five of the twelve traditional sequence types was tested in this retrospective study. The study population consisted of patients deemed high-risk between January 1, 2013 and December 31, 2016. Radiologists with a specialization in breast imaging reviewed patient history and prior images (mammograms, ultrasounds, etc.), then reviewed the abbreviated protocol images and recorded an interpretation. Timing of the abbreviated protocol consisted only of the review of the abbreviated MRI sequences and did not include dictation or report generation. Following a 30-day washout period, the radiologist interpreted the entire full protocol with their interpretations and timing again recorded.

Three metrics were obtained and compared for the 2 different protocols: accuracy of cancer detection, reading time, and callback rate. Preliminary data of 217 patient were classified using the "Breast Imaging Reporting and Data System" (BIRADS). There were no significant changes in the callback rate nor in the diagnostic interpretations. On average, the interpretation time was 67.94 seconds for the abbreviated protocol compared to 102.05 seconds for the full protocol, with an average difference of 33.90 ± 5.7 seconds per patient. Our study revealed no difference in cancer detection, with all cancers found using both protocols.

We conclude that future use of an abbreviated MRI protocol can increase breast MRI accessibility by reducing the amount of imaging time with improved cost effectiveness, patient satisfaction, and efficiency of the radiologist, with no reduction in cancer detection. Further studies across the country would aid in diversifying the patient cohort and develop a wider representation of the general population.

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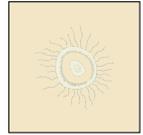
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Cerebrovascular Endothelium Cell Response to Tumor-Activated Astrocytes in the Perivascular Stage of the Brain Metastasis Process of HER2-Overexpressing Breast Cancer Cells

Brain metastasis is an important cause of death in patients with advanced cancer, and its development begins in a functional microenvironment regulated by cerebrovascular endothelium (CVE) cells and astrocytes of the blood-brain barrier (BBB). However, the molecular pathogenesis of brain metastasis is largely unknown, and there are no molecular biomarkers alerting us on the risk of suffering brain metastasis and that might represent good targets for therapy.

The aim of the project was to study the neurovascular microenvironment and the growth pattern of experimental and clinical brain metastasis and the transcriptional activity of the CVE cells in response to soluble factors from cultured astrocytes activated by MDA-231 breast cancer (BC) cells with or without HER2 overexpression.

Results showed that the initial growth of both experimental and clinical brain metastases occurred in the perivascular space, with the original BBB being split into two new barriers, an internal hemato-tumoral (between blood and metastatic tissue), and another external neuro-tumoral (between metastatic tissue and unaffected brain tissue). Next, by using an *in vitro* model recapitulating the functional interrelationship operating in the brain metastasis microenvironment among BC cells, perivascular astrocytes and CVE cells we demonstrated an altered gene expression in CVE cells induced by tumor-activated astrocytes. Interestingly, oxygen deprivation (1% hypoxia), oxidative stress (1 nM hydrogen peroxide), mechanical stimulation (induced by fluid flow) and inflammation (10 ng/ml TNF α) activated the production of astrocyte-stimulating factors from HER2-overexpressing BC cells. In turn, conditioned medium of such tumor-activated astrocytes induced a CVE cell transition into a neuroinflammatory phenotype, involving increased gene expression of Claudin-1, VCAM-1 and PECAM-1 (involved in the regulation of intercellular relationships), VEGFR-2, RAGE and Collagen-IV (involved in the regulation of endothelial differentiation) and P-Glycoprotein (involved in the regulation of transcellular molecular exchanges).

In conclusion, early metastatic growth in the perivascular microenvironment of the brain remarkably altered astrocyte effects on BBB-forming CVE cells. In addition, overexpression of HER2 determined the functional response of BC cells to the perivascular tumor microenvironment, which in turn affected the action mechanism of BC cells on CVE cells via perivascular astrocytes.

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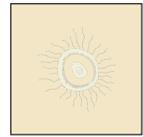
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Evaluating Racial Disparities in Breast Cancer Referrals for Hereditary Risk Assessment

Washington, D.C. had the highest national incidence of breast cancer in African Americans (AA) patients between 2010-2015 and the worst outcomes (American Cancer Society). Previous studies demonstrate a higher incidence of deleterious BRCA1/2 mutations in AA patients compared to other groups (Hall 2009). Despite this, AA women meeting National Comprehensive Cancer Network (NCCN) criteria for genetic testing are less likely to complete testing compared to Caucasian women nationally. We hypothesize that lack of physician referral for cancer genetic counseling and testing for AA women contributes to this disparity.

Non-Hispanic African Americans (BNH) and non-Hispanic whites (WNH) treated for breast cancer between 2014-2018 were identified using the George Washington Cancer Center (GWCC) Registry. Individuals selected for inclusion were BNH and WNH patients who met NCCN criteria for referral for genetic evaluation including breast cancer diagnosis under age 50, triple negative breast cancer (TNBC) under age 60, and two primary breast cancers. Excluded patients were individuals who were not BNH or WNH or who did not meet NCCN criteria. Patients were stratified by race according to who underwent genetic evaluation by reviewing GWCC, RPCGPS, and clinic records. Physician referral was determined through patient chart review.

1180 patients (BNH n=502; WNH n=435) were treated at the GWCC for breast cancer (in situ and invasive carcinoma) between 2014-2018. Twenty-seven percent of BNH and WNH patients met the study criteria for referral for genetic evaluation (n=252; BNH n=115, WNH n=137), including breast cancer diagnosis under age 50 (BNH n=76; WNH n=108), TNBC under age 60 (BNH n=14; WNH n=5), and two primary breast cancers (BNH n=18, WNH n=16). Several patients met two or more criteria for referral (BNH n=7, WNH n=8). Physician referral rates differed significantly by race (BNH 76%, n=87 and WNH 91%; n=125; $\chi^2=11.4$, p-value<0.001). Of referred patients, there was no significant difference in those who followed-up at RPCGPS by race (BNH 93%, n=81; WNH= 93%, n=116, $\chi^2=0.0072$, p-value=0.93).

Low genetic testing rates for AA breast cancer patients are an impediment to resolving the prominent onco-racial disparities. Physician referral is a potential contributor to racial disparity in the utilization of cancer genetics services. Potential reasons for the discrepancy in referral may include lag in physician education on hereditary risk and barriers in physician-patient communication. These findings need to be confirmed and explored at other sites to help improve the identification of at-risk women in the AA community.

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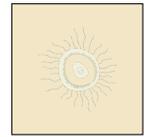
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Reversing Immune Evasion of Ovarian Cancer through Epigenetic Modulation

Epithelial ovarian cancer (EOC) is the most lethal of all gynecological malignancies with five-year survival rate of less than 25%. While immunotherapy has emerged as an effective treatment strategy for a variety of cancers, the immunosuppressive microenvironment produced by EOC has limited the success of this approach. Recent efforts have sought to overcome the immunosuppressive microenvironment produced by EOC by combining immunotherapy with epigenetic therapy. Epigenetics is broadly defined as a “stably-heritable phenotype resulting from changes in a chromosome without alterations in the DNA sequence”. Chromatin structure is primarily maintained by nucleosome histone tail acetylation and DNA methylation. Epigenetic therapies work to open chromatin structure of cancerous cells by preventing the removal of histone tail acetyl groups (Histone Deacetylase inhibitors/HDACis) or inhibiting methylation of DNA (DNA methyltransferase inhibitors/DNMTis). Opening up densely packed chromatin structures in OEC cells promotes a pro-inflammatory microenvironment by inducing $INF\gamma$ signaling and de novo transcription of endogenous retroviruses, thereby making cancerous cells more prone to immune-surveillance. Histone deacetylase 6 (HDAC6) is a cytoplasmic protein plays a major role in malignant transformation. Clinically, high levels of HDAC6 expression correlate with higher pathologic grades of ovarian cancers. Knockdown of HDAC6 in ovarian cancer cell lines decreases proliferative capacity and survival. We hypothesize administration of NextA, a commercially available HDAC6 inhibitor, will promote pro-inflammatory signaling and immunogenicity in OEC cells. Here we find HDAC6i combined with DNMT1i induces the expression of pro-inflammatory signaling pathways, increases the expression of PDL1 and increases the expression of MHC1 in vitro. However, animals inoculated with OEC and subsequently treated with combination therapy consisting of HDAC6i and DNMT1i do not demonstrate increased survival when compared to animals treated with DNMTi alone. This finding suggests that either that HDAC6i does not act synergistically with DNMTi, or significant off target toxicity of HDAC6i. Future studies will focus on evaluating the in vivo treatment efficacy of additional HDAC6is.

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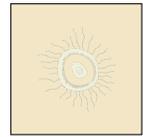
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

OncoMX: An Integrated Cancer Mutation and Expression Knowledgebase for Biomarker Evaluation and Discovery

The massive, multiform datasets generated by cancer genomics studies provide tremendous opportunities for the scientific community to explore and develop hypotheses. However, challenges arise during analysis due to the size and heterogeneity of these datasets, making it difficult to extrapolate meaningful results. A variety of technical characteristics including the pre-processing of data, file formats, attribute names, and reference data currently appear in variable formats across multiple databases. These databases are often designed to facilitate highly specific research. Consequently, attempting to utilize, analyze, or combine datasets from multiple sources proves inefficient and overly complicated. OncoMX is a knowledgebase and web portal currently being developed to quell such challenges by streamlining searches between unified datasets. The OncoMX mission is to create an integrated cancer mutation and expression resource for exploring cancer biomarkers to facilitate early cancer detection. OncoMX is a collaborative project between The George Washington University, NASA's Jet Propulsion Laboratory, the Swiss Institute of Bioinformatics, and the University of Delaware. OncoMX currently integrates sequencing-based mutation data from BioMuta, cancer/normal differential expression data from BioXpress, normal expression data across organisms from Bgee, biomarker data from EDRN, pathway data from Reactome, and literature mining evidence using custom applications of DEXTER and DiMeX. BioMuta and BioXpress serve as the foundational knowledgebases for OncoMX, where data is connected through Disease Ontology and Uberon terms. Normal expression data from Bgee and custom literature mining software augment the cancer data to improve functional interpretation of the reported variants and expression profiles. Additional data is currently being integrated into OncoMX, such as functional annotations, scRNA-seq data, and cancer mutation and expression literature mining results. The OncoMX web portal interface development is use case driven by the following four perspectives: 1) exploration of cancer biomarkers, 2) evaluation of mutation and expression in an evolutionary context, 3) side-by-side exploration of published literature for mutation and expression in cancer, 4) and exploration of a specific gene or biomarker within a pathway context. The unification of multiple types of cancer datasets allows researchers to explore or generate hypotheses within one database, execute targeted searches, and compare data sources. OncoMX, with direct community feedback, is projected to support a broad range of cancer research initiatives for the enrichment of cancer biomarker detection; paving the way for earlier cancer detection. The OncoMX web portal can be accessed at: <https://www.oncomx.org/>.

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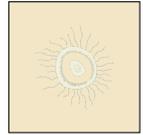
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

miR-p14, a Novel Tumor Suppressor microRNA, May Serve as a Therapeutic Target in Melanoma

Melanoma remains an aggressive cancer, marked by an increasingly high rate of malignancy that accounts for more than 70% of skin-related deaths with a low five-year survival rate (5%) in advanced stages. Given a high predilection for early metastasis, frequent silencing of tumor suppressor gene p14ARF has been implicated as an important event in melanoma progression. However, the mechanism of p14ARF inactivation remains unclear. We previously characterized a deleted AT rich repeat (ATRR) sequence that encodes miR-p14, a novel microRNA (miRNA) positively correlated with p14ARF expression. Since dysregulated miRNAs have been demonstrated to modulate important hallmarks of cancer, the primary aim of this study was to identify potential target genes of miR-p14 and to delineate their roles in the course of melanoma tumorigenesis.

Bioinformatic algorithms revealed high homology between miR-p14 and three bona fide miRNAs (miR-1277, miR-620, & miR-3171). Potential target genes of miR-p14 were identified using cross-referencing analysis across three microRNA databases. A well characterized malignant melanoma cell line, A375-SM, was obtained from ATCC and cultured in DMEM medium with 10% fetal bovine serum. miR-p14 mimic was transfected via Lipofectamine RNAiMAX to assess its effects on target gene expression. Total RNA was isolated and the efficacy of transfection was confirmed with TaqMan quantitative RT-PCR. Primers for candidate genes were designed using Primer-BLAST software. The expression of individual genes was assayed using qRT-PCR and further functional analysis of miR-p14 was performed by MTT assay.

Cross-referencing analysis between three homologous microRNAs to miR-p14 revealed 10 predicted target genes in addition to p14ARF. Forced expression of miR-p14 resulted in the upregulation of two known tumor suppressors involved in the cell cycle and cell survival: p14ARF, an inducer of p53-dependent and p53-independent pathways, and PTEN, a negative regulator of the Akt/PKB signaling pathway. miR-p14 overexpression also upregulated SAP130, a damage-associated molecular pattern (DAMP) associated with necroptosis. MTT assay results further showed forced expression of miR-p14 inhibits cell proliferation. Taken together, our data supports the predicted role of novel miR-p14 to function as a tumor suppressor regulating p14ARF expression through a p53-independent mechanism in addition to other gene targets associated with an anti-tumor response. These findings suggest miR-p14 may serve as a potential therapeutic biomarker in melanoma management.

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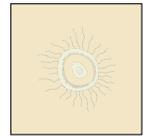
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Feasibility and Acceptability of the Survivor Choices for Eating and Drinking (SUCCEED) Digital Health Dietary Intervention after Colorectal Cancer (CRC): A Randomized Pilot Trial

Diet after CRC is associated with risk of recurrence and death. Our objective was to develop a feasible intervention to help individuals diagnosed with CRC adopt healthy dietary habits.

We conducted an unblinded 12-week pilot randomized trial to determine the acceptability and feasibility of a web-based dietary intervention with text messaging after a CRC diagnosis at the University of California, San Francisco. Eligible patients (pts) had colon or rectal adenocarcinoma; were not receiving chemotherapy; were disease-free or had stable disease; able to speak and read English; and had a mobile phone. We excluded pts meeting ≥ 4 of the 6 target dietary behaviors. Pts were randomized 1:1 to intervention or control. All pts received print materials on diet after CRC. Pts in the intervention group received 12 weeks of access to a responsive website with daily text messaging which recommended ≥ 5 serv/d of vegetables, ≥ 3 serv/d of whole grains, ≥ 2 serv/wk of fish, ≤ 2 alcoholic drinks/d for men and ≤ 1 alcoholic drinks/d for women, and no processed meat or sugar-sweetened beverages.

We screened 94 pts for eligibility; 75 were eligible and we randomized 50 (25 per arm) to intervention or control between April 2017 - May 2018. 35 pts were considered disease-free and 15 had stable disease. During the 12-week study, the intervention arm accessed the website on a median of 2 days and spent a median of 28 minutes on the site (IQR: 4-51 min). Pts responded to a median of 15 of 21 text messages that asked for a reply (IQR: 8-20 text messages). 22/25 intervention pts completed the feedback survey; 82% were satisfied or very satisfied with the text messages. When asked to rate the quality of the website on a scale from 0-100, the median rating was 72 (IQR: 55-83). Diet record data was available at baseline and 12 weeks for 23 control and 22 intervention pts. Comparing baseline and 12-weeks, intervention pts increased intake of whole grains; controls had no change in intake of whole grains. We did not observe changes in other dietary factors, body size, blood pressure, or circulating markers in the intervention or control arm.

Individuals with CRC participating in a digital health dietary intervention engaged with text messaging more than the study website. A digital health dietary intervention may increase whole grain and dark/fatty fish intake after CRC diagnosis.

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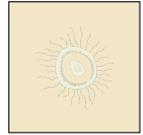
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Adipocyte PD-L1 Modulates Checkpoint Blockade Cancer Immunotherapy Efficacy

PD-L1 expression in both tumor and host cells correlates with antitumor therapeutic efficacy, but the specific contribution of PD-L1 in various cell compartments to antitumor immunity remains to be fully elucidated. Here we show that PD-L1 expression is significantly elevated in human and mouse mature adipocytes versus preadipocytes. When co-cultured with mouse splenocytes, adipocytes reduce α PD-L1 antibody-mediated CD8⁺ T cell activation. Genetic ablation of adipose PD-L1 obliterates, while enforced PD-L1 expression in preadipocytes confers, the immune-inhibitory effect of adipocytes. Pharmacologic inhibition of adipogenesis by the PPAR gamma antagonist GW9662 reduces adipose PD-L1 expression and enhances the antitumor efficacy of α PD-L1 and α PD-1 immunotherapies in female mice bearing syngeneic melanoma or mammary tumors. Combo treatment with GW9662 and α PD-L1 increased antitumor lymphocytes infiltration versus control or single agent treatment. In diet-induced obese female mice, combo treatment elicited suppressed melanoma growth, although less effectively versus lean females. In contrast to females, melanomas in either lean or obese male mice exhibited no applicable response to combo treatment. More strikingly, obese males lost α PD-L1 single treatment response versus lean males, with lower CD45⁺ and CD3⁺ T cell infiltration in tumors. However, castration in lean males rescued efficacy of combo treatment. These data suggest an antagonistic effect of male hormones in this combination. Our findings provide a previously unappreciated approach to bolster anticancer immunotherapy efficacy. The potential impact of sex and obesity warrants consideration in future development of immunotherapy-related combination therapy.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Does a Higher Level Of Education Translate To a Lower CVD Prevalence

Education is one of the determinants of health as described by the WHO, and it is one of the primary determinants of Socio-Economic Class (SEC), a higher level of education is associated with a higher level of SEC. Few researchers have addressed the link between the level of education and cardiovascular disease. However, there remains a need for a national study to determine the relationship between the level of education and cardiovascular disease. In this study, we investigated the effect of the level of education on the rate myocardial infarction (MI) and cardiovascular risk factors including diabetes mellitus, hypertension, hypercholesterolemia, and smoking status.

The National Health Interview Surveys of 2016 and 2017 (n=59,071) were utilized to measure the effect of level of education on MI and other risk factors. Subjects were assigned into four groups based on the level of education. The first group labeled as no education till the 12th grade, the second group identified as General Education Diploma (GED) or a high school diploma, the third group included subjects with some college, associate degree or bachelor, and the fourth group designated for subjects with master's degrees, professional degrees, or doctorates. Logistic regression models were used to examine the association between level of education and cardiovascular risk factors. The final model examined the association between level of education and MI after adjusting for demographics and cardiovascular risk factors.

A higher level of education was associated with lower odds of having cardiovascular risk factors. The final logistic regression model revealed that subjects with GED and high school education (OR 0.86, 95% CI 0.74-0.99; p 0.036), subjects with some college degree/ bachelor degree (OR 0.71, 95% CI 0.61-0.82; p <0.001), and subjects with master degrees or professional degrees (OR 0.55, 95% CI 0.45-0.69; p <0.001) have lower odds of having MI compared to the first group after adjusting for other risk factors including age, gender, diabetes mellitus, hypertension, hypercholesterolemia, and tobacco use.

This study unveiled that a higher level of education is associated with a lower rate of myocardial infarction and cardiovascular risk factors.

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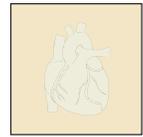
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Exposure to Heavy Metals May Increase Cardiovascular Risk by Elevation of Serum Lipid Levels and Hemoglobin a1c – A National Health and Nutrition Examination Survey Based Study

Introduction: Heavy metals (HM), defined as metals with densities higher than 5g/cm³, have the ability to interact with various physiological processes in the body with cardiovascular consequences. We sought to understand the relationship of serum levels of HM and serum total (TC) and LDL-cholesterol (LDL-C) and glycated hemoglobin (HbA1c).

Hypothesis: Serum total and LDL cholesterol, HbA1c may be related to serum HM.

Methods: Cross-sectional survey involving multistage stratified sampling using NHANES 2009-2012 database. Age, gender, ethnicity, education were considered as covariates. TC (normal <200 mg/dl), LDL-C (normal < 100 mg/dl) and HbA1c (normal <=6.5) were related to levels of lead, cadmium and mercury.

Results: 50.27% females, mean age 36.93 years (SE = 0.443776). Non-Hispanic Whites 36.54% (7158), Non-Hispanic Black 22.89%, Hispanics 18.48%, others 22.09%. We divided subjects into 3 tertiles, T1, T2 and T3 based on levels of heavy metals.

There was a significant difference in the level of LDL-C and TC from first to third tertile for lead with progressively increasing values. (p <0.0001).

After running a multivariate analysis, odds of having higher TC was higher in T3 for lead when compared with T1 (OR 1.567, 1.376-1.786), odds were also higher in T3 for mercury (OR 1.730, 95CI 1.512-1.981) and for cadmium (OR 1.412, 95CI 1.184-1.700). For LDL-C, odds of having higher LDL was more in T3 for lead compared to T1 (OR 1.225, 95CI 0.835-1.739), also odds of having higher LDL-C was higher in T2 for mercury (OR 1.233, 95CI 1.004-1.515).

When compared to the reference group T1, odds of having higher TC level was statistically significant (p < 0.01) in T3 for all metals studied and odds of having higher LDL-C was more in the T2 for mercury (p < 0.01). Odds of having diabetes was high in T2 for lead when compared to T1 (OR 1.291, 95 CI 1.001-1.663). We did not find any positive effect due to mercury. Odds of having DM was higher in T2 (OR 1.136, 95CI 0.870, 1.484) and T3 (OR 1.157, 95CI 0.844, 1.586) for cadmium but not statistically significant.

Conclusions: Our study demonstrates increasing serum levels of heavy metals are significantly associated with increasing TC and LDL-C, also with HbA1C. This in turn may be associated with cardiovascular consequences in populations exposed to heavy metals such as areas with natural disaster water crises (i.e., Flint and Puerto Rico) and in areas with other environmental concerns raising consideration of screening for heavy metals as a risk for cardiovascular disease.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Time to Switch to Bivalirudin for Routine Anticoagulation on ECMO

Bleeding continues to be one of the most frequent complications associated with extracorporeal membrane oxygenation (ECMO). This can be attributed to the need for systemic anticoagulation to maintain circuit patency. Traditionally, heparin has been the first-line agent due to the short half-life and readily available reversal agent, but the risk of heparin-induced thrombocytopenia (HIT) and its thrombotic complications have brought attention to finding an alternative agent. One option is Bivalirudin (bival), which is a direct thrombin inhibitor. Small retrospective and case-control studies that compare heparin and bival suggest equivocal safety between heparin and bival on ECMO, but no large randomized trials exist comparing these two agents head-to-head. This study aims to add to the evidence that bival is a safe alternative to heparin for ECMO. This is a single-center retrospective observational study evaluating ECMO patients from 3/2014 to 1/2018 for bleeding events as defined by intracranial hemorrhage, decrease in hemoglobin by 3g/dL over 24 hours in the setting of a bleed, hemodynamic instability due to bleeding, fatal bleeding, and bleeding requiring an invasive intervention. Other variables measured included thrombotic events and incidence of HIT. A paired Wilcoxon rank-sum test analyzed bleeding events in patients that had been switched from heparin to bival during the course of their ECMO run. 100 ECMO patients cannulated for a mean time of 10.2 days were reviewed. 157 bleeding events were recorded with 150 events on heparin. 15 patients were switched from heparin to bival for suspicion of HIT. Within these 15 patients, there was statistically significantly more bleeding on heparin with 28 events when compared to bival with 7 events ($p=0.01251$). 14 patients had 20 total thrombotic events while on heparin. Zero thrombotic events occurred while on bival. Serological testing for HIT was performed on 17 patients and 3 were SRA/ab positive. This study found that patients who were on both heparin and bival during their ECMO run had significantly more bleeding events while on heparin compared to bival. Also, patients exposed to heparin were far more likely to have thrombotic events compared to bival, 3 of which were HIT related events. The results here add to the evidence that bival is at least as safe as heparin, but large randomized trials are necessary to fully evaluate the safety and efficacy of bival as first line anticoagulation in ECMO patients.

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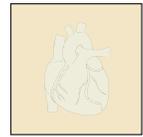
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CARDIOLOGY/CARDIOVASCULAR RESEARCH



SCHOOL OF MEDICINE AND HEALTH SCIENCES
CHILDREN'S NATIONAL MEDICAL CENTER

Developmental Changes in Cardiac Electrophysiology and Calcium Handling—Implications for Pediatric Research

Cardiac electrical conduction is the driving force behind the heart's ability to pump and facilitate adequate perfusion to vital organs. Despite intracellular differences in neonatal, pediatric and adult hearts, our current understanding of excitation-contraction coupling is largely limited to adults. To guide pediatric cardiac research, a more thorough understanding of age-dependent differences in cardiac physiology is needed.

This study aimed to clarify normal pediatric cardiac physiology by monitoring developmental transformations in electrical activity, calcium handling, and cardiac gene expression.

Hearts from Sprague-Dawley rats (age day 1- adult) were excised and the aorta was cannulated. The hearts were transferred to a temperature-controlled constant pressure Langendorff-perfusion system and perfused with oxygenated Krebs-Henseleit buffer, supplemented with 10 μ M blebbistatin to reduce motion artifact. The heart was stained with calcium (50 μ g Rhod2-AM) and voltage (62 μ g RH237) sensitive dyes and illuminated by a 530nm LED spotlight. Fluorescence signals were acquired using a sCMOS camera (Andor, Zyla 4.2 Plus; >500fps). Electrocardiograms were monitored and recorded throughout the duration of the study. In a subset of studies, RNA isolation was performed to measure age-dependent differences in gene expression.

Compared with adults, isolated neonatal rat hearts displayed a significantly longer action potential duration (APD80: adult= 61.28ms, neonatal=109.4ms n= 9-34, $P<0.05$), which is likely attributed to delayed K⁺ channel expression. Calcium handling was also significantly slower in the neonatal heart (Cad80: Adults: 126.8ms, neonatal=170.1 n=12-30, $P<0.05$). This difference is likely due to improved calcium handling in the adult heart, which was facilitated by an increased SERCA2a (+175% Adult vs postnatal day 0-3), RYR2 (+39% Adult vs postnatal day 0-3), and CASQ2 (+61% Adult vs postnatal day 0-3) expression. Clarification of postnatal cardiac maturation can facilitate future pharmacological and toxicological studies.

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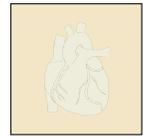
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Acute Plasticizer Exposure Alters Mitochondrial Bioenergetics in Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes

Background: Di-(2-ethylhexyl)-phthalate (DEHP) is a common plasticizer used in the production of polyvinyl chloride (PVC) plastics, including various medical devices such as blood storage bags and medical tubing. DEHP is not covalently bound and can leach out of plastics and into children's blood during high-risk procedures, such as cardiopulmonary bypass and blood transfusions. Phthalate leaching raises concern for increased exposure to patients undergoing repeated medical interventions. DEHP and its primary metabolite, mono-2-ethylhexyl-phthalate (MEHP), disrupt endocrine function, which can be linked to metabolic disturbances. Previous studies have shown that DEHP exposure changes oxygen consumption in rat cardiomyocytes.

Objective: To investigate the effects of acute plasticizer exposure on bioenergetics and mitochondrial respiration in human cardiomyocytes.

Methods: Human induced pluripotent stem cell-derived cardiomyocytes were acutely treated with either 10 μM MEHP, 60 μM MEHP, 26 μM DEHP, or 128 μM DEHP for one hour. Mitochondrial respiration was assessed using an extracellular flux analyzer (Seahorse Biosciences, Billerica, MA). Complexes V, III and I were inhibited by oligomycin, antimycin A, and rotenone, respectively, to isolate electron transport chain functions. FCCP was used to disrupt the mitochondrial membrane and determine maximal respiration. Basal respiration, spare respiratory capacity, non-respiratory capacity, and non-mitochondrial respiration were also determined.

Results/Discussion: Acute exposure to 60 μM MEHP and 0.128 μM DEHP significantly increased basal respiration by 117.6 % and 84.9%, and maximal respiration by 97.6% and 33.5%, respectively, compared with controls. These results are indicative of mitochondrial biogenesis. Additional studies are necessary to investigate chronic 48 hour treatments, the mechanisms of mitochondrial biogenesis, and the effects of acute plasticizer exposure on bioenergetics in isolated rat hearts.

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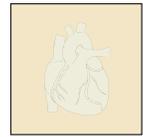
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Surgical Outcomes of Patients with Heterotaxy Syndrome

Heterotaxy syndrome may be defined as a spectrum of abnormally discordant organ situs resulting from aberrant left-right axis determination in the thoracic and abdominal cavities. The abnormal degree of thoracic and abdominal visceral symmetry results in complex intracardiac abnormalities. In cases in which only one ventricle is capable of supporting the circulation, patients with heterotaxy syndrome will undergo univentricular palliation. The aim of this study is to compare the outcomes of heterotaxy syndrome patients at Children's National Hospital who received either univentricular palliation or full biventricular repair.

We performed a descriptive analysis of patients with heterotaxy syndrome who underwent cardiac surgical repair at Children's National Hospital from January 2008 to December 2017. Diagnosis of heterotaxy syndrome was confirmed based on echocardiography. Patients who had undergone previous cardiac surgeries at outside hospitals were excluded from analysis. Patients were classified as either univentricular or biventricular according to their functional anatomy after cardiac repair. Univentricular patients were further divided according to stage of repair as follows: stage I (PA band, BT shunt, Norwood), stage II (Bidirectional Glenn operation, Kawashima), and stage III (Fontan operation). Data collection was performed via retrospective chart review.

Seventy-nine patients with heterotaxy syndrome were included in the study (35 males, 34 females). Fifty-three patients underwent single ventricle palliation and 26 underwent complete biventricular repair. Of those receiving single ventricle palliation, 44 patients underwent stage I repair, 38 patients underwent stage II repair, and 21 patients underwent stage III repair. Genetic abnormalities were found in 22% of the cohort (17/79), occurring in 17% of univentricular patients (9/53) and 31% of biventricular patients (8/26). 30-day mortality for univentricular patients at each stage was as follows: stage I=16% (7/44), stage II= 2% (1/38), stage III=0% (0/21). 30-day mortality for biventricular patients was 19% (5/26). Median follow-up days (interquartile range) from time of cardiac surgery for univentricular patients was 649 days (129-1642 days) and biventricular patients was 228 days (30-659 days). Long term survival was 66% in univentricular patients (35/53) and 62% in biventricular patients (16/26).

Outcomes of heterotaxy patients undergoing cardiac surgery at Children's National Hospital are comparable to other centers. Further research of heterotaxy patients should be performed in both univentricular and biventricular groups to improve outcomes in the current era. Identifying risk factors that result in negative outcomes in this complex group should be the priority of future studies.

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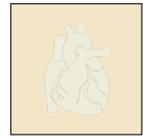
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FXII Inhibition Can Block Thrombus Formation without Causing an Increased Risk of Bleeding

Discovery of an antithrombotic therapy that does not cause bleeding would be a transformative advance in the management of arterial thrombosis, including in peripheral arterial disease and at sites of artificial surfaces such as stents, balloons, and grafts. One promising approach is inhibition of factor XII (FXII/FXIIa), which has been demonstrated to be thromboprotective in preclinical models. Importantly, severe congenital FXII deficiency is not associated with bleeding and FXII inhibition does not augment bleeding in animal models. Despite its potential as a therapeutic target, the physiological mechanisms of FXII recruitment to sites of injury and its activation by platelets remains poorly understood.

To explore the binding and activation of FXII by platelets, we stimulated human platelet rich plasma and measured thrombin generation in the presence of inhibitory antibodies against FXIIa, tissue factor (TF), and activated factor VII (FVIIa). Flow cytometry was used to quantify binding of fluorescently-tagged FXII to the platelet surface. We also used antibody X210-C01, a specific inhibitor of mouse and human FXIIa, in a mouse cremaster laser injury model in order to test the effect of FXIIa inhibition *in vivo*.

We found that stimulated platelets were able to support thrombin generation via a FXII-dependent pathway. By contrast, blocking key components of the extrinsic pathway, such as TF or FVIIa, did not mitigate thrombin generation by activated platelets. We found that the ability of platelets to activate FXII was contained in the membrane fraction and not in the platelet releasate. Platelets bound FITC-tagged FXII in a specific and zinc-dependent manner; other divalent cations, including Ca^{2+} , Mg^{2+} , and Mn^{2+} , were unable to support interaction between the platelet surface and FXII-FITC. We found that approximately 135,000 FXII binding sites were present per stimulated platelet. Using the mouse laser injury model, we also found that treatment with X210-C01 potently abolished both platelet accumulation and fibrin formation at sites of vascular injury. Mice treated with high doses of X210-C01 did not demonstrate increased bleeding in the tail bleeding assay relative to mice treated with non-immune IgG control.

Our data demonstrate that platelets bind and activate FXII in a zinc-dependent manner and that FXIIa inhibition *in vivo* can block thrombus formation without causing bleeding. Greater insight into this mechanism of FXII in coagulation could aid in the much-needed development of antithrombotic medications that carry minimal risk of hemorrhage.

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A Systematic Review of Gender Differences in METs After Cardiac Rehabilitation

Cardiac rehabilitation programs employ a multipronged approach of exercise and lifestyle modifications to reduce cardiometabolic risk factors, improve physical function, and improving quality of life for patients with a wide range of cardiac pathologies. Prior research has demonstrated that cardiac rehabilitation can benefit both men and women's exercise capacity. However, while systemic reviews have been conducted comparing compliance and referral rates between men and women to cardiac rehabilitation, none have assessed potential differences in functional capacity.

The purpose of this systemic review is to investigate the differences in outcomes between men and women after an intensive cardiac rehabilitation program as measured by metabolic equivalents (METs).

Search strategies were developed using MeSH heading and free-text terms for four databases: PubMed, SCOPUS, and CINAHL, and Cochrane. One author then eliminated any article duplicates and screened the remaining titles and abstracts. Papers were considered relevant if they compared outcomes in cardiac rehabilitation between men and women. For each study, two coauthors collected data using a standardized form. Data included answering if the study related to the PICO question, whether the study is observational or randomized, the population in the study, the cardiac rehabilitation intervention, any comparison intervention, the time points at which the outcomes were measured, and the functional exercise outcome measures metabolic equivalents (METs).

Randomized or observational studies, published in English, full text article available. Papers were considered relevant if they compared outcomes in cardiac rehabilitation between men and women.

A Total of 9986 records identified from the search and 15 studies included in the final review. No eligible high level (RCT) study identified. All studies reported that both men and women benefit from cardiac rehabilitation as demonstrated by a universal increase in peak METs. Of the 15 studies included in the review, 13 showed a greater increase in peak METs in men and 2 showed a greater increase in peak METs in women. These differences tended to be small and not all of these differences were statistically significant.

The majority of studies reported that there were, on average, more male subjects participating in cardiac rehabilitation programs than females. Given the significant underrepresentation of women in these studies, it is difficult to speculate if differences in MET levels reported in these studies are a true representation of gender differences with respect to peak MET levels.

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Assessing Cardiac Gap Junction Intercellular Communication Toxicity in Response to Chemicals Used in Medical Devices

Di-(2-ethylhexyl) phthalate (DEHP) is a main component of polyvinylchloride plastics used in many medical devices. DEHP can leach into blood or other lipophilic solutions where it is hydrolyzed to mono-(2-ethylhexyl) phthalate (MEHP). Pediatric ICU patients can have DEHP exposure 2 to 3 times higher than the average daily exposure for adults, making it important to quantify the toxicological effects of plasticizers on vulnerable pediatric populations.

This study aimed to examine the toxicity of phthalate exposure on cardiomyocyte intercellular communication, using gap junction fluorescence recovery after photobleaching (GAP-FRAP) and microelectrode array (MEA) recordings.

Cardiomyocytes differentiated from human-induced pluripotent stem cells were treated with either 10 or 60 μ M MEHP or 10 or 50 μ g/mL DEHP for up to one week. For MEA experiments, field potential duration (FPD) measurements were recorded in response to external pacing (2 Hz) and during spontaneous beating. Local extracellular action potentials (LEAP) were recorded in response to external pacing (2 Hz). Parameters of interest included beating rate, FPD, LEAP 90% duration, spike amplitude, and conduction velocity. For GAP-FRAP experiments, cells were stained with Calcein-AM dye and imaged on a Leica TCS SP8 confocal microscope. Recovery after photobleaching was quantified and used as a measure of toxicity to cellular communication to explain potential MEA changes in beating rate and conduction velocity.

Preliminary MEA results showed DEHP immediately decreased beat period (1 hr: 670 \pm 50 msec, 4 days: 460 \pm 10 msec) compared with controls (1 hr: 840 \pm 60 msec, 4 days: 880 \pm 40 msec). Sodium spike amplitude was decreased at 4 days (.33 \pm 0.05 mV vs 2.41 \pm 0.03 mV). No significant differences in MEA parameters were observed between control and MEHP-treated samples. In conclusion, the results of this study will be important for helping to understand the effects of phthalate plasticizers on cardiac electrical conduction, specifically related to intercellular communication.

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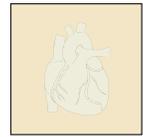
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Impact of Mesenchymal Stem/Stromal Cell Intra-arterial Delivery during Pediatric Cardiac Surgery on Neurogenesis in the Porcine Subventricular Zone

Congenital heart diseases is the leading birth defect, affecting almost 1% of births each year. Moreover, children who undergo cardiac surgery with cardiopulmonary bypass (CPB) show significant cognitive and behavioral impairments. The subventricular zone (SVZ) in the postnatal/adult brain is a very crucial region for neurogenesis and it plays an important role in neocortical growth of the gyrencephalic front lobe during postnatal life. Our preliminary data showed that CPB insults can cause a reduction in the neural stem progenitor cell (NSPC) pool. We have also observed a reduction in neurogenic activity and disruption in neuroblasts migration toward the frontal cortex.

It has been shown that mesenchymal stem/stromal cell (MSC) promote neurogenesis form SVZ neural stem/progenitor cells on various rodent models. The aim of this study is to assess the short-term impact of MSC delivery through CPB on the NSPC pool in the SVZ of juvenile porcine model.

Two-week old piglets (n=12) were randomly assigned to one of 3 groups: (1) Control, (2) Deep hypothermic circulatory arrest (DHCA), and (3) DHCA followed by MSC administration. In the third group, MSCs (10×10^6 per kg) were delivered through CPB during the rewarming period. The piglet brains were fixed three hours after CPB.

NSPCs and proliferation were determined by SOX2⁺ and Ki67⁺ antibodies. Neuroblasts and radial-glia like cells were identified by DCX⁺ and GFAP⁺ antibodies, respectively. The anterior-SVZ was divided into three tiers which were then subdivided into ventral and dorsolateral SVZ. Quantification of the NSPC and neuroblasts in each tier/region was performed, as these parameters reflect neurogenic activity.

CPB insults increase the proliferative NSPCs three hours after surgery and this impact on proliferative NSPCs was confined to the dorsolateral-SVZ in the MSC group. Also, MSC delivery reduces the average length of the GFAP⁺ processes in the dorsolateral-SVZ while MSC delivery increases the density of DCX⁺ cells found in tiers 2 and 3. These findings may suggest that MSC delivery alters the distribution of neuroblasts.

Our data show that CPB insults cause proliferation of SVZ neural stem/progenitor cells. Moreover, our preliminary results suggest that MSC delivery has the potential to affect migratory stream of young neurons in SVZ in the acute phase. To determine the ameliorative effect of MSC delivery on neurogenesis, we will need to further investigate the SVZ in long term studies.

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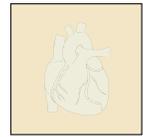
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Long-Term Outcomes of Coronary Artery Bypass Grafting in Veterans with Ischemic Cardiomyopathy

Recent data show that surgical revascularization of patients with ischemic cardiomyopathy (ICM) significantly improves mortality over ten-year period. The objective of this study is to evaluate outcomes of the veterans with ICM undergoing revascularization and examine how the findings in the civilian population translate in our veterans.

From 2000 to 2018, 1461 patients underwent isolated coronary artery bypass grafting (CABG). There were 201 patients with ICM (EF < 35%). The primary outcome was mortality. Secondary outcomes included postoperative complications. Subgroup analysis was performed within the ICM cohort to compare the outcomes of off versus on-pump CABG.

Patients in the ICM and the non-ICM group had similar demographic profiles. ICM group was more likely to have a history of myocardial infarction, diabetes, chronic kidney disease, and higher rates of preoperative intra-aortic balloon pump use. The non-ICM cohort was more functionally independent. Surgeries were performed off-pump in 80.1% and 66.3% of ICM and non-ICM cohorts respectively. Unadjusted mortality was higher for ICM cohort at 30 days (5% vs. 2.1%), 1 year (12.9% vs. 4.6%), 5 years (31.8% vs 18.2%), and at 10 years (36.3% vs. 22.2%). Risk-adjusted multivariable regression model analysis showed there was no statistical difference between ICM and non-ICM cohort in 30-day mortality (OR 1.94 [0.79 - 4.75]). However, ICM cohort had increased all-cause mortality (OR 1.75 [1.14 - 2.67]) at ten years. The subgroup analysis of ICM cohort showed a strong trend of improved short-term mortality with Off-pump CABG (3.1% vs. 12.5%, OR 0.31 [0.05 - 1.82], P=0.20), though it was not statistically significant.

Veterans with ICM undergoing CABG demonstrated comparable short-term survival compared to non-ICM veterans. However, the long-term survival in ICM cohort is still inferior to patients without ICM. There is a strong trend of improved short-term survival in patients with ICM undergoing off-pump CABG.

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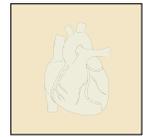
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Long Term Changes in Flow-Mediated Dilation Among Postoperative Abdominal Aortic Aneurysm Patients

Ruptured abdominal aortic aneurysms (AAA) cause around 175,000 deaths globally per year. Several studies have explored flow-mediated dilation (FMD) of arteries as a biomarker for endothelial dysfunction, a component of aneurysm pathophysiology. A previous study from this group (OxAAA) found that decreased FMD of the right brachial artery was correlated with AAA progression; after AAA surgical repair, FMD among participants improved. The purpose of this study was to evaluate the long-term changes in endothelial function of a subset of previous participants and to determine if improvements persisted. The study utilized the OxAAA database of participants who received any form of AAA repair at The John Radcliffe Hospital in Oxford, UK since 2013. Participants who underwent preoperative and postoperative FMD evaluation were included in the study (N=43). Participants were recalled to the hospital for blood sample collection and FMD measurement using high-frequency ultrasound. Brachial arterial diameter was measured at baseline, during 4 minutes of occlusion, and immediately after release of occlusion. The data were analyzed using the validated "Brachial Analyzer," to determine FMD. The Wilcoxon Sign Rank Test was used to compare patients' FMD values pre-surgically to 1-4 year follow up, while ANOVA was used to analyze changes in pre-surgical, post-surgical, 1 year, and 2-4 year follow up FMD values. Demographic information and FMD protocol have previously been published; the subgroup was 97% male and 100% white, consistent with UK AAA epidemiology. The average number of days from surgery to follow up was 996.7. Analysis showed a statistically significant increase in FMD among all 43 patients between 1-4 years after AAA repair ($p=0.0061$), as well as a statistically significant increase in FMD at each point of follow-up after surgery ($p=0.0079$) for the 13 participants for whom all data points were available. This study demonstrates improved FMD years after AAA repair among patients, and supports the hypothesis that AAAs are systemic diseases. The exact mechanism is unknown at this time. Current vascular research indicates the aortic thrombus is a possible source of systemic inflammation; another UK study found that even sub-surgical AAAs increase the risk of MI or stroke among patients. FMD could therefore potentially be used as a cost-effective and non-invasive biomarker in determinations of surgical interventions. Though the study power is limited, the data provides initial evidence for long-term improvement in endothelial function after AAA surgery.

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Application of Novel Genomic Markers to Identify New Pathways in Left Ventricular Remodeling

Left ventricular assist devices (LVAD) are increasingly utilized as destination therapy for patients with advanced congestive heart failure (CHF). LVAD has been shown to reverse left ventricular (LV) remodeling by unloading the left ventricle. Transcriptional profiling of the LV tissue before and after LVAD therapy has been utilized to examine the impact of LV unloading on pathways involved in LV remodeling. In this study, we used deep sequencing of the LV tissue to study the interplay of different species of transcripts in LV remodeling.

LV samples were acquired under informed consent from patients with ischemic cardiomyopathy (ICMP) undergoing surgical placement of LVADs (PRE-LVAD). After a variable period of time, a second LV sample was acquired (POST-LVD) from the same patients, during heart transplantation. Both the PRE- and POST-LVAD samples were preserved in an RNA preservative solution and RNA was isolated by homogenization and Trizol extraction. Total nucleic acids were DNase treated, and depleted of ribosomal RNA prior to true single molecule sequencing (tSMS) on the SeqLL RNAseq platform. Raw reads were aligned to the human genome, and then counted per transcript to render reads (R) per thousand bases of exon (K) per million (M) total informative reads (RPKM), and then compared within subjects to identify transcripts affected by the LVAD support.

Analysis of differentially expressed genes (DEGs) identified 175 coding and 28 non-coding transcripts that were significantly affected by the mechanical unloading during LVAD support. A dominant group of transcripts (>20) were either close, or identical matches to transcripts previously identified as sequestered in stress granules (SGs). The integrated stress response (ISR) involves sequestration of low priority, translationally paused transcripts into SGs, which are self-assembling structures nucleated by a family of amyloid/prion-like proteins, such as TIA1 and G3BP1/2. LVAD support was associated with movement in well-known SG transcripts such as CEP63, CIRBP, EIF3K, TANK, TCEA3, and TPM1, in what appears to be an overall shift in the translational machinery towards transcripts essential to cardiomyocyte survival.

The myocardial transcriptome is dynamically regulated in advanced CHF and following LVAD support. The expression profiles of coding and noncoding RNAs altered in response to LVAD support can be used to understand the pathways involved in LV remodeling. In this study, normalization of transcripts involved in stress granule formation in LV tissue suggests an important role for these pathways in reversal of LV remodeling, and provides a blueprint for druggable targets.

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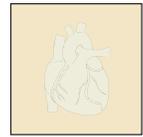
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A Case Series of Central Airway Obstruction Treated with Rigid Bronchoscopy

We report our experience in the management of Central Airway Obstruction (CAO) with Rigid Bronchoscopy (RB) in the Washington DC Veteran population.

This was a retrospective study in patients with CAO treated with RB between March 2017 and September 2018. Imaging studies, including computed tomography (CT) scans and positron emission tomography/computed tomography (PET/CT) scans, were used to determine the etiology, degree of airway stenosis, anatomic and histopathological characteristics.

A total of 12 patients underwent RB with a preoperative diagnosis of CAO. Mean age was 65.9. 10 patients (83%) were male. 7 patients (58%) were African American with the remainder being Caucasian. 10 patients (83%) had a smoking history. The majority of CAOs were caused by malignant tumors in 10 patients (83%) of which, eight, were due to squamous cell carcinoma (SCC) of the lung. One patient had stage IV pulmonary adenocarcinoma. One case of CAO due to metastatic prostate cancer. Two cases secondary to benign tracheal stenosis; an aberrant subclavian artery aneurysm and secondary to prolonged intubation. Five patients had stenotic lesions located in the right mainstem bronchus, five in the left mainstem bronchus, and two with lesions in the trachea. 3 patients had a preprocedural need for positive pressure ventilation (PPV), all three patients were successfully extubated or weaned off PPV post procedure. 8 patients (67%) underwent balloon dilation, 4 (33%) had argon plasma coagulation, 3 (25%) underwent laser debulking, and 5 patients (42%) received a stent across the stenosis, including four silicone covered, self-expanding metal stents and one full silicone stent. Stenotic relief was achieved transoperatively in 10 patients (83%). Complications included: All cause 30-day mortality in 4 patients (33%), procedural mortality 0%, readmission for airway compromise in 3 patients (25%), stent migration in 1 patient (8.3%), hemodynamic instability in 1 patient (8.3%), procedural hypoxemia (<85% by pulse oximetry) in 1 patient (8.3%). There were no cases of pneumothorax or bleeding requiring transfusion.

We conclude that CAO is a complex clinical syndrome frequently encountered with later staging of lung malignancies in our veteran population. Due to the scarcity of data available amongst veterans, it is necessary to report additional cases, since veterans are at increased risk of pulmonary malignancies due to a higher smoking incidence and later detection. Veterans with advanced pulmonary malignancies have increased surgical risk. RB, with or without stenting, is an important minimally invasive procedure for relieving airway compromise.

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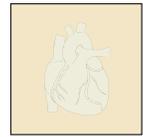
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Safe Use of Immediate Release Nifedipine to Wean Off Nicardipine Infusion in the ICU

Nicardipine infusions are commonly used in patients with severe hypertension who require strict BP control, and who are NPO, such as those with intracerebral hemorrhages. Options for transitioning to an oral regimen is limited, as long acting anti-hypertensives cannot be crushed down a feeding tube for those NPO patients. Nifedipine immediate release (IR) is a short-acting dihydropyridine calcium channel blocker used for hypertensive crisis. Safety concerns stemming from reports of cardiovascular events including myocardial infarction (MI), arrhythmias, and stroke have limited its use. We hypothesize that these harmful events occurred as a result of unrecognized hypotension in a less frequently monitored unit (i.e., medical-surgical floor) and that the use of nifedipine IR is a safe anti-hypertensive agent when introduced in the intensive care unit (ICU) setting.

Retrospective observational study evaluating the safety of nifedipine IR in ICU patients at the George Washington University Hospital from January 1, 2012 to January 31, 2017. Fifty consecutive patients treated with nifedipine IR, in order to wean a nicardipine infusion, were included in the review. The primary outcome was the incidence of nifedipine-associated hypotension and need for blood pressure (BP) support. Secondary outcomes included troponin elevation, cardiovascular events, or death.

Of the 50 patients reviewed, only one required BP support, and required phenylephrine to meet a therapeutic hypertension goal of raising the BP from 140 mmHg to a goal of 160-180 mmHg. Six patients experienced a mild troponin elevation during nifedipine administration (peak, 0.35 ng/dl). There were no new cardiovascular events such as an MI, arrhythmia, stroke, or EKG changes requiring intervention. Death occurred in 18 of the 50 cases. All 18 deaths were due to the underlying primary disease and/or withdrawal of care.

These results suggest that nifedipine IR is a safe and effective agent for weaning patients off of a nicardipine infusion in the ICU.

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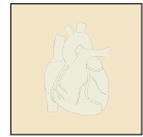
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Transcatheter Mitral Valve Replacement Outcomes: Insight From The National Cardiovascular Data Registry

Transcatheter mitral valve replacement (TMVR) was approved by the FDA in 2013 for patients who are not candidates for surgical mitral valve replacement. Since the FDA approval, the rate of TMVR procedure has increased exponentially across the nation. In this study, we conducted a descriptive analysis for patients who underwent TMVR in The United States to scrutinize the procedural approach and clinical outcomes of this procedure.

The National Cardiovascular Data Registry (NCDR) was used to summarize the baseline demographic and health characteristics of all patients who underwent TMVR procedures between 2014 and 2017. The trend and change in the procedure approach, adverse events, and clinical outcomes were summarized and visualized in scatter graphs.

The number of subjects who underwent TMVR has raised substantially from 73 subjects in 2014 to 493 in 2017. The baseline rates of hypertension, diabetes, stroke, peripheral vascular disease, end-stage renal disease, and atrial fibrillation have not changed significantly during the last four years. However, the rate of patients low to intermediate STS score has increased during the last four years (24% vs. 42%). Interestingly, there has been a significant shift in the procedural approach from transapical to transseptal. The transseptal approach has increased from 8% in 2014 to 64% in 2017. The procedural duration (155 vs. 141 minutes) and the rate of the procedural success (92% vs. 95%) have also improved during the last four years. Finally, patients who underwent TMVR had significant improvement in the status of their NYHA. The rate of subjects with NYHA III & IV had reduced from 81% before the procedure to 9% within 30 days from the procedure.

Transcatheter mitral valve replacement has significantly evolved during the last four years. The rate of TMVR will likely increase further among patients with low to intermediate STS score.

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What Are the Implications of Non-Cardiac Findings in Patients Undergoing Evaluation for TAVR?

Cardiac CT with body and vascular imaging (CCT) is essential in transcatheter aortic valve replacement (TAVR) planning for patients with severe aortic stenosis (AS). Clinical and prognostic implications of significant non-cardiac findings (NCF) are not well defined. This study is aimed to evaluate the impact of NCF on downstream testing and outcomes. Patients undergoing TAVR work-up with CCT had NCF grouped by body system. Clinically significant (CS) findings were defined as need for a procedure or clinical referral. Outcomes included valve-related and non valve-related hospitalizations, major bleeding, cardiac events, as well as 1 month and 1 year mortality. Survival was assessed by Kaplan-Meier and by a cox proportional hazards regression model. N=152 had CCT for TAVR work-up. Patients who received TAVR (n=120) were 79 ± 9 years, 33% female, 66% high risk, and 16% inoperable. For TAVR patients, all (100%) had NCF, but n=33 (27%) were clinically significant. The most common CS NCF were a lung nodule (8, 6%) or abdominal cyst (10, 8%). CS NCF prompted 45 referrals or procedures. 2/152 (1%) patients were deferred for malignancy. Mortality and outcomes were similar between TAVR patients with and without CS NCF at 1 month and 1 year (p=NS). 27% of TAVR patients had CS NCF, but this did not impact 1 year mortality and outcomes. 1% of referred patients were deferred due to malignancy. These findings may guide the Heart Team in proceeding with TAVR without undue delay for most severe AS patients.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Racial Influences on Quality of Life and Sleep Quality Change Following Patch Testing

Allergic contact dermatitis (ACD) affects 15 million patients annually with previous research showing its negative effects on quality of life (QoL) especially in minority populations who underutilize dermatology services. Minority populations with ACD undergoing patch testing show greater improvement in QoL compared to Caucasians, but more research is needed to understand the disparity among the different racial groups and the effects of patch testing on sleep. The primary objectives from this project are to determine sleep quality in ACD patients before patch testing and to understand the racial differences in how patch testing affects sleep and QoL in ACD patients prior to and 4 months after patch testing. The secondary objectives are to understand the relationship between sleep and QoL and understand the prevalence of sleep disturbances in ACD patients. Patients coming for patch testing at the Dermatology Clinic at the George Washington Medical Faculty Associates are given a demographics survey and are self-identified into one of the following racial groups: Caucasian, African American, Hispanic, Asian American or Pacific Islanders. Participants are asked to complete the Dermatology Quality of Life Index (DLQI), a brief quality of life survey (Skindex-16), and the Pittsburgh Sleep Quality Assessment (PSQI) before undergoing patch testing and are asked to complete the same set of surveys after 4 months. Currently, 13 Caucasians, 4 African Americans, 2 Asian Americans, 1 Hispanic, and 1 mixed race subject make up the 21 patients who are enrolled in the study and completed the initial surveys. The preliminary data averages for the DLQI, Skindex-16, and PSQI are 6.67, 41.51, and 8.04, respectively. Thus, quality of life is moderately affected in these patients. Additionally, since a global PSQI of more than 5 indicates poor sleep, sleep disturbances seem to be present in ACD patients undergoing patch testing. Differences between the racial categories cannot be determined yet due to the small sample size but an underutilization of dermatology services by minority populations can be suspected in our sample. More patients will be enrolled in this ongoing study with the goal of reaching at least 25 subjects per racial group in order to understand the effects of patch testing on sleep and quality of life in a diverse patient population.

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Development of a Cognitive Behavioral Therapy (CBT) for Psoriasis Patients

This study initially sought to provide a qualitative basis for the development of a protocol on cognitive behavioral therapy (CBT) by utilizing patient focus groups. A protocol on utilizing CBT as adjunct therapy in psoriasis treatment would then be used as a basis for further studies as a standard for alternative therapies in psoriasis. Due to time restrictions, patients were interviewed on a one-to-one basis and asked questions based on past and current treatment, willingness to attend CBT sessions for adjunct treatment, and whether or not they believed stress played a major factor in psoriasis flares. At its conclusion, results of the interview period demonstrated that the majority of patients interviewed stated that they believed stress was an integral player in their psoriasis flares, and most of the patients would be willing to try CBT therapy as adjunct to their current psoriasis treatment. None of the patients who were interviewed had formal therapy experience. Because of the small sample size, further interviews are needed to conduct a more comprehensive and accurate investigation and development of a manual for use of CBT in adjunct psoriasis treatment. Patients have valuable insight into their own disease process, and since psoriasis is not completely understood, this information may prove helpful for development adjunct and alternative non-medical therapies for the disease.

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Recurrence Rate of Choroidal Neovascularization in Patients with Neovascular Age-Related Macular Degeneration Managed with a Treat and Extend Protocol

Purpose: To examine recurrence rates of choroidal neovascularization (CNV) in patients with successful cessation of therapy with a Treat and Extend protocol (TAE) for exudative macular degeneration (AMD).

Methods: A retrospective review of 385 eyes in 321 patients with exudative AMD. Patients were managed with bevacizumab, aflibercept, or ranimizumab every four to five weeks, for a minimum of three injections, until macula was fluid-free. Scheduled injections were then serially extended by two weeks up to twelve weeks. Two injections were then given every twelve weeks, and stopped if recurrence was absent at the third treatment. Recurrence was then followed beginning at week four, and serially extended by two weeks until week twelve. Patients were subsequently monitored every three months. Treatment was reinitiated at any point of recurrence.

Results: 37.3% of eyes met criteria for treatment cessation, with 10.9% demonstrating recurrence following an average of 14 months. Average vision before TAE (20/70) improved to 20/50 ($p < 0.001$) with therapy. Vision loss was observed during recurrence (20/60, $p < 0.003$). However, overall vision improved compared to baseline. Visual function at TAE completion was not different than at time of final treatment (20/50; $p < 0.34$).

Conclusion: Exudative AMD may be successfully managed with TAE for overall improved vision, even with recurrence.

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Outcomes of Paraesophageal Hernia Repair: Analysis of the Veterans Affairs Surgical Quality Improvement Program Database

While there have been many outcome studies on paraesophageal hernia repair in the civilian population, there has been little from the veteran population. This study analyzes the outcomes of veterans who underwent paraesophageal hernia repair in the Veterans Affairs Surgical Quality Improvement Program (VASQIP) database.

Veterans who underwent paraesophageal hernia repair from 2010-2017 were identified using Current Procedural Terminology (CPT) codes from the VASQIP database. The primary outcome was mortality, and secondary outcomes were postoperative complications. Multivariable analysis was used to compare the laparoscopic and open groups.

There are 1607 patients in the laparoscopic paraesophageal hernia repair (LPHR) group and 366 in the open paraesophageal hernia repair (OPHR) group. There are 84.1% men and the mean age was 61 years. The laparoscopic approach was used more often in the last four years than the first four (83.6% versus 78.4%, $p=0.003$). Gender, age, or BMI did not influence the type of surgical approach. The mortality rate at 30 and 180 days was 0.51% and 0.71%, respectively. Perioperative complications including reintubation(2.18%), pneumonia(1.98%), intubated>48 hours(1.98%), and sepsis(1.98%) were higher in the OPHR group (15.9% versus 7.2%, $p<0.001$). The LPHR group had a significantly lower length of stay (4.3 days versus 9.6 days, $p<0.001$) and return to surgery within 30 days (3.9% versus 8.2%, $p<0.001$) than the OPHR group.

Veterans undergoing LPHR experience similar outcomes as patients in the private sector. The results document that Veterans should be offered a laparoscopic approach to paraesophageal repair regardless of BMI or age.

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Comparison between Medical Therapy and Endovascular Treatment of the Extracranial Atherosclerotic Vertebral Artery Disease: A Systematic Review

Objective: To assess the potential benefit of endovascular treatment compared to medical treatment in patients with symptomatic extracranial vertebral artery (ECVA) atherosclerotic disease in terms of clinical outcomes through a systematic literature review of published reports.

Methods: We identified ECVA studies published between January 1966 and December 2017 using a search on PubMed and Cochrane libraries supplemented by review of bibliographies of selected publications based on pre-specified criteria. The rates of stroke and stroke and/or death were estimated for best medical treatment and endovascular treatment, at 1 month and at last follow-up. A random effects model was used to calculate pooled proportions (PP) across all studies and 95% confidence intervals.

Results: Of a total of 57 reports reviewed, 8 studies reported outcomes in patients receiving medical treatment only (362 patients) and 49 studies reported upon patients treated with endovascular approach (2142 patients). The mean age of patients in the medical group was 65.6 years (range 61.3 - 69.0 years) and 64.1 years (range 53.5 - 72 years) in the endovascular group. The 30 day incidence of stroke was 26 (7.2%) in the medical treatment group compared to 18 (0.84%) in the endovascular group, resulting in a higher risk for patients in the best medical treatment when compared to endovascular treatment [PP 0.0559 vs. 0.0025; p-value = 0.0001]. Similarly at follow-up, 33 (12.3 %) stroke were observed in the medical group compared to 51 (2.4 %) in the endovascular group [PP 0.1027 vs. 0.0109 ; p-value = 0.0001]. There was also statistically difference in stroke related death in the medical group vs endovascular group 12 (4.5 %) vs 1 (0.04%) [PP 0.03309 vs. 0.0000 ;p-value =0.001] . There was no statistically significant difference in the rates of recurrent TIA or death to other causes between the two groups.

Conclusion: Our analysis demonstrated that endovascular treatment significantly reduced the risk of stroke and death when compared to best medical treatment alone at 30 days and at follow-up. Randomized clinical trial is warranted for further understanding of the safety and efficacy of the endovascular treatment.

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C1q Nephropathy with a Positive ANA

C1q Nephropathy is a histopathologic diagnosis characterized by dominant immunofluorescent staining for C1q electron dense deposits on renal biopsy. There are a variety of light microscopy appearances of C1q nephropathy. The pathology can appear similar to lupus nephritis. However, patients with C1Q nephropathy lack the clinical and serologic markers of systemic lupus erythematosus (SLE). In our case, a 29-year old woman presented with nephrotic syndrome and was found to have C1q nephropathy on renal biopsy. Our patient had a positive ANA titer, which led to a diagnostic conundrum given her biopsy diagnosis.

A 29 year-woman was found to have proteinuria on routine labs that later progressed over the next few months to nephrotic syndrome with worsening lower extremity edema. Her work up revealed a positive ANA titer of 1:640. However, her anti-dsDNA and serum complement levels were normal, and she did not meet clinical criteria for SLE after extensive evaluation. A renal biopsy revealed pathologic features suggestive of C1q nephropathy, without classic features of lupus nephritis. Despite treatment with prednisone and cyclosporine over the next five months, her disease progressed leading to hospital admission for worsening volume overload. A repeat renal biopsy was performed for diagnostic confirmation. The second renal biopsy showed evolution to focal segmental glomerulosclerosis (FSGS) with C1q nephropathy as well as diffuse foot process effacement of the podocytes in more than 90% of capillary loop surfaces. She continues on cyclosporine and is on a slow Prednisone taper with reports of improved symptomatology on outpatient follow-up, though she continues to have evidence of steroid-resistant nephrotic syndrome.

C1q nephropathy is a rare immune-complex mediated glomerulopathy, thought to be a variant of FSGS, minimal change disease or mesangioproliferative glomerulonephritis. Current diagnostic criteria include 1) C1q electron dense deposits on immunofluorescence microscopy and 2) lack of clinical or laboratory evidence of SLE. There have been no reports of biopsy proven C1q nephropathy with a positive ANA titer. We treated our patient with prednisone and cyclosporine. Lack of clinical improvement lead to a repeat renal biopsy, which demonstrated C1q deposition with progression to FSGS. This patient will be closely monitored for potential development of SLE in the future.

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High Number of Negative Radiographs for Suspected Tibial Shaft Fracture Adds Expense and Increases Patient Throughput Time in the Emergency Department

Tibial shaft fractures (OTA 42A-C) are the most common long bone fracture in adults, and the diagnosis is commonly made by emergency department (ED) providers prior to orthopedic consultation. Due to the subcutaneous anatomy of the tibia, a comprehensive history and physical examination are often sufficient for fracture diagnosis, with radiographs serving as a secondary aid in confirming the diagnosis and planning treatment. Although it is expected that some of these radiographic studies will be negative despite clinical suspicion for fracture, a high rate of negative X-Rays increases cost and inefficiency in the ED. This study aims to define the rate at which tibial radiographs are negative for fracture at a Level I trauma center. Secondary objectives include assessment of cost, resource allocation, and radiation exposure associated with these negative X-Rays. Finally, we present diagnostic criteria to guide the clinician in efficiently obtaining tibial radiographs. At a Level I trauma center, a prospective database was retrospectively evaluated for ED radiographs taken from 2014 to 2017. The number of radiographs taken for suspected trauma to the tibial diaphysis in the absence of concomitant periarticular injury was recorded. From this group, the percentage of X-rays positive for tibia fracture was determined. The increased cost, ED throughput time, resource utilization, and radiation exposure was analyzed.

During the three year study period, 734 tibia radiographs were performed in the ED for diagnosis of tibial shaft fracture. Of these, 565 (76.9%) were negative for tibial shaft fracture. Patient charges were increased from these negative radiographs through both higher radiology charges (\$598 per tibia radiographic series) and higher professional charges. The average time to obtain a tibia X-ray series in the ED was 28 minutes (range: 13-74 minutes). The radiation exposure from a tibia radiographic series was found to be 15 millirems.

At this institution, a large proportion of the radiographs obtained for suspected tibial shaft fracture are negative. The resources and time spent acquiring these radiographs places higher demands on physicians and staff and increases charges and radiation exposure to the patient. In addition, these negative radiographs add throughput time in the ED, thereby potentially contributing to ED overcrowding. Given the subcutaneous nature of the tibia, diagnosis of tibial shaft fracture is often reliably made through history and physical examination. We propose a systematic approach to maximize the diagnostic efficiency of tibia radiographs and subsequently improve resource allocation in the ED.

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Understanding Treatment Choices by Patients with Presbylarynges

The purpose of the project was to determine if objective measures of glottal closure, supraglottic activity and degree of bowing from endoscopic images of patients with presbylarynges differentiated between: 1) those recommended for observation and those recommended for treatment; 2) those recommended for voice therapy and those recommended for surgical intervention; and 3) those who followed through on recommendations and those who did not. Additionally, self-evaluation ratings and acoustic/aerodynamic measures were analyzed to see if they supported these findings. The study consisted of 104 patients over 60 years of age seen at the Voice Treatment Center diagnosed with presbylarynges and no other laryngeal pathology. Of the 104 patients, 30 were observed, 39 were recommended for voice therapy, and 35 were recommended for surgical management, either injection augmentation or bilateral thyroplasty. Images were selected from endoscopic evaluation for measurement of glottal gap (incomplete closure), bowing, and false vocal fold (FVF) compression. For measurement of glottal gap, 2 images from stroboscopy during prolonged /i/ were selected. For ascertaining the degree of bowing, 2 endoscopy images during rest breathing were selected. For measurement of FVF compression, 2 endoscopy images during prolonged /i/ were selected. Normalized measures were determined using equations from various publications. For glottal gap, Normalized Glottal Gap Area (NGGA) was determined (Omari, Kacker, Slavit & Blaugrund, 1996). For bowing, Total Bowing Index (BI) was determined (Bloch & Behrman, 2001). For false vocal fold compression, Normalized True Vocal Fold Width (NTVFW) was determined (Stager, Bielamowicz, Regnell, Marullo, Gupta, & Barkmeier, 2001). Self-reported ratings and other measures included GFI, RSI, V-RQOL, and flow during vibration. Those recommended for treatment were more likely to have greater NGGA values (larger gaps) than those observed ($p = 0.06$). Those recommended for voice therapy had greater NTVFW (less FVF compression) than those recommended for surgical intervention ($p = 0.025$). Those who followed through with recommendations had smaller NGGA values ($p = 0.025$) than those who did not follow through. They also had smaller flows during vocal fold vibration ($p = 0.024$) (commensurate with smaller gap) and rated themselves as having more severe symptoms (GFI, $p = 0.01$; V-RQOL, $p = 0.01$). A combination of measures from endoscopic images and other self-rating measures may provide a rubric for who is more likely to follow through with treatment recommendations; degree of FVF compression may be an early indicator of glottal insufficiency.

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Skin Alcohol Sensor in the ER

In 2010, despite education and awareness, 112 million individuals self-reported driving their vehicle while impaired, and 1.2 million individuals were arrested for driving under the influence of alcohol or narcotics. It was reported in 2012 that 10,322 deaths were related to alcohol-impaired driving crashes, and the annual cost related to alcohol related incidents totals close to \$59 billion. Although commercial alcohol sensors are available, they typically measure breath, therefore lacking continuous monitoring capabilities and requiring user operations. To address this challenge, there is a growing interest in developing non-invasive wearable sensors, capable of monitoring blood alcohol content (BAC) continuously in real-time. Such devices could be a valuable tool for research, consumer protection, and clinical use in the Emergency Room to monitor patients presenting with alcohol intoxication in a cost-effective manner.

Transdermal alcohol monitoring is one of the methods to achieve this goal. It measures the transdermal alcohol content (TAC), alcohol vapors released from the skin, and estimates the BAC based on sensor readings. This technology has been adopted in the criminal justice system, especially in cases of alcohol abuse. However, existing monitors are expensive, bulky, inaccessible to typical consumers, and not available for use in a hospital setting. We designed and prototyped a wearable transdermal alcohol sensor based on modern low-power electronics and state-of-the-art ethanol fuel cell technologies. The fabricated prototypes can be worn like a watch or anklet. A small electrical signal proportional to the alcohol concentration is generated and recorded by the sensor system in real-time. The data can be recorded to a cloud database via Bluetooth Low Energy communication through a gateway device. The results are compared against BAC values measured by the standard available breathalyzer in the Emergency Room.

Testing on known solutions of alcohol has shown a linear response of the sensor, and testing on healthy subjects time after consumption of an alcoholic beverage has shown a TAC response curve over that is similar to that of the BAC response curve from a commercially available breathalyzer. After initial testing in the Emergency Room, design modifications were made to improve the sensor enclosure to eliminate significant fluctuations in sensor readings. Testing is required on more healthy subjects before further testing on patients presenting to the Emergency Room with alcohol intoxication. Future improvements to the sensor include two humidity sensors to calibrate for sweat evaporation rate and a thinner enclosure.

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The Use of Lifestyle Modification to Manage Dysautonomia: A Case Series

Dysautonomia is not a single disease process, but rather a constellation of symptoms that together represent dysfunction of the autonomic nervous system. Certain connective tissue disorders, such as Ehlers Danlos Syndrome hypermobility type (EDs-ht), are known to be associated with various forms of dysautonomia, most commonly Postural Orthostatic Tachycardia Syndrome (POTs) and Mast Cell Activation Syndrome (MCAS), and is disproportionately found in female patients. Currently, treatment for individuals with dysautonomia is limited and mainly consists of symptomatic management through the use of off-label medications, as the etiologies of dysautonomia are poorly understood. One of proposed pathophysiologic mechanisms driving autonomic dysfunction is increased levels of systemic inflammation and neuroinflammation. Reducing systemic inflammation in patients presenting with dysautonomic processes may prove helpful in reducing symptoms and improving quality of life, and can be achieved through lifestyle modification to an “anti-inflammatory lifestyle.” This lifestyle includes eating an anti-inflammatory diet, engaging in physical activity and limiting sedentary time, optimizing sleep quality and quantity, and practicing stress management, including through mind-body interventions.

The objective was to assess the effectiveness of lifestyle modification to decrease number of symptoms, symptom severity, and to improve quality of life for a cohort of patients who presented with a combination of POTs and MCAS in the setting of EDs-ht.

A retrospective chart review was performed for 4 adult female patients, treated for dysautonomia in a lifestyle medicine practice. Data was collected regarding relevant diagnoses, symptoms, medications, side effects, lifestyle modification counseling, and outcomes.

Using individualized anti-inflammatory lifestyle modification counseling for patients with underlying dysautonomia, we found that 3 out of the 4 patients (75%) reported decreased number of symptoms, increased symptom control, as well as improved quality of life. No worsening of symptoms was reported.

Individualized anti-inflammatory lifestyle modification counseling show promise as a tool for the management of patients that present with dysautonomia in the setting of EDs-ht. Decreasing systemic inflammation through lifestyle modification maybe a useful and safe means to both decrease the number and severity of symptoms in these patients and improve their quality of life, and further research into this subject is warranted.

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Age of Initial Complaint of Sexual Dysfunction Among Inflammatory Bowel Disease Patients

There is a rise in incidence of Inflammatory Bowel Disease (IBD) among all age groups in the United States. IBD has many known extra-intestinal manifestations, however, there is limited data regarding its effects on sexual dysfunction. The aim of this study is to determine the age of onset of sexual complaints among IBD patients.

A retrospective chart review of all IBD patients at an urban academic medical center. Patient gender, age, disease type, presence of sexual dysfunction, medications, and documented physician discussions were obtained. A confidential database was created using Microsoft Excel with statistical analysis set at <0.05 . There were no exclusion criteria. The study was approved by the IRB.

261 IBD patients (121 males, 140 females; mean age 44.9) were evaluated. There were 76 (29.1%) with sexual dysfunction. 29 males (23.9%) and 47 females (33.6%) had sexual dysfunction ($p=0.042$). The most common female sexual complaint was dyspareunia while that for males was erectile dysfunction.

The average age of initial complaint among males was 47.2 and females was 46.1. The most common age range of initial complaint among males was from 31-40 years (24.1%) and in females was between 31-40 and 51-60 years (both 22.9%). There was no significant difference in the average age of initial complaint in Crohn's disease (age 45.8 years) and ulcerative colitis (age 47.9 years) patients.

In the general population, 7.4% males and 28% females are estimated to have sexual dysfunction. This study revealed that sexual dysfunction is significantly more prevalent among IBD patients than non-IBD patients. This was more prevalent in females and the age group of 31-40 years with no significant difference between those with Crohn's disease and UC. Although we recognize potential co-morbidities may be linked to sexual dysfunction, this study highlights the need for a consistent multidisciplinary approach to the IBD patient that addresses sexual function.

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Pulse Check Improvement through Video Analysis and Feedback

Minimizing pulse check times and maximizing compression ratio is arguably the only intervention other than defibrillation shown to improve outcomes in cardiac arrest. Major guidelines on resuscitation following cardiopulmonary arrest emphasize that chest compression fraction is a predictor of return of spontaneous circulation as well as survival to hospital admission. The objective of our study is to analyze the efficacy of a quality video review-based educational intervention in minimizing pulse check times and maximizing compression ratio for all out-of-hospital cardiac arrests at George Washington University Hospital.

Cardiac arrest resuscitations are recorded in real time via in-ceiling cameras in multiple critical care bays. Resuscitation videos are reviewed separately by two emergency medicine residents and pulse check times and compression ratio are measured. Through grand rounds presentations as well as individualized email feedback, individuals who participated in the resuscitation as well as the entire department receive qualitative and quantitative feedback on the resuscitations. This educational intervention was continuously implemented between December 2017 and October 2018. Spearman's Correlation Coefficient, ρ , was analyzed to show the relationship between date, percentage compression time, and pulse check time.

47 cases met inclusion criteria and had full data record for this pilot study. Inter-rater reliability among video reviewers was sufficiently concordant ($p=0.9664$, $p\text{-value}<.0001$). Over the course of our study, there was a statistically significant positive correlation between more recent dates and percent compression time ($p=0.4277$, $p\text{-value}<.0001$) and a statistically significant negative correlation between more recent dates and pulse check time ($p= -0.7871$, $p\text{-value}<.0001$).

Analysis of resuscitation videos has improved cardiopulmonary resuscitation in our emergency department. There was a statistically significant reduction of pulse check times after staff received individualized feedback as well as video-review lectures. Other emergency departments can also improve their cardiopulmonary resuscitation care in a meaningful way over the course of one year through video review and email feedback.

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Racial and Ethnic Disparities in the Management of Acute Pain in US Emergency Departments: Meta-Analysis and Systematic Review

Prior evidence suggests that healthcare disparities exist in a variety of healthcare settings and for multiple medical conditions. For patients with acute pain, there is conflicting data about the existence of racial/ethnic disparities in the ED management of acute pain. This review aims to quantify the effect of minority status on receipt of analgesia for acute pain management in US Emergency Departments and urgent care settings.

We used the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology to perform a systematic review and meta-analysis of articles from 1990 to 2018 that compared racial/ethnic differences in the administration of analgesia for acute pain in EDs. Inclusion criteria include research conducted between 1990 and 2018, US-based ED or urgent care settings, adult patients, and studies that compared white patients to an ethnic or racial minority for acute pain. Exclusion criteria included research that focused primarily on chronic pain, chest pain, post-operative pain, case reports or survey studies. Acute pain was categorized by traumatic or non-traumatic causes and analgesia was categorized by opiate or non-opiate class. Two independent reviewers were involved in each stage of review. Following data abstraction, meta-analysis was performed using a fixed effects and random-effects model to determine primary outcome of analgesia administration stratified by racial and ethnic classification.

763 articles were screened for eligibility and ultimately fourteen studies met inclusion criteria. Thirteen studies compared black and white patients and seven compared Hispanic and non-Hispanic patients. In total, study population included 7070 non-Hispanic white patients, 1538 Hispanic patients, 3125 black patients and population was 50.3% Female. Black patients were less likely than white to receive analgesia medication for acute pain: OR 0.64 [95%-CI: 0.55-0.75, fixed effects model] and OR 0.60 [95%-CI, 0.43-0.83, random effects model]. Hispanics were also less likely to receive analgesia administration in the ED: OR 0.70 [95%-CI, 0.57-0.87, fixed effects model] and 0.75 [95%-CI, 0.52-1.09, random effects model].

This meta-analysis demonstrates the presence of racial/ethnic disparities in analgesic administration for the management of acute pain in US EDs. Further research is needed to examine patient reported outcomes in addition to the presence of racial/ethnic disparities in other racial groups.

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Fluoroscopically Guided Sharp Recanalization with Dilation and Stenting of an Esophageal Occlusion

Esophageal strictures may lead to dysphagia, intolerance of normal secretions, and malnutrition. The gold standard of treatment is esophageal dilation. Though most cases are relieved by balloon dilation, one third of cases require multiple dilations. To complicate treatment further, complete occlusion of the esophagus or severe fibrotic strictures may limit the use of balloon dilation or stents. In our case, a patient with a complex fibrotic occlusion above a previously placed esophageal stent was successfully treated with a sharp recanalization technique using fluoroscopy alone.

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Presentation Features and Misdiagnosis in Anti-MDA5 Autoantibody (Ab) Associated Juvenile Dermatomyositis (JDM)

Clinical phenotypes of JDM have been defined by various myositis specific autoantibodies (MSAs). We assessed presentation features of anti-MDA5 (melanoma-differentiation associated gene 5) Ab associated JDM.

Physician completed questionnaire about presentation features for 35 MDA5 Ab JDM patients meeting probable or definite Bohan and Peter criteria were assessed and compared to those of 132 with anti-TIF1, 84 with anti-NXP2, 15 with anti-ARS (aminoacyl-tRNA synthetase), 12 with anti-Mi2 Abs, and 144 MSA/MAA negative patients. Myositis Abs were tested by validated immunoprecipitation (IP) and IP-immunoblotting.

Median delay to diagnosis in anti-MDA5 was shorter compared to anti-ARS (4 [1-8] vs. 7.5 [3-13.2] months, $p=0.033$). The most frequent first symptoms in anti-MDA5 were cutaneous (37%), constitutional (14%), muscular and skeletal (8.6% each). Rash as a first symptom was less frequent in anti-MDA5 compared to anti-TIF1 (75%, $p=0.0001$). Weakness as a first symptom was less frequent in anti-MDA5 (8.6%) compared to anti-NXP2 (48%, $p=0.0001$), anti-ARS (32%, $p=0.05$), anti-Mi2 (25%, $p=0.018$), and Ab negative (35%, $p=0.0012$). Skeletal symptoms were less frequently first compared to anti-ARS (8.6% vs. 32%, $p=0.05$). 28% of anti-MDA5 had a combination of cutaneous, constitutional, and skeletal symptoms initially; 26% of anti-MDA5 presented with rash and weakness simultaneously. Rash before weakness was less frequent in anti-MDA5 compared to anti-TIF1 (49% vs. 72%, $p=0.014$). Gottron's (31%) were most often first rash followed by both Gottron's and heliotrope (14%), and heliotrope alone (11%). In 11.6% of anti-MDA5, first rash was a combination of both Gottron's and heliotrope with other rashes (malar, V-sign, skin ulcerations). Gottron's combined with ulceration, malar, or periungual erythema were first rashes in 8.7%. Other initial rashes included malar and/or other erythema (5.7% each), or mucus membrane lesions, maculopapular and vasculopathic rashes (2.9% each). Heliotrope was less frequent first rash in anti-MDA5 compared to anti-NXP2 (11% vs. 34%, $p=0.013$) and anti-ARS (47%, $p=0.01$). First weakness was proximal in 80% of anti-MDA5, both proximal and distal in 8.6%, and distal in 11%. Early distal weakness was more frequent in anti-MDA5 compared to anti-TIF1 (11% vs. 0.8%, $p=0.007$), anti-NXP2 (0%, $p=0.006$), and MSA negative (1.8%, $p=0.019$). 23.5% of anti-MDA5 had one and 14.7% two misdiagnoses, including infections (17.6%), skin diseases (14.7%), other autoimmune (5.9%), cardiac and psychologic disorders (2.9% each).

In anti-MDA5 JDM, cutaneous, constitutional and skeletal symptoms are observed most frequently at illness onset, and patients present most often with rash before weakness. Illness presentations of anti-MDA5 Abs differ from other MSAs.

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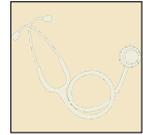
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Cause of Death and Wounding Pattern in Firearm-Related Violence in Washington, D.C.

Previous studies on gunshot wound (GSW) management have often excluded firearm deaths and autopsy reports from analysis. Recent research has found that GSW fatalities in civilian public mass shootings (CPMS) most often involve injury to the head, chest, and extremities. This study investigates the mechanism of death and wounding pattern among firearm fatalities in Washington, D.C.

One hundred and eighty two autopsies representing all GSW fatalities in the D.C. area from January 1, 2016, to December 31, 2017 were included. Date of injury, date of death, age, gender, race, manner of death (homicide, suicide, unknown, or confirmed accident), types of weapon used (handgun, rifle, shotgun, unknown), number and location of GSWs, pre-hospital interventions, and transport were collected. Congruent with the approach taken by trauma surgeons, each skin wound was counted as a separate GSW. GSWs were catalogued by body region, which was defined as head (including face), neck, chest/upper back (defined as above the costal margin or above the tip of the scapula), abdomen/lower back (including groin and buttocks), and extremity. Non-penetrating graze wounds were not counted as GSWs. Outcomes included fatal organ or vascular injury.

One hundred and eighty two autopsy reports were reviewed. The population was 91% male with a mean age of 31 (SD 12.5 y). Homicide accounted for 92% of fatalities followed by suicide (7.1%), accident (0.5%), and unknown (0.5%). Handguns were used in 99% of cases while rifles were used in the remaining 1% of cases. GSW locations were distributed as follows: 30% chest/upper back, 23% head/face, 21% extremity, 19% abdomen/lower back, 7% neck. The organs most commonly fatally injured were the brain (39%), lung parenchyma (37%), heart (27%), thoracic aorta (19%), and liver (19%). Transport to trauma center rates differed with head wounds being less likely to be transported (45% vs. 55%, $p = 0.0003$), and abdominal wounds being more likely to be transported (45% vs. 29%, $p = 0.03$).

The head and chest are the most commonly injured areas in firearm-related fatalities. While the extremity injuries account for a large proportion of GSWs, these injuries rarely result in death. The brain, heart, and lung were the most common fatally injured organs. Internal bleeding from penetrating trunk and head wounds is best addressed by rapid transport to the hospital for management.

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Outpatient Parotidectomy: A Safe and Feasible Alternative to Inpatient Surgery

Parotidectomy has traditionally been regarded as an inpatient procedure. Recent literature suggests that outpatient head and neck surgery is just as safe as inpatient surgery, may decrease costs, and improve patient satisfaction. Although data exists for a wide range of outpatient surgical procedures, there is limited recent literature examining the viability of outpatient parotidectomy.

A cohort of patients who underwent parotidectomy over a 7-year period was retrospectively studied in a single institution. Patients were divided by inpatient or outpatient status. Complication and readmission rates for both outpatient and inpatient groups were tabulated. Complications that were analyzed included infection, seroma, sialocele, salivary fistula, hematoma, and flap necrosis.

Over a period of 7 years, a total of 144 patients had available data for analysis. 9 of the 144 patients had complications (6.3%). 7 of 98 (7.1%) outpatients and 2 of 46 (4.3%) inpatients had complications. The most common complication among the entire cohort was sialocele (2.08%). Among the inpatient group, complications consisted of wound infection requiring readmission, hematoma, and facial nerve injury. There was no statistically significant difference in overall complication rate between the two groups ($p=0.518$).

Our results suggest that outcomes are comparable between inpatient and outpatient parotidectomy groups. Outpatient parotidectomy appears to be a safe and viable alternative.

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Validity and Reliability of Patient Reported Outcomes Measurement Information System (PROMIS) Computerized Adaptive Tests (CAT) in a Canadian Cohort of Patients with Systemic Lupus Erythematosus

Patient-reported outcomes are an invaluable tool in clinical practice and are central in providing patient-centered care. There has been minimal research on the use of The Patient Reported Outcomes Measurement Information System (PROMIS) computerized adaptive test (CAT) in adults with systemic lupus erythematosus (SLE). The present study aims to examine the construct validity and test-retest reliability of the PROMIS CAT in a Canadian cohort of patients with adult SLE.

All consecutive adult (≥ 18 years old) patients with lupus and visiting a Canadian Lupus Clinic between July-September 2018 were approached to participate. Patients completed PROMIS CAT during their clinical visit assessing 14 domains of health, specifically: physical function, mobility, pain behaviour, pain interference, ability to participate in social roles, satisfaction with social roles and activities, fatigue, sleep disturbance, sleep-related impairment, applied cognition-abilities, applied cognition-general concerns, anger, anxiety, and depression. The construct validity (using spearman correlation, r) of the PROMIS CAT was evaluated against the commonly used legacy instruments, specifically: SF-36, LupusQoL, The Perceived Deficits Questionnaire (PDQ-20), Beck Depression Scale - 2nd edition (BDI-II), Beck Anxiety Inventory (BAI), the Assessment of Chronic Illness Therapy Fatigue Scale (FACIT), and the Epworth Sleepiness Scale. For intra-rater test-retest reliability (Intraclass Correlation Coefficient (ICC [2;1]) PROMIS was completed 7-10 days after baseline.

Ninety-four patients (93.5% females) were enrolled with a mean age of 49.7 ± 14.3 years and mean disease duration of 19.7 ± 12.8 years. A moderate-high correlation ($r = 0.59-0.87$) between PROMIS domains and the corresponding legacy instruments was demonstrated confirming PROMIS construct validity [e.g. $r = 0.80$ for SF-36 Physical Functioning and PROMIS Physical Functioning domain and $r = 0.86$ for FACIT-F and PROMIS Fatigue domain]. This was also applicable for depression, anxiety, and pain. Reliability: In 92 patients, good agreement was found for the majority of domains [ICC (2;1) range 0.64-0.93]. The lowest ICC [2;1] were identified for sleep disturbance (ICC 0.37, 95% CI:0.13-0.63) and fatigue (ICC 0.45, 95% CI:0.23-0.69) and pain domains. This may be explained by the daily variation in these domains.

This is the first study to confirm the construct validity and the reliability of PROMIS CAT in a Canadian adults SLE cohort. Compared to legacy instruments (such as SF-36), PROMIS CAT has moderate-high correlation and good-excellent reliability. PROMIS can assess an expanded number of content domains with lower patient burden, compared to legacy measures improving the participation of patients in their medical care.

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Opioid Utilization for Shoulder Dislocations in Emergency Department

United States Emergency Departments (EDs) frequently see closed shoulder dislocations. There is no standard analgesia for pre-reduction, reduction, and post-reduction pain in patients and pain is typically treated by physician preference. It is largely unknown how many patients with shoulder dislocations receive opioids in the ED or receive a home opioid prescription for post-reduction pain. Our purpose is to discover in what proportions various medication classes were utilized during shoulder dislocation-related ED visits and to analyze prescribing trends in the ED.

This is a retrospective analysis from a nationally representative sample of US EDs from the Center for Disease Control's National Hospital Ambulatory Care Survey between 2005-15. All patient visits related to closed shoulder dislocations were identified and analyzed. CDC codes were used to identify the prescriptions of opioid analgesics, NSAIDs, muscle relaxers, and local anesthetics.

2.2 million shoulder dislocation ED visits were documented between 2005-2015. In total, 69.4% of patients were under 44 years (95% CI 63.85-74.95), and 74.1% were male (95% CI 69.0-78.9). The majority, 69.6% (95% CI 62.7-75.8), received opioids while in the ED, with 45.5% (95% CI 39.2-51.9) of patients receiving an opioid as their first medication. In addition, 41.3% (95% CI 35.8-47.1) received opioids as discharge prescription. Concurrently, 38.2% (95% CI 31.7-45.1) of patients were administered NSAIDs, 11.3% received muscle relaxers (95% CI 8.1-15.4) and 3.3% (95% CI 1.6-4.66) received lidocaine injections.

Most visits related to closed shoulder-dislocations received opioid in the ED with nearly half receiving a home prescription. In comparison to patients with shoulder dislocations who did not receive opioids, there was no significant difference in age or gender, pain scale at triage, triage level, wait time to see a provider, or length of stay in the ED. NSAIDs, muscle relaxers and lidocaine injections were comparatively underutilized.

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Retrospective Analysis of Compliance and Efficacy of a Novel Formulation of Deferasirox (Jadenu)

Transfusion-related iron overload is a complication of chronic transfusion therapy in patients with sickle cell disease (SCD). Iron overload can cause hepatic, cardiac and other end-organ dysfunctions, and greater iron burden has been associated with increased mortality in this population. Several medications are available to chelate iron, and adherence to chelation medication is critical to prevent iron-related damages. We assessed the impact of Jadenu®, a novel film-coated tablet formulation of deferasirox, versus dissolvable deferasirox on adherence, iron control, patient/parent reported preferences, and quality of life (QoL) in chronically-transfused patients with SCD.

Pediatric patients with SCD receiving chronic transfusion therapy and chelation were invited to participate in this single-institution trial. Subjects and parents were administered a survey on medication preference and adherence. Then, they completed PedsQL™ Sickle Cell Disease Module 3.0, and PedsQL™ Quality of Life Short Form 4.0. Retrospective measures of iron burden (laboratory values and imaging) were abstracted from the electronic health record. In subjects who transitioned to tablet deferasirox, iron measures were compared during the time on their prior chelation and while they were taking tablet deferasirox.

Twenty-one subjects were enrolled including 15 subjects prescribed tablet deferasirox and 6 prescribed dissolvable deferasirox. 92% on tablet deferasirox reported missing more doses with dissolvable formulation than with tablet, with 50% reporting missing 3-4 doses per week of dissolvable formulation. Patient-reported barriers to taking dissolvable formulation included side effects, need to take on empty stomach, taste, and forgetfulness. 64% reported no side effects from either formulation. Cost did not appear to be a barrier to taking or obtaining either formulation. There were no statistically significant differences in QoL measures between subjects taking either formulations of deferasirox, except patient-reported psychosocial QoL was higher in 8-13y cohort taking tablet deferasirox. For subjects on both formulations, average ferritin was comparable during the time periods on dissolvable vs tablet within subjects (3358ng/dL vs 3395ng/dL, $p>0.05$), but there was a trend towards improved LIC on the tablet formulation (15.6mg/g dry weight vs 14.9mg/g dry weight, $p>0.05$).

Film-coated tablets were the patient-preferred formulation of deferasirox, and subjects reported improved adherence with this formulation. Though chelation had little impact on general and sickle cell specific measures of QoL, there was a trend towards improved iron burden as measured by LIC. Long term evaluations of chelation adherence and impact of iron burden on mortality are needed in patients with SCD receiving chronic transfusion.

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Paget-Schroetter Syndrome in Pregnancy: Unique Considerations and Management

Thoracic outlet syndrome (TOS) refers to a set of symptoms caused by the compression of either the subclavian vein, artery, or brachial plexus. Venous TOS is characterized by thrombosis of the deep veins of the upper extremity including the subclavian to radial veins. Paget-Schroetter Syndrome (PSS), also known as effort-induced thrombosis, is a rare form of primary venous thoracic outlet syndrome whereby spontaneous thrombosis of the subclavian vein is instigated by repeated, vigorous overhand activity.

A 35-year-old G1P0 Caucasian woman, a competitive swimmer by profession with no significant medical history presented to an outside facility at 8 weeks gestation by LMP with a two-day history of acute onset left upper extremity paresthesia, discoloration and swelling after swimming for 90 minutes. She was subsequently diagnosed with deep venous thrombosis (DVT) after a left upper extremity ultrasound revealed a thrombus extending from the left subclavian to the brachial vein. After overnight anticoagulation, pharmaco-mechanical thrombectomy was performed which achieved adequate outflow. First rib resection via an infraclavicular approach was then performed a week after initial presentation. Repeat venogram and pharmaco-mechanical thrombectomy was performed with balloon venoplasty yielding satisfactory result. The patient recovered without complications. On follow-up appointment 2 weeks post-operatively, arm swelling was noted to have markedly improved down to baseline and the patient had no other complaints.

We present successful treatment of a challenging case of PSS in a pregnant patient with focus on the unique diagnostic evaluation and management of pregnant patients with PSS. Pregnancy poses unique clinical considerations when deciding the type of anticoagulation, pre and post-operative surgical care, and fetal assessment. Additionally, our case highlights the value of careful management of anticoagulation and the utility of surgical thoracic outlet decompression shortly after pharmacomechanical thrombectomy for long-term venous patency and the role of multi-disciplinary patient care with other specialties such as Hematology and Obstetrics for additional recommendations to ensure safe, long-term anticoagulation throughout pregnancy.

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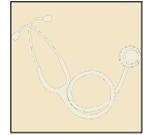
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Pre- and Post-Contrast Dual Energy CT: Is Post-Contrast Attenuation Different for Single and Dual Energy Modes?

Dual energy CT (DECT) is increasingly being used in clinical practice due to its assortment of applications beyond those of conventional single energy CT (SECT). While SECT and DECT attenuations are relatively comparable, small differences in the soft tissue attenuation range are not well established. Thresholds for lesion enhancement were created with SECT and small deviations between SECT and DECT attenuations could affect interpretation for enhancement. As a result, differences in post-contrast attenuation values between SECT and DECT may result in the overcalling or undercalling of these lesions. The purpose of this study is to compare attenuations between SECT images and 70 keV dual energy monochromatic image reconstructions (70MI).

Four rows of four tubes containing saline and three dilutions of iodinated contrast (with approximate SECT attenuations of 5, 15, 25, and 35 HU) were suspended in a plastic water filled abdominal phantom. The phantom was scanned five times in SECT (120 kVp) and DECT (100/140 kVp and 80/140 kVp) modes with a CT DIvol of 8 and 16 mGy and constant remaining settings. 70MI reconstructions, considered the 120 kVp SECT equivalent-image, were then created. SECT and 70MI attenuations and noise were measured for each tube using 2.0 cm² regions of interest and were compared using the Wilcoxon signed rank test.

All tubes had greater attenuation on 70MI than SECT ($p < 0.01$), with larger deviations at high attenuation tubes. The 70MI mode overestimated SECT attenuations by a mean of 6.5 ± 1.8 HU (range 2.1-10.6 HU) and 9.4 ± 2.3 HU (range 5.6 - 15.5 HU) for the 25 and 35 HU tubes respectively. There was no difference between deviations at CT DIvol of 8 and 16 mGy ($p = 0.20$). 70MI had slightly more noise than SECT with CT DIvol of 16 mGy ($p < 0.02$), although there was no difference in noise levels at CT DIvol of 8 mGy.

At high iodine concentrations, 70MI DECT post-contrast imaging can overestimate enhancement attenuation as compared to SECT. Radiologists should be aware of these deviations when measuring attenuations with 70MI DECT.

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Interosseous vs. Intravenous Access is Associated with Survival in Out-of-Hospital Cardiac Arrest

Data have been unclear about the roles of interosseous (IO) vs IV access in out-of-hospital cardiac arrest (OHCA). One randomized controlled trial of prehospital providers showed increased rate of initial success and decreased time to access in IO vs IV. However, subsequent retrospective trials have shown decreased likelihoods of sustained return of spontaneous circulation (ROSC), survival, and favorable neurologic outcome. Our objective was to determine if there was a difference in survival for IO vs IV access in OHCA in our patient population.

This was a retrospective, observational study at an urban academic hospital. Three resuscitation bays were continuously videotaped to capture resuscitations of OHCA patients. Each resuscitation was analyzed by two independent observers for standardized metrics as well as type of access. If no time to IV access was recorded, only IO access by prehospital providers was assumed. Data was analyzed by contingency tables with Fisher's exact test as well as Spearman rank correlation analysis.

A total of 47 cases were captured for analysis. 36 patients presented with prehospital IO access and 11 patients obtained IV access in the emergency department (ED). Overall, 91.7% of patients with prehospital IO access died, compared to 100% of patients with IV access. In addition, of the 47 cases, 35 patients received IV access in the ED and 12 did not. Patients who received IV access in the ED had higher overall survival (32/35 or 91% vs 12/12 or 100%).

In this retrospective, observational study, there were trends towards survival for OHCA patients who had received prehospital IO access as well as those patients who received IV access in the ED. Future directions include analyzing data from a larger sample size, as well as analyzing specific data on what access patients have and anatomic site of IO access.

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Elevated Circulating Phthalate Levels in Pediatric Pediatrics Following Cardiopulmonary Bypass or Extracorporeal Membrane Oxygenation Procedures

Background: Di-(2-ethylhexyl) phthalate (DEHP) is a main component of polyvinylchloride plastics used to soften otherwise rigid plastics; as such, DEHP is frequently used to manufacture plastic medical devices that are utilized in intensive care units. Cardiopulmonary bypass and extracorporeal membrane oxygenation (ECMO) are circulatory support procedures that utilize plastic tubing circuits. Although phthalates have been associated with adverse health outcomes, relatively little is known about pediatric exposure to phthalate chemicals in the clinical setting.

Objective: To measure circulating phthalate levels in pediatric patients who have undergone cardiopulmonary bypass and/or ECMO procedures.

Methods: Plasma samples were collected from cardiac and neonatal intensive care unit (CICU, NICU) patients over the course of their treatment, and frozen at -80C. Phthalates were isolated from plasma samples via solid phase extraction method, as described by Frederikse et al., 2010. Metabolites of DEHP (including MECCP and MEHP) were measured by mass spectrometry and the values were calculated as concentrations in parts per billion. Time points included preoperative, intraoperative, and postoperative exposure.

Results: Patients included in this study underwent either cardiopulmonary bypass and/or ECMO (mixed gender, age 3 days - 2 years). The average time spent on bypass was 126.4 minutes. For plasma samples collected after CPB and ECMO, the concentration of metabolites MECCP and MEHP increased 1139 and 807%, respectively, compared with preoperative levels. Plasma samples collected 6-24hrs after the procedures resulted in MECCP and MEHP levels that were 270% and 28.4%, respectively, higher compared to preoperative levels.

Conclusion: Phthalate metabolites were highest in patient blood samples during procedures in which patients were exposed to plastic tubing circuits, as compared to preoperative levels. Elevated phthalate levels persisted for 6-24hours after each procedure. Further study is warranted to investigate the connection between hospital-based phthalate exposure and health outcomes.

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Implementation of “Microsim” Training to Improved Readiness for Mass Casualty Scenario in a Pediatric Trauma Center Emergency Department

It is essential that all emergency department (ED) staff be trained to prepare for and respond to Mass Casualty Incidents (MCI). Traditional MCI training often requires significant resources, leading to laborious and infrequent drilling. Microsimulations (“MicroSims”) are a novel training strategy focused on abbreviated drill scenarios testing knowledge and execution of critical tasks. We hypothesize that implementation of MicroSims will increase staff preparedness and performance in an MCI.

Children’s National Medical Center (CNMC) ED conducted a 7-point readiness pre-survey of all ED staff before implementing microsim MCI exercises. 3 pre-scripted microsim MCI scenarios were exercised on a weekly basis alternating AM and PM shifts and days of the week to ensure random sampling of staff. The primary measure was the completion of 8 critical tasks on a rating scale of 0- did not perform, 1- performed inadequately, or 2- adequately performed. Study staff led a debrief at the conclusion of each drill. Staff also completed an evaluation survey at the end of each exercise.

Equal numbers of drills were performed during day and night shifts. Average drill length was 8:12 (m:s) and an average debrief length of 2:51. Completion of critical tasks was significantly better during night shift drills ($p=0.024$). The task most missed during the exercise was review of the MCI leader job action sheet. Key themes in drill evaluations included: (1) clarification of roles (2) task prioritization (3) awareness of job action sheet and (4) need for more repetitions of drills.

It is possible to conduct an MCI microsim training in under 10 minutes in a Level 1 Pediatric Trauma Center ED that can impact staff knowledge about the MCI protocol and available resources. Qualitative assessment of microsim evaluations show that ED staff appreciate these frequent drills and can identify opportunities for improvement without being disruptive to their workflow. Additional microsims are needed to identify best practices for MCI management in a pediatric ED.

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The Safety of Hemoconcentration During ECMO

Hemoconcentration is regularly used in the operating room for cardiac surgery patients with a positive fluid balance or impaired renal function. A hemoconcentrator can be safely added to the heart lung machine where blood runs through the 40 micron filter, often with a vacuum applied, to create a high transmembrane pressure forcing cell water and small solutes out of the dialysate port and out of circulation. The access for the hemoconcentrator is connected to a positive pressure port on the circuit distal to the centrifugal or roller pump. The return from the hemoconcentrator is attached to the top of the circuit's reservoir with either no pressure or negative pressure to return the blood. A hemoconcentrator, after priming, can also be attached to an ECMO circuit. Though an ECMO circuit usually does not contain the same safety of an open return reservoir, if adequately primed and de-aired it can be returned to a port pre-pump with minimal risk of air embolus. While used in some institutions, the safety of hemoconcentration during ECMO has not been widely studied.

In this study, the last 100 ECMO patients at the George Washington University Hospital were retrospectively reviewed for documented hemoconcentration events. Each hemoconcentration event was then studied closer to examine for amount of fluid removed during hemoconcentration, adverse events during and after hemoconcentration, changes in ECMO flow rates before and after the hemoconcentration event, and chemistry and iStat labs were compared before and after the hemoconcentration event. Once the average pre and post values were calculated, the results were analyzed using a t-test and a Wilcoxon Rank Sum.

After review, 75 hemoconcentration events were identified. Out of these, one adverse event was recorded showing hypotension and decreased ECMO flow rates. The average event removed 1.2 L of dilute fluid. Hemoconcentration was performed in both VA and VV ECMO patients with a wide variety of pathophysiologies. ECMO flow rates, chemistry and iStat labs showed on average no difference.

The potential benefits of hemoconcentration during ECMO include the ability to rapidly correct hypervolemia and the ability to maintain hemoconcentration without significant blood transfusion. However, hemoconcentration could result in rapid fluid shifts, electrolyte derangement, and hemodynamic instability in an already unstable patient. This data presented here supports the idea that hemoconcentration when can be safely used during ECMO without significant adverse events. Further and larger studies are needed to better understand the effect of hemoconcentration during ECMO.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

The Accuracy of Video Capsule Endoscopy to Detect Upper Gastrointestinal Hemorrhage in the Emergency Department: A Systematic Review and Meta-Analysis

Gastrointestinal (GI) hemorrhage is a common presentation in US emergency departments (EDs), accounting for about 243,675 visits in 2014. The standard of care for patients presenting to the emergency room with symptoms of Upper Gastrointestinal Bleedings (UGIB) is admission to the hospital, followed by an in-patient esophagogastroduodenoscopy (EGD). Due to the inadequacy of current risk stratification tools, nasogastric lavage and Glasgow Blatchford Score, majority of the patients are inappropriately triaged for admission, resulting in increased patient load and cost of healthcare. Video Capsule Endoscopy (VCE) is an emerging technology which conducts live readings of patient's gastrointestinal tract, thereby allowing detection of any lesions. This systematic review aims to synthesize data from pre-existing studies in the ED, to assess the accuracy of VCE in detecting upper gastrointestinal hemorrhage compared to the gold standard, EGD. A comprehensive systematic search following the PRISMA criteria for Diagnostic Tool Accuracy was conducted on PubMed, Scopus, and Cochrane CENTRAL independently by two authors. This process yielded 40 studies, and based on the inclusion and exclusion criteria, five studies were included in the review and meta-analysis, comprising of 193 patients total. All the studies must have occurred in the ED focusing on VCE as the index test and EGD as the reference test for the detection of UGIB. Further, data such as patient characteristics, type of study, sample size, sensitivity, specificity, and time to EGD was extracted from the studies. Methodological quality for the studies was found to be fair using the QUADAS-2 tool. The summary estimates of sensitivity and specificity were 0.724 and 0.748, respectively. The DOR was 6.293 (95% CI: 3.23-12.25), and using the Bivariate Model, the AUC was 0.782. This review was limited in part due to the quality and quantity of studies included. Three of the five studies included in the review had small sample sizes (less than 35 patients). Further, EGD should be ideally performed immediately after VCE due to the dynamic nature of gastrointestinal lesions; however, the variability in time may reflect the discrepancy between the two modalities. This review suggests that VCE has the potential to serve as a better risk stratification tool in the ED for UGIB; however, large-scale randomized trials will be needed to better understand its accuracy.

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Presentation of Idiopathic Intracranial Hypertension with Sensorineural Hearing Loss

Objectives: To determine the sensorineural hearing loss (SNHL) pattern in patients with idiopathic intracranial hypertension (IIH).

Study Design: Retrospective chart review.

Methods: A review of patients with IIH diagnosis and available audiograms. Otologic complaints, hearing threshold and opening pressures were documented before and after intervention. Correlations between opening pressure and hearing thresholds were analyzed using Spearman's rank correlation coefficient due to the non-parametric nature of our data.

Results: Forty two patients (mean age = 42.4) were included in the study, 35(83%) of whom were female. The most common otologic symptoms reported were tinnitus in 24 (57%, 14 pulsatile and 10 non-pulsatile), aural fullness in 13 (31%), vertigo in 4 (10%), and facial spasms in 3 (7%) patients. Twenty-nine patients (69%) had some form of hearing loss (threshold over 20dB) of which 17 (40%) were bilateral. The hearing ranged from normal to profound hearing loss, and no specific pattern (low, central, high frequency or flat) was statistically significant in unilateral or bilateral patients. Two patients presented with sudden SNHL and four had normal retinal examination. In three patients hearing thresholds improved with treatment. There was no statistically significant correlation between opening pressures and hearing thresholds, except for air conduction on the left ear ($p=0.0059$).

Conclusions: IIH does not present with any pattern of hearing loss and may present as unilateral, bilateral, mild to profound or even as sudden SNHL.

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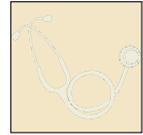
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Getting to the Heart of the Matter: A Case of Seronegative Antiphospholipid Syndrome

A 52-year-old gentleman with past medical history of lupus nephritis, non-ST-elevation myocardial infarction, venous thromboembolism (on anticoagulation), and peripheral vascular disease requiring arterial bypass grafting presented to the hospital with two days of left toe pain, fever and chills. Physical exam demonstrated gangrenous changes of the left second toe as well as nontender, nonblanching erythematous macules along the plantar surface of the foot. Laboratory evaluation revealed prolonged partial thromboplastin time and elevated inflammatory markers without leukocytosis. Infectious serologies and final blood cultures were negative. Hypercoagulability studies, including antiphospholipid antibody titers and lupus anticoagulant, were normal. On imaging, he was found to have a patent bypass graft but was noted to have a 2.5-cm vegetation on the tricuspid valve. He had no atrial septal defect. Intravenous antibiotics were initiated for 4 weeks without resolution, and the patient underwent surgical tricuspid valve replacement and toe amputation. Intraoperative pathology was notable for sterile vegetation and toes with arterial thrombus but no vasculitis nor organisms on Gram stain or final culture.

Antiphospholipid syndrome (APS) is a hypercoagulable state which often occurs secondary to systemic lupus erythematosus (SLE). The diagnostic criteria for APS require the presence of at least one clinical and one laboratory criterion. Clinical criteria include vascular thrombosis or pregnancy morbidity and laboratory criteria include the presence of lupus anticoagulant, anti-cardiolipin, or anti- β 2-glycoprotein. APS also predisposes to the development of sterile thrombotic Libman-Sacks endocarditis, which most commonly affects the mitral valve. Seronegative APS (SN-APS) is diagnosed when clinical criteria are met but serologic testing is negative. Testing must be performed outside the contexts of acute thrombosis and treatment with anticoagulation, as these conditions can cause a transient loss or consumption of antiphospholipid antibodies. This patient's case was unusual for several reasons. His Libman-Sacks endocarditis was located on the tricuspid valve, a rare presentation. Moreover, his toe ischemia was the result of an arterial thrombus rather than embolism or ischemia from graft stenosis. Given his extensive history of hypercoagulability in the setting of known SLE, thrombosis secondary to SN-APS was the unifying diagnosis.

APS is a hypercoagulable state associated with SLE. It confers increased risk of developing Libman-Sacks endocarditis as well as peripheral thrombotic events which may mimic other clinical entities such as limb ischemia or embolism. It is a clinically important diagnosis to consider in patients with clinical manifestations of the syndrome but persistently negative serology.

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An Investigation of the Relationships between Chronic Pain, Insomnia, and Psychiatric Disorder

Objective: To investigate the role of underlying sleep and psychiatric disorders to the pain-sleep relationship.

Introduction: Recent literature suggests sleep disturbance is one of the most prevalent complaints among chronic pain patients. Small studies have shown a positive correlation between sleep and chronic pain with some even suggesting a reciprocal relationship between the two. There is little research describing how to treat insomnia in this patient population or how psychiatric conditions affect this pain-sleep relationship.

Methods: 91 patients from the GW Spine and Pain Center were prospectively surveyed using the Brief Pain Index and the Insomnia Severity Index. Using statistical methods, we compared the sleep and pain indices and this relationship to the presence of a psychiatric disorder.

Results: Using Pearson correlation, there was a statistically significant correlation between the BPI to the ISI. Each increase by one point on the average of selected items on the BPI was associated with a 1.2 point rise in the total ISI. This pain-sleep relationship was then compared using a regression model to the presence or absence of an underlying psychiatric disorder. The data indicated that this pain-sleep association was similar regardless of whether the patient had a psychiatric diagnosis.

Conclusions: The data presented here continues to support the ongoing evidence that sleep disturbance and chronic pain are positively correlated. These results show that the presence of a psychiatric disorder does not influence the pain-sleep relationship. Future studies are necessary to understand more about the bidirectional relationship of sleep and chronic pain.

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Do Distinguishing Imaging Characteristics Exist Between Plunging Ranulae and Cervical Lymphatic Malformations?

Lymphatic malformations (LM) are congenital anomalies of the lymphatic system that present as cystic masses, while plunging ranulae (PR) are mucus extravasation cysts of the sublingual gland (SLG) that plunge below the mylohyoid muscle. LM and PR are managed differently, with sclerotherapy and SLG excision respectively. Pre-operative differentiation between LM and PR is challenging, requiring intraoperative aspiration for definitive diagnosis.

The primary objective of this study was to determine if LMs and PRs demonstrate unique ultrasound imaging (US) or magnetic resonance imaging (MR) characteristics that would enable reliable pre-operative differentiation in a pediatric population.

Imaging and clinical features of PRs treated at our institution between 1/1/2008 and 8/1/2018 by the otolaryngologist or interventional radiologist were compared to a cohort of cervical LM's to determine if distinguishing radiologic characteristics exist. The following characteristics were compared of pre-operative imaging: complexity of fluid on US, unilocular fluid body on US, Hyperintensity on T2-weighted MR, involvement of SLG on MR, breaching of mylohyoid plane on MR, "Tail Sign" on MR, and diffusion study on MR. This is a descriptive study since the rarity of the condition prevented statistical analysis.

Fifteen PR patients were identified: 3 US, 6 MRI, and 1 MR diffusion study were available. Nine submandibular LM patients were identified: 6 US, 6 MR, and 2 with MR diffusion studies were available. Both PR and LM US displayed complex and simple fluid behavior. PRs were unilocular, while LMs were unilocular or multilocular. PR and LM were uniformly hyperintense on T2 Fat Saturated MR. PR always communicated with SLG, while LM did or did not. Both PR and LM can cross mylohyoid muscle plane. Both PR and LM can demonstrate a "tail-sign". Both PR and LM demonstrate diffusion on imaging.

Definitive distinguishing imaging criteria between PR and LM were not found in this study, although trends were noted. While imaging studies are useful to determine the extent of disease and to exclude other anomalies, this study shows that differentiation of LMs versus PRs is difficult without aspiration of fluid.

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Quality of Life Outcomes Following Surgery for Velopharyngeal Insufficiency

Velopharyngeal insufficiency (VPI) alters speech quality and intelligibility which can compromise verbal communication. Treatment of VPI begins with a trial of targeted speech therapy, but the majority of patients with severe insufficiency require surgical intervention. Multiple techniques are utilized, but no evidence exists demonstrating significant differences in quality of life outcomes. Additionally, there is little data identifying preoperative factors associated with outcomes following surgical VPI repair.

The Velopharyngeal Insufficiency Effects on Life Outcomes (VELO) survey is a 26-question parental proxy survey assessing quality of life measurements including speech, swallow, emotional impact, perception by others, and caregiver impact. VELO has been validated as an effective measure with high internal consistency and test-retest reliability in English and Spanish. We used the questionnaire to determine which preoperative factors correlated with higher VELO scores following corrective surgery.

In our IRB approved study, we identified 51 eligible patients and categorized them by presence/absence of genetic syndrome, presence/absence of submucous cleft abnormality (SMC), severity of hypernasality, and surgical technique. We called parents to administer the VELO survey in English or Spanish.

We received 26 responses. Eleven of these patients were male and 15 were female. The average age at surgery was 9.4 years. Analysis of VELO scores between patient groups revealed a significantly higher average among non-syndromic patients compared to their syndromic counterparts (83vs69, $p=0.043$) specifically in subcategories of speech ($p=0.030$), swallow ($p=0.022$), and caregiver impact ($p=0.008$). There was no significant difference in VELO score between surgical techniques, patients with/without submucous cleft abnormalities, or with mild-moderate versus severe hypernasality of speech. Quality of life in this cohort of patients was improved in patients with non-syndromic VPI after surgery. This is not unexpected, as their syndromic counterparts have comorbidities which may impact the VELO results despite correction of VPI. Surprisingly, there was no difference in VELO between patients with/without SMC. We expect a repaired anatomic abnormality to show higher improvement than functional abnormalities postoperatively. This could be explained by a low sample size as well as confounders including length and intensity of speech therapy. Limitations to this study include subjectivity in analyzing parents' attitudes, which may be discordant with patients' perceptions of their condition. Furthermore, retrospective collection of VELO scores at different times postoperatively predisposes to recall bias. Prospective research is necessary to explore impacts of medical and surgical therapies in different patient groups to optimize quality of life in children with VPI.

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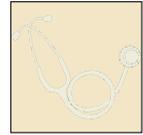
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Evaluation of a Virtual Reality Intervention on Fatigue, Alertness, Stress among Emergency Medicine Residents

Virtual reality (VR) has shown promise as a tool in medical education. Our study aims to examine application of VR on anxiety, stress, confidence, alertness and fatigue of clinicians during an ER shift.

We prospectively enrolled a convenience sample of EM resident volunteers. We gave them ten-minute breaks halfway through their shifts; the break was either “wild type” (WT) during which they did whatever they chose or an immersive VR activity. We used a Samsung Gear Headset with games, travel, and relaxation content from AppliedVR. Residents were surveyed on their alertness, stress, anxiety, confidence, and fatigue at the beginning, before and after their break, and end of shifts (day, evening or swing). A Psychomotor Vigilance Test was given at each interval to objectively measure alertness. Various statistical analyses such as factorial design, time series, linear and logistic regression, categorical and t-test were used to analyze the data.

We measured 115 events. Resident demographics were a mean (+SE) age of 31.7(+1.34), 55.6% female and 55.6% white. The incidence of Lapses was significantly associated with Break Time ($p=0.036$), resident ($p=0.002$), and shift ($p=0.031$) but not the intervention ($p=0.21$). It was negatively correlated with efficiency ($r=-0.85$, $p<0.000$) and positively associated with Mean Response Time ($r=0.85$, $p<0.000$). Efficiency was significantly associated with the resident ($p<0.000$) and Break Time ($p=0.008$) but unrelated to intervention ($p=0.82$). Similar results were obtained (using factorial analysis of variance) for anxiety, stress, and alertness. Fatigue was not associated with shift, $p=0.42$, but significantly associated with break time ($p=0.002$) and intervention ($p=0.05$). Specifically, the residents being exposed to WT had significantly lower fatigue levels after adjusting for other factors (4.38 vs. 5.18, $p=0.05$)

Due to large variations in this small pool of residents, we did not see any significant effects of the VR intervention; however, after adjusting for other confounding variables, the intervention had some effects on fatigue and warrants further investigation.

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Longitudinal Follow-Up of Patients Enrolled in the STOP Scleroderma Biorepository

Scleroderma is an autoimmune disease characterized by inflammation, vasculopathy, and fibrosis. The purpose of this study was to investigate longitudinal outcomes and assess clinical differences in a cohort of patients with limited and diffuse scleroderma.

This research was conducted via the STOP Scleroderma Study, a biospecimen and data repository approved by The George Washington University IRB (051427). All subjects gave written informed consent for longitudinal collection of their data.

Of the 84 scleroderma patients enrolled in the STOP scleroderma study at the time of data lock, 37 fulfilled criteria for limited and 19 fulfilled criteria for diffuse scleroderma. Data were collected on demographics and baseline disease activity including skin score, scleroderma health assessment questionnaire disability index (SHAQ-DI), gastrointestinal (GI) score, physician global assessment, and the Medsger severity score. Data were analyzed using GraphPad Prism (version 7.0).

There was no significant difference in age or gender in the diffuse and limited scleroderma cohorts (52.40 ± 12.72 years and 84% female) compared to (57.36 ± 14.48 years and 78% female), respectively ($p = 0.21$) and ($p = 0.27$); or in race ($p = 0.41$). Gastrointestinal involvement was similar in diffuse (0.48 ± 0.38) and limited scleroderma (0.50 ± 0.55 , $p = 0.90$).

As expected, the diffuse patients had higher Medsger Severity Score, (5.68 ± 2.58 compared to 3.20 ± 1.98 in limited, $p = 0.0002$); and SHAQ-DI, (0.87 ± 0.74 in diffuse compared 0.40 ± 0.51 in limited, $p = 0.013$). Physician reported assessments also demonstrated a significant difference in the two cohorts including physician global assessment diffuse (3.63 ± 1.46) and limited (2.08 ± 1.25) ($p=0.0001$); and skin score for diffuse (4.89 ± 1.73) and limited (2.03 ± 1.31) ($p=.0045$).

In this cohort of patients with diffuse and limited scleroderma, there were a number of quantifiable patient outcomes that correlated with disease activity. Ongoing longitudinal follow up of this cohort is planned.

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Incidence of Fractures Requiring Orthopedic Operative Intervention Following Electric Scooter Injuries

Standing electric scooters became widely popular and increasingly available as an inexpensive and easy mode of transportation in the United States in September 2017. Regulation and safety guidelines established by electric scooter companies and government agencies vary greatly, and serious injuries have subsequently followed the rise in use of these devices.

The objective of this study is to determine the incidence, severity, and outcome of orthopedic injuries related to standing electric scooter usage.

This study is a case series of all patients sustaining injuries attributed to electric scooter usage requiring orthopedic consultation at George Washington University Hospital between January 1, 2018 and December 31, 2018. The main outcomes include the type and severity of these injuries, definitive treatment, and the estimated cost to the health system.

10 patients were identified as sustaining injuries directly relating to electric scooter usage that required orthopedic consultation at GWUH between January 1, 2018 to December 31, 2018. Eight patients underwent operative fixation; three patients sustained upper extremity fractures and five sustained lower extremity fractures. Those injuries included two distal radii fractures, one humeral shaft fracture, one ankle fracture, one ankle fracture with dislocation, one tibial plateau fracture, and one tibia/fibular shaft fracture. Two patients were treated definitively without surgical treatment. Two patients were kept inpatient for their injuries and underwent fixation in the acute setting. Six patients were stabilized at the time of injury and discharged with scheduled follow up for outpatient surgical fixation. Two patients did not require surgical treatment and were treated definitively prior to discharge and follow up.

Orthopedic injuries secondary to electric scooter usage are increasing in prevalence as the devices become more available and popular. The severity of orthopedic injuries varies from definitive care in the emergency department to requiring operative fixation and inpatient admission at the hospital. These findings may contribute to more standard regulation and safety guidelines for safe electric scooter usage.

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Orthopaedic Injuries Related to the Segway® Personal Transporter™

As the Segway® personal transporter™ (SPT) gains popularity, observational studies have increasingly reported on injuries sustained by both SPT operators and bystanders. We investigated injuries related to SPT use over a five-year period.

A prospective trauma database was retrospectively analyzed to identify patients admitted to the Emergency Department with injuries sustained as a result of a fall from a SPT at a Level I trauma institution in an urban setting. Pertinent patient information was compiled and injuries were cataloged and classified. The percentage of orthopaedic injuries were identified and stratified by gender, age, anatomic location and operative versus non-operative treatment.

Fifty-seven patient visits were identified. Of these, 40 (70%) suffered a fracture, dislocation, and/or tendon rupture, 18 (45%) of which required surgical intervention. The average patient age was 55.1 years, with 47 females and 10 males ($P < 0.01$). Males who suffered injuries were older than females (62.4 vs. 53.6 years respectively, $p = 0.01$), while no difference was observed in the percentage of males and females requiring surgery (30% male vs. 34.1% female, $p = 0.8$). Twenty-one injuries (50%) were upper extremity injuries, 14 (33.3%) were lower extremity injuries, four (9.5%) were pelvic injuries, and three (7.1%) were injuries to the spine ($p < 0.01$). Nine patients experienced multiple fractures, seven of which occurred at the same body location (i.e. same upper extremity, same lower extremity), two occurred in different body locations. Length of stay for patients requiring surgical management for injuries was significantly longer than those managed non-operatively (4.6 days vs. 1.7 days, $p < 0.01$).

Patient visits to a Level I trauma institution were identified with injuries related to SPT use. A majority of patients injured using a SPT sustained a fracture and/or dislocation. Injured patients were of middle age, predominately women and often required surgical intervention.

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Developing a Method to Objectively Assess Sensory Nerve Fiber Sensitivity: A Pilot Study

The rate of chronic pain in the United States is greater than the combined rates of diabetes, heart disease, and cancer, with associated healthcare costs ranging from \$560-\$635 billion per year. It is imperative that an objective assessment tool be developed to ensure adequate pain evaluation and appropriate analgesic intervention is provided to patients experiencing chronic pain.

Pupillary reflex dilation (PRD) occurs when an alerting stimulus activates peripheral nociceptive fibers and elicits pupillary dilation. Preliminary data indicates that a unique PRD (nPRD) can be produced by depolarizing sensory nerves fibers via non-noxious neurospecific electrical stimuli at particular frequencies. The area under the curve (AUC) of the nPRD reflects nerve fiber sensitivity and the amplitude correlates with pain self-report. These findings suggest that the nPRD has potential utility in the objective assessment of pain characteristics.

In this pilot study of healthy adult subjects, infrared pupillometry was used to evaluate whether the nPRD was reflective of known differences in nerve fiber physiology under tourniquet-induced ischemic conditions. At a baseline state, activated, myelinated A β touch fibers inhibit the transmission of presynaptic pain signals by unmyelinated, nociceptive C-fibers to diminish pain sensation. In an ischemic environment, A β fibers are not activated and thus no suppression of C-fiber transmission occurs. We hypothesized this phenomenon could be quantified by the nPRD AUC.

Baseline nPRD measurements for each fiber type were assessed using perception intensity at a specific activating stimulation frequency (C fiber at 5 Hz, A δ at 250 Hz, and A β at 2000 Hz). A tourniquet was placed on the subject's upper arm and nPRD measurements were repeated at 5-minute intervals. The tourniquet was removed at 20 minutes and final measurements were taken during reperfusion.

Five subjects demonstrated the hypothesized outcome. At 12 minutes after tourniquet placement, the A β nPRD AUC was diminished while the C-fiber nPRD AUC was significantly increased from baseline. This suggests that ischemia resulted in removal of A β regulation and disinhibition of the C-fiber. During reperfusion, the C-fiber nPRD AUC decreased towards baseline indicating a return of A β suppression and the A β nPRD AUC increased to reflect heightened sensitivity. For all five subjects, there was a significant difference between the A β nPRD AUC values ($p=0.024$) and a difference trending towards significance between the C-fiber nPRD AUC values ($p=0.091$) at the three time points. These results indicate that the nPRD method is able to detect modulation of nerve fiber sensitivity.

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Post-Operative Complication Rates after Gender-Affirming Surgery – Are They Affected by Human Immunodeficiency Virus (HIV) Status?

The role of human immunodeficiency virus (HIV) on surgical outcomes has had a controversial past. While several surgical subspecialties have published data on related peri-operative outcomes, the plastic surgery literature is particularly sparse on outcomes after elective surgery in the HIV-positive population. In our practice, transgender individuals comprise the largest subset of HIV-positive patients. This is consistent with epidemiological surveys suggesting a disproportionately higher rate of HIV infection (22% according to a recent meta-analysis) in the transgender population with multi-factorial attribution.

The goal of our study was to elucidate the role of human immunodeficiency virus (HIV) on surgical outcomes after elective plastic surgical procedures. We thus performed an IRB-approved, retrospective review of our recent experience at a single, tertiary-care center in patients undergoing gender affirmation surgery between January 2015 and December 2017. Of the 138 patients who underwent gender affirmation surgery, 48 (34.8%) carried a diagnosis of HIV compared to 90 (65.2%) patients who did not. There were minimal complications in the HIV-positive cohort. One patient in each cohort experienced delayed wound healing after mastopexy (OR 1.00; 95% CI 0.045-22.17; $p=1.00$). Two patients had delayed intraoral wound healing after facial feminization procedures in the HIV-positive cohort compared with no patients in the HIV-negative cohort (OR 4.70; 95% CI 0.21-105.80; $p=0.33$). There were no other cases of delayed wound healing, infection, hematoma, DVT/PE, or required explantation or reoperation in HIV-positive patients during the study period. The findings suggest no significantly higher risk for post-surgical complications in the well-controlled HIV-positive patient population undergoing gender affirming surgery of the chest or face. Thus, the higher rate of HIV among transgender individuals does not affect early post-operative complications in those seeking gender affirming surgery of the face and chest, and HIV-positive status should not influence surgical decision making.

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Opioid Prescribing Patterns for United States Military Veterans with a History of Musculoskeletal Injury

Military Veterans are at-risk for musculoskeletal injuries (MSKI) and opioid misuse. Opioid prescription rates increase with age; thus, age is important to consider in this high-risk population. Morphine milligram equivalents (MMEs) allow for comparisons between opioids of varying potencies. Currently, no studies describe the opioid prescribing patterns for different age groups of Veterans with MSKIs treated within the Veterans Health Administration (VHA). Thus, we determined the opioid prescription rates by age group and the MME rates per beneficiary. Understanding opioid prescribing patterns for this at-risk population is essential to combat the opioid epidemic. A retrospective review of VHA Managerial Cost Accounting including the National Patient Care Database was queried to identify VHA Veterans with ≥ 1 MSKI diagnosis ($n=4,455,335$) from FY2013-2015. Opioid prescriptions (count) for these Veterans and associated information (medication, dose) were abstracted from the Treating Specialty and Outpatient National Data Extracts Database. Prescribed MMEs were calculated. VHA beneficiaries were stratified by age group. Rates and 95% confidence intervals (CI) were calculated for opioid prescriptions and MMEs per VHA beneficiary age group. Prescription and MME rates were compared between age groups; 95% CIs not overlapping with another age group were considered significantly different. VHA Veterans ($n=4,455,335$; males=90.9%) diagnosed with an MSKI during the study period were provided with 21,064,631 opioid prescriptions. Opioid prescription rates differed between all age groups (lowest-to-highest: <25 [0.30 prescriptions/beneficiary; 95% CI: 0.29, 0.30], 95+, 85-94, 25-34, 75-84, 35-44, 65-74, 45-54, 55-64 [2.09 prescriptions/beneficiary; 95% CI: 2.09, 2.09]). MME rates per beneficiary differed between all age groups (lowest-to-highest: <25 [5.35 MMEs/beneficiary; 95% CI: 5.34, 5.36], 95+, 84-94, 75-84, 25-34, 35-44, 65-74, 45-54, 55-64 [41.06 MMEs/beneficiary; 95% CI: 41.05, 41.06]). Veterans aged 45-74 receive the majority of opioid prescriptions amongst Veterans with MSKI within the VHA. These findings concur with previous studies. Individuals who receive >50 MME/day have greater risk for opioid overdose. None of the age groups exceeded this threshold; however, the 55-64 group was close. Our study identified a high risk sub-population (55-64 group) within an already at-risk population; this information can help clinicians be more cognizant when prescribing opioids and help mitigate the opioid epidemic.

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DRUG ABUSE



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Implementing Medication Assisted Treatment in Harm Reduction Organizations: A Review of Current Literature and Recommendations

The opioid epidemic remains one of the most pressing public health issues in the United States, with 2.1 million Americans meeting the criteria for opioid use disorder (OUD). Medication assisted treatment (MAT) has been shown to be an effective long-term treatment for OUD and has demonstrated improvements on quality of life and reduction of health care utilization among people who use drugs. MAT can be successfully delivered to marginalized populations of low socioeconomic status through community-based, harm reduction agencies. Harm reduction agencies also have the benefit of being able to provide wrap-around services that can address socioeconomic factors that preclude access and adherence to treatment. However, despite the evidence, access to treatment remains difficult for marginalized communities, and barriers such as unstable housing or recent release from incarceration are associated with subsequent treatment failure. Expanding access to MAT through harm reduction agencies can provide non-judgemental, non-coercive care for marginalized individuals with OUD while addressing barriers to continued therapy.

The objective of this narrative review was to investigate the current published literature on the feasibility and efficacy of offering MAT services at harm reduction organizations, particularly targeted at marginalized and vulnerable populations.

We searched PubMed and MEDLINE for published literature on the feasibility and efficacy of offering MAT services at harm reduction organizations, particularly targeted at marginalized and vulnerable populations.

The literature found in this review centered on three common themes. First, the literature shows that syringe exchange programs, a common service offered at harm reduction organizations, can be a means to improve access to medication assisted treatment for marginalized populations. A second theme found in the review is that familiarity with an organization can be a protective factor in retaining marginalized populations in long-term treatment, emphasizing the harm reduction principle of "meeting people where they're at." Finally, the literature demonstrates that harm reduction agencies and community based organizations can possibly improve retention for marginalized populations if they offer wrap-around services.

With the findings of this review, we see promise in offering MAT services in harm reduction organizations. By developing treatment in familiar community environments that emphasize the principles of harm reduction, we can address treatment barriers, give patients agency in their treatment, and serve those unable or unwilling to receive care elsewhere by addressing and reducing stigma. Future studies should further examine long-term treatment outcomes of patients utilizing this integrative approach.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Motivational Interviewing to Treat Substance Abuse Disorders in the Emergency Department: A Scoping Review

Motivational Interviewing (MI) is a patient-centered counseling style for eliciting behavior change. Unlike traditional counseling, which focuses on a pre-determined therapeutic agenda, MI emphasizes the patient's individual goals and attempts to identify individual behavioral patterns that may impede one's ability to accomplish those goals. Prior studies of MI have demonstrated its effectiveness in treating substance abuse in primary care settings after only brief interventions. The effectiveness of MI in the emergency department (ED) has not been definitively established.

The methodological frameworks that contributed to the scoping review were a completion of five steps outlined by Arskey and O'Malley (2005) and the Joanna Briggs Institute Reviewers Manual Methodology for JBI Scoping Reviews (2015). A search strategy was implemented using PubMed, Scopus, CINAHL, and greylit.org resulting in 18 articles to be included for the full analysis. The initial search identified 164 studies after the removal of duplicates. 128 studies were excluded on the basis of title and abstract. 36 full texts were assessed for eligibility and 18 were included for full analysis.

MI holds great promise as an ED-based intervention due to the brief nature of the intervention and the high prevalence of patients with substance abuse disorders in the ED.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES, VETERANS AFFAIRS MEDICAL CENTER

It Takes a Village to Care for an Older Adult: Update on Senior Villages in Washington, DC

Senior Villages are neighborhood organizations designed to bring resources to help older adults age in place successfully. The first village started in 2001 in Boston's Beacon Hill neighborhood. Today more than 200 are in operation in 45 states and the District of Columbia.

Five geriatric fellows surveyed senior villages in DC via website information and telephone interviews. Queries focused on village history, geographic distribution, membership criteria, services offered, types of financial support, and challenges.

18 DC senior villages were identified including Capitol Hill, Mount Pleasant, Palisades, Woodley Park, Dupont Circle, Georgetown, Foggy Bottom, East Rock Creek, Glover Park, Northwest Neighbors, Waterfront, Kingdom Care, Pennsylvania Avenue and Southeast. Three villages are new in the past three years, and at least two villages, Legacy Collaborative and Ward 7 serve low socioeconomic areas. Annual membership fees range from \$50 to \$625 for individuals and \$100 to \$945 for households. One village has no fees at all. Various levels of financial aid are available and range from full scholarships to sliding-scale membership, and a 60-day trial membership. Membership restrictions included geographic location, age, or certain criteria such as cognitive impairment. Villages depend on volunteers to provide services, and each village has anywhere from 30 to 350 volunteers. All villages offer basic household services, transportation, technological support, wellness programs, recreational and socialization activities. Some villages offer medical note-taking and advocacy. The DC Office on Aging at the Department of Health provides support and guidance on how to start a village. Common challenges include funding, meeting needs of cognitively impaired members and the need for more volunteers. A few villages partner with medical house-call programs.

Senior villages continue to expand in Washington DC and offer various support services for older adults in the community. The socioeconomic status of the neighborhood appears to be an important determinant of senior village presence.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Survey of Medical Student Perceptions and Preparedness on the Study of Medical Cannabis During Medical School

Professional education on medical cannabis lags behind its growing public interest and increasing legal availability. The Cannabis as Medicine Interest Group at GW SMHS believes future physicians should be prepared to handle patients' questions about cannabis as it relates to their health and well-being. This study investigated the extent to which medical students wish to learn about medical cannabis and assessed their subjective preparedness to counsel patients on this topic.

105 allopathic medical students completed an online survey on their learning about medical cannabis in medical school. All participants attended medical school here at GW.

Participants were spread across all four years of medical school; 37.1% were first-years, 20% were second-years, 21.9% were third-years, and 21% were fourth-years. Sixty-percent of participants claimed that they have received no cannabis education in medical school, and 38.1% endorsed "a little bit." Only two participants (1.9%) endorsed "a sufficient amount," and zero responded that the topic was "frequently covered." When given the statement "I believe there should be more formal education on medical cannabis in medical school classes," 30.5% strongly agreed, 46.7% agreed, five participants (4.8%) disagreed, and one participant strongly disagreed. Most respondents (55.2%) had encountered a patient who was curious about medical cannabis. Most felt "not at all prepared" to counsel patients on the health benefits (57.1%) or risks (54.3%) of cannabis use; 4 participants (3.9%) felt "prepared" or "very prepared" to discuss the benefits, and 14 (13.3%) felt "prepared" or "very prepared" to discuss the risks.

It is overwhelmingly clear that the medical students in this study are not comfortable with their level of medical cannabis knowledge and would like to learn more while in medical school. Given the lopsided nature of these results, despite the legal "cannabis-friendly" location, the authors of this study think that it is reasonable to assume that most medical students across the country also feel similarly, although further work is needed to confirm this. As legal medical and recreational cannabis likely becomes more accessible throughout the US, medical schools and medical education regulatory bodies should be urged to strongly consider adopting standards for cannabis education to ensure that the future physicians can provide the best possible patient care. This survey clearly demonstrates there is a need to increase undergraduate medical education on this topic.

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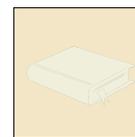
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

An Examination of the Flipped Classroom's Efficacy on Post-Baccalaureate Pre-Medical Students

Existing flipped classroom (FC) research focuses on a typical, homogenous student population in terms of age. Research focuses on student satisfaction and perception of the FC to assess if student performance translates to actual perceived learning. Further, a growing number of studies show that outcomes of FC depend on student motivation. This study examines student performance, perception, and satisfaction in the FC in a novel demographic: Post-Baccalaureate Pre-Medical students. These students, who vary widely in age, experience, and prior knowledge of subject matter, are career changers who become full-time students to complete prerequisite coursework for medical school. Students enrolled in the undergraduate Biology course in GWU's Post-Baccalaureate Pre-Medicine program were taught by the same instructor for this study. 17 students (Cohort 1), enrolled in 2017-2018, had a traditional classroom with a three hour didactic lecture. 30 students (Cohort 2), enrolled in 2018-2019, had the flipped classroom with 50% less didactic lecture time and more active and independent learning. End-of-course evaluations, pre and post quizzes, exam performance, and overall course grades were compared between cohorts. Course perceptions from evaluations were also compared, and Cohort 2 completed an additional survey on their perceptions of the FC. Results show that students were between ages 20 and 40 years of age for both cohorts. Student performance on exams and overall course grades did not vary significantly between the cohorts. FC components such as pre- and post- quizzes were perceived as significantly useful ($p < .01$) and were often found to be engaging and most beneficial in promoting understanding. FC components viewed by students as really useful for exam preparation included pre-quizzes (68.96%), post-quizzes (82.75%), and jeopardy (51.72%). Components viewed by students as really useful for concept comprehension included pre-quizzes (42.85%), post-quizzes (57.14%), and questionnaire worksheets (58.62%). Group work was also viewed by 51.72% students as useful for concept comprehension. Student comments between cohorts indicated that students almost universally desired to maintain a lecture component to their learning. Surprisingly, course evaluation data further showed most students in both cohorts viewing lectures as contributing most to their learning over other class activities. This seems contrary to the majority of the current literature on student learning. These results suggest that student motivation and engagement are important factors in assessing student comprehension, and understanding the influence of these factors in learning methods could alter how instructors approach and effectively structure courses to increase student satisfaction.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Intimate Partner Violence Curriculum at GW

Domestic violence is identified as a global epidemic, where 1 in 3 women throughout the world will experience physical and/or sexual violence (WHO 2013). Medical education research around the world has included DV curriculum studies to determine how to most effectively train medical students to understand, screen, and manage DV (Wathen et al. 2009) (Daniel and Milligan 2013)(Ogunsiji and Clisdell 2017). However, the published studies target varying healthcare specialties, trainee age groups, and study design, thus rendering comparison of specific curriculum inclusions statistically unattainable. Instead, this literature review identified common themes in the conclusions drawn from various studies to isolate reasonable, measurable learning objectives, and compare them to the current DV curriculum design for The George Washington University School of Medicine and Health Sciences undergraduate medical education. 22 papers were obtained primarily through a general search of Scopus database using keywords “intimate partner violence”, “domestic violence”, and “curriculum”. Though there is a recent trend for DV curriculum research to utilize the Physician Readiness to Manage Intimate Partner Violence Survey adapted to survey medical students, other studies used Likert-type scale surveys or reflective journal entries. Common factors of evaluation included: students’ perceived confidence in screening, treating, and counseling DV victims. Regarding the efficacy of DV curricula to medical students and other training healthcare providers, two common themes were identified: a need for an enhanced student-perceived relevance of DV curriculum, and a need for a more longitudinal curriculum across the undergraduate years. Currently, GWU SMHS medical students are not evaluated on their perceptions of the DV curriculum—one that is restricted to a standardized patient didactic in the second year, and lacks any additional formal training in clinical rotations. Next steps for GWU SMHS include quantifying student competency and implementing a more longitudinal DV curriculum to prepare future providers for the DV epidemic.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Designing a Simulated Clinic to Supplement Recruitment and Leadership Training

Every year, our clinic faces challenges with training new volunteers in time for the official handoff of clinic operations and maintaining patient care at the current standard. Many student-run free clinics experience similar challenges given the intensity of medical school education and the limited terms of clinic leadership. Taking on this role can be overwhelming as many students have been to fewer than two clinic nights themselves prior to the leadership transition.

The strengths of the training included aspects specific to our clinic, including blood draw protocol, the referral process within our Patient Navigator program, and how a clinic night flows. Weaknesses to the training included broader healthcare concepts, such as a lack of increased understanding of what the overall role of a primary care provider is and limited improvement in conceptualizing healthcare delivery in an underserved setting. Overall, the main goal of the mock clinic night was focused on specifics. Additionally, students were also initially more comfortable with these broader concepts as opposed to the specific skills of the GW Healing Clinic which could have contributed to the overall limited improvement in those weaknesses.

This event was overall successful and was able to be done with limited resources. It was a great way to engage volunteers and help them to feel more comfortable in clinic during their initial shifts.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Pediatric Resident Preparedness for Neonatal Intensive Care Unit (NICU) Disasters: A Mixed Methods

NICU disaster preparedness is essential to safely care for neonates during a crisis. Pediatric residents in the NICU are essential personnel who can play critical roles in a disaster response. However, they are seldom considered in disaster protocols and disaster preparedness research. This study aimed to assess pediatric residents' preparedness, their potential roles during two NICU disaster scenarios, and determine their training needs. To meet this objective, semi-structured interviews with 10 senior pediatric trainees were used to create response choices for a survey (mixed-methods design). Questions addressed resident roles and responsibilities during NICU crises (evacuation and surge), current preparedness, prior experience and perceived training needs. Survey results were used to confirm themes from interviews. Results from the interviews showed central themes: 1) lack of prior disaster training, 2) unpreparedness for evacuation or surge, 3) importance of disaster training, 4) insufficient knowledge of NICU disaster protocols, and 5) primary role of residents as system facilitators e.g. clerical work. Of the 37 senior pediatric residents invited to participate in the survey, 30 responded (81%) (57%, 21 full completion). The survey confirmed that all residents (100%, 30) did not have prior NICU disaster training and most did not feel prepared for either evacuation (88%, 24) or surge scenarios (82%, 23) due to unfamiliarity with content (100%, 24 evacuation, 23 surge) and location of disaster protocols (100%, 23). Potential resident roles included: recruiting other residents (35%, 7), clerical work (26%, 5), and any role assigned by supervisor (21%, 4). Residents agreed that education on NICU disaster protocols (100% evacuation, 91% surge) would make them feel more prepared and most wanted to receive training (90%). Residents believed that a multipronged approach during NICU rotations (53%, 10), in the form of multidisciplinary simulations (89%, 16), a NICU disaster handbook (78%, 14) and a description of residents' roles (72%, 13) should be used. Most were willing to respond to a hospital disaster (84%, 16) but did not know their specific role (96%, 22), even though they believed they had an important one to play (84%, 16). In conclusion, pediatric residents' views on NICU disaster preparedness are quite universal and are not limited to residents who self-selected to be interviewed. Residents lacked experience but were enthusiastic to receive training and participate in disaster response. Educating residents should include NICU disaster protocols and multidisciplinary simulations during NICU rotations to allow them to contribute fully to any disaster response.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

An Evaluation Guideline for a Service-Learning Curriculum Implemented in Medical Education

The purpose of this project is to evaluate the impact of student community service activities on recall, comprehension, and application of learning objectives from the Clinical Public Health (CPH) aspects of the medical curriculum. CPH theme lectures and Summits were added to the medical curriculum at The George Washington University School of Medicine and Health Sciences (GW SMHS) in 2014. Many GW medical students perform community service during medical school through voluntary student activities such as The Healing Clinic, Whitman-Walker Health and activities of various student organizations. This project is being conducted in the context of an overall evaluation of the CPH curriculum. The specific objective of this project is to create an evaluation guideline for a Service-Learning Curriculum in medical education. This information will aid in the development of the pilot program because it will provide how the program will be evaluated on deliverables.

An initial retrospective analysis of existing literature specific to the area of service-learning curriculum within medical education was undertaken utilizing the following methods: PubMed, Himmelfarb, and Journal of Graduate Medical Education. A deficiency in this specific area was identified. Follow-up discussion with experts in the field provided an outline for critical information which was incorporated into guidelines by our team.

The evaluation guideline was designed. From the literature and advice from experts, it was emphasized that a thorough evaluation would need both qualitative and quantitative data. In the context of a service-learning curriculum, this means reflections from students and community partners as well as evaluations of perception of success from faculty. In addition to this, quantitative data will be collected in the form of a survey with statements/questions to agree/disagree from a scale of 1 to 5.

To our knowledge, this is the first evaluation guideline of service-learning curriculum in medical education that will be released for universal use. The implications of this evaluation guideline are to be used to determine the success of the implemented service-learning curriculum for GW SMHS and other medical schools.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Medical Student Perceptions on the Effectiveness of an Online, Interactive Quizzing Tool for Learning Histology and Pathology at the George Washington University School of Medicine and Health Sciences (GWU-SMHS)

A move toward blended teaching in medical school curricula often results in decreased in-class time for disciplines such as Histology and Pathology, as it has at GWU-SMHS. This study proposes to balance loss of in-class time with a self-study quizzing tool to increase medical student learning and comprehension of histology and pathology, which are foundational disciplines in preclinical organ system studies. Since many studies have shown that quizzing increases learning, we developed an online, interactive, quizzing tool that allows students to test their ability to recognize visual features and to recall information important to an understanding of histology and histopathology. This study reports preliminary results on the perceptions of medical students concerning the effectiveness of the quizzing tool as measured by survey.

Images for the quizzing tool were derived from the MicroAnatomy and Pathology Atlas (MAPA) currently used by students for studies of histology and pathology (<http://microanatomyatlas.com/>). The on-line quizzing tool was designed to display representative images without annotations or descriptions until these are activated by the student, allowing students to quiz themselves on the findings (<http://microanatomyatlas.com>). The quizzing tool was provided to students in the GWU-SMHS class of 2022 near the beginning of each system block and used by them at their discretion. On completion of the Pulmonary organ block, students are invited to complete a Google Form survey asking if and how they used the quiz tool and the extent of their use of it, with feedback about what they liked and did not like about the tool. A Likert scale (1-5 most useful) was used by students to rate the usefulness of the tool for their learning.

The quiz tool survey was completed by 29.8% of students (56/188) after the pulmonary organ system block in 2019. The quizzing tool was rated at 5 (most useful) by 60.7% of students, 30.4% rated it at 4, 7.1% at 3, 1.8% at 2, and 0% at 1. In answering the question "Did using the quizzes make you more comfortable about answering histology questions on your exam?", 96.4% of respondents answered yes (54/56).

Preliminary results find that the majority of students perceive that the quizzing tool has a positive impact on learning histology and histopathology. Future studies using the quizzing tool will include additional qualitative analysis of survey results and the impact of using the tool on exam performance.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Applying Team Science Principles to Biomedical Publications Teams: Understanding Team Effectiveness

The Science of Team Science is a relatively new interdisciplinary field of study that aims to investigate the factors that hinder or facilitate team-based research and practice, with a focus on how these factors impact scientific innovation and translation. Teams and their interactions are complex, making measurement of teams' characteristics and outcomes challenging. There is a myriad of methods used in the Science of Team Science that aid in measuring the effectiveness of biomedical teams. Bibliometric analysis is one method by which researchers have attempted to measure team effectiveness. In bibliometric studies of team effectiveness, journal, article, and author level data have been used as a proxy for assessing the value of science teams in producing new and/or integrated knowledge. This method, however, is not without its flaws, as co-authorship does not necessarily equate to collaboration and teamwork. Bibliometrics are solely quantitative and leave much to be desired regarding the qualitative interactions between teams working together on biomedical publications. These quantitative metrics cannot provide sufficient insight into the factors that facilitate team functioning, effectiveness, and quality of experience. Given this gap, this case study aimed to assess a biomedical publications team using both quantitative and qualitative methods. Bibliometric data were collected and analyzed by the author. Additionally, a team teleconference with the biomedical publications team occurred in Fall 2018, and qualitative and quantitative coding of the discussion were used to evaluate team interactions. These methods revealed that scientific impact measured by bibliometrics was relatively equal between authors, with only one author having an h-index of at least 20, suggesting no significant differences between authors' publication impacts. Coding of discussions between team members revealed positive sociopsychological dynamics and high levels of cohesion, as well as robust information sharing among team members leading to knowledge transfer and progression toward project goals. Conflict was least prominent among all types of communication, and when it did occur, it was resolved quickly. Preliminary findings from this study suggest that high levels of positive social interactions and cohesion are necessary to assembling functional publications teams. These findings point to the need to further understand optimal team factors when assembling biomedical publications teams. In future studies, more emphasis on the use of qualitative methods may help to provide further insights into the characteristics of teams and their members that facilitate effective functioning and positive team experiences.

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Using Verbal Interaction Analysis to Understand Ethnicity and Gender Effects in Standardized Patient Evaluation of Medical Student Empathy

It is estimated that 94% of US medical schools incorporate Standardized Patients (SPs) into the curriculum to assess students' empathy, technique and clinical competency. Berg et al. examined the effects of ethnicity and gender, which have the capacity to introduce bias scoring on SPs' assessments. Berg et al. concluded that there are "significant interaction effects of ethnicity and gender in clinical encounters," and call for further research to address these biases. The purpose of Using Verbal Interaction Analysis to Understand Ethnicity and Gender Effects in Standardized Patient Evaluation of Medical Student Empathy is to better understand SPs' assessment of student empathy by analyzing conversations between SPs and medical students. The study examines how empathy-related verbal, self-expression behaviors compare among varying ethnicities and genders.

The study analyzed conversations of 65 third-year medical students simulating a physician-patient interaction with standardized patients (SPs). Medical students from 4 institutions: The George Washington University, Howard University, Uniformed Services University, and Sidney Kimmel Medical College. Transcribed using a qualitative analysis program, Dedoose, coding for 19 identifiers; using SP's name, introduction of oneself, beginning with an open-ended question, agenda setting for encounter, beliefs, psychosocial questions, echoing, self-disclosure, explicit empathy statements, normalizing, summarizing, transitional statements, education, jargon, missed empathy opportunities, presenting treatment plan and asking for feedback, other questions, long pause and writing, pause, non-standard language.

The qualitative analysis continues to be in progress. Based on the preliminary qualitative data (reliability <70%), there are themes among the varying genders, varying ethnicities, and high vs. low scorers in terms of empathy. In terms of gender, high empathy scorers were higher in the Female group, 54.3% (Male, 45.7%). In terms of ethnicity, high empathy scorers were higher in the Asian group, 45.7% (Black, 25.7%, Caucasian, 28.8%). Final conclusions remain to be determined based off the re-coded data.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

A Pilot and Feasibility Study of Virtual Reality Guided Meditations in First-Year Medical Students

Virtual reality (VR) is a popular technology that places users in an interactive 3D environment. VR has been used to enhance surgery training, rehabilitation of brain injury survivors, and telepsychiatry. Our aim for this study is to assess the perception of first-year medical students on the value of a VR meditation program on stress reduction, both immediate and longer term. We recruited 10 volunteer participants. Each participant completed a guided meditation using a commercially available VR headset paired with a meditation app and oximeter that calculates a heart rate variability (HRV) index. Each meditation was five minutes long and participants were asked to do the exercise once a day for five consecutive days. Participants completed surveys before and after each meditation exercise. Additionally, a follow-up survey was administered two months later. Of the 10 participants, seven completed the five-minute meditation exercises for five consecutive days; three performed the exercise for four consecutive days. Every participant except one completed all of the required surveys (1-7 scale, 7 high). Participants gave their stress level before each meditation, reporting a mean score of 4; after each meditation, the average stress score decreased to 3.3. On the last day, seven participants (78%) reported a decrease in overall stress; two (22%) reported no change. Over the course of the study, the average HRV index increase was 10%. During the two-month follow-up, six (60%) volunteers reported a decrease in their overall stress compared to seven (78%) on the last day of the study. When asked about the usefulness of the intervention on managing stress, participants reported an average score of 6.0—a slight increase from the rating of 5.6 given before beginning the study. Participants perceived that the VR program decreased their stress levels in the short and longer term—after each five-minute VR exercise, at the end of the five-day study and during the two-month follow-up. Their favorable perception of the usefulness of breathing exercises prior to the study, relatively high to begin with, stayed steady for two months post-intervention. Their perception that the intervention is useful for stress reduction is objectively supported by the increased HRV index, which current research shows is positively correlated with mental and physical health.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Adult CPR Video Review Improves Resident Knowledge

For many residents, education to manage adult patients with cardiac arrest consists of ACLS, simulation cases, and observing healthcare providers. The latter can be variable and confusing for those without a solid foundation of knowledge. Feedback on performance often only occurs through real time debriefing sessions. Although these have shown improved cardiac arrest outcomes, they can be inconsistent and challenging to implement in a busy emergency department. An alternative or supplement to these forms of education is a longitudinal curriculum that provides private, individualized feedback to those who participated, as well as facilitated video reviews and lectures.

Our objective was to implement a longitudinal curriculum based on real, videotaped, adult cardiac arrest cases, in order to improve resident knowledge.

Three resuscitation bays were equipped with 24/7 video cameras, allowing capture of cardiac arrest cases. Cardiac arrest cases were then reviewed by two independent observers for Cardiac Arrest Registry to Enhance Survival (CARES) elements. The percentage of closed loop communication provided by the team leader was also measured. Standardized feedback was sent to all emergency department staff who were actively involved. Bi-monthly lectures during grand rounds included facilitator-guided video reviews for feedback and critique, followed by lectures. Pre- and post-intervention resident surveys assessed changes in knowledge.

Funding: None.

Surveys showed increased knowledge in the areas of ACLS and EtCO₂ interpretation. Specifically, more residents chose to resume chest compressions after defibrillation (92 vs 83% in post- and pre-intervention surveys), correctly interpreted a low EtCO₂ in the setting of a secured airway (100% vs 92%), and chose waveform capnography as the most reliable means of confirming endotracheal intubation (93% vs 64%). Anecdotally, residents identified individualized feedback and monthly lectures as valuable educational tools.

The overwhelming response to this project has been positive in terms of resident satisfaction and education. We will continue to refine this longitudinal curriculum based on real, videotaped, adult cardiac arrest cases, through periodic resident assessments, continuing to collect and analyze patient outcome data, and more multidisciplinary involvement to identify areas of improvement.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Integrative Medicine (IM) Providers' Perceptions of Palliative Care Conversations – A Collaboration between Integrative Medicine for the Underserved (IM4US) and Palliative Care

IM providers treat patients of all ages, at all stages of life. Many IM modalities are well-suited to end-of-life (EOL) care; however, IM providers' comfort with EOL conversations and the adequacy of their training for EOL conversations is unknown. Our goals were to determine 1) how comfortable providers feel talking to patients about EOL issues, 2) how effective providers felt that their formal education was at teaching this skill, and 3) providers' perceptions of the importance of this skill in their fields. We surveyed 29 IM providers in an IRB-exempt study at the June 2018 IM4US conference in Washington, DC. Most respondents (64%) reported that they are comfortable talking to patients about EOL issues. 70% of respondents felt comfortable modifying their goals from cure-focused to care-focused. However, just 36% of respondents felt that their formal education had been effective at teaching these skills. 93% responded that it is important for practitioners in their fields to skillfully talk to their patients about EOL issues. Despite providers' perceptions of inadequate formal training in conducting EOL conversations with their patients, the majority of providers responded that they are at least somewhat comfortable in discussing EOL and comfort-focused care with their patients. The majority recognized the importance of conducting EOL discussions skillfully with their patients but only one-third of practitioners felt they had sufficient training. Because the vast majority of IM providers acknowledge the importance of skillful EOL discussions, further research is required to determine the best way to integrate EOL education into IM curricula and whether formal education can effectively teach these skills, so that more IM providers are comfortable with EOL discussions and goal setting in their life-limited patients.

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Measuring the Effects of THC on Human Sperm Parameters Using Biomonitoring Analysis

Marijuana is one of the most common substances used in the United States with more men utilizing marijuana compared to women. The effects of marijuana on the brain are well known, however, there is limited research on its effects on human sperm parameters. We examined the association between THC and human sperm parameters in participants in the Washington D.C. area. Our preliminary results suggested that THC was associated with low sperm morphology.

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Coccidioidomycosis and Climate Variability in Southwest US: A Systematic Review

Coccidioidomycosis, or more commonly known, Valley Fever, is an infection caused by inhaling a fungus that is found in the Southwest US, including California and Arizona. Coccidioidomycosis has a substantial public health impact. It is also a huge financial burden on the state's economy. Populations as pregnant women, children, elderly and certain ethnic groups such as Filipino Americans, African Americans and Hispanic Americans are particularly susceptible to coccidioidomycosis. The fungus causing coccidioidomycosis is sensitive to climate variability and seems to respond to changes in temperature and moisture. Climate change can exacerbate coccidioidomycosis incidence because the precipitation is projections to increase in the next decades. The objective of this systematic review is to explore the relationship between climate change and Valley Fever, with a specific focus on weather conditions result in an increase in coccidioidomycosis incidence in the Southwest United States. The review found the climatic factors contributing to extreme heat events and droughts are strongly associated with increasing incidence of coccidioidomycosis. Particularly, precipitation seems to be a stronger predictor, and temperature has varying degree of association to coccidioidomycosis incidence. The relationship is not determined by a single driver, and it is a complex interplay of environmental, climatic and human factors. This review confirms the relationship between coccidioidomycosis incidence and climatic variables, and climate change can make the situation worse.

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Intersex Wildlife as Sentinels for Human Health and Endocrine Disruption Near Superfund Sites: A Systematic Review

Fish and wildlife are often used as sentinels for human health. This systematic review examines one aspect of wildlife health, intersex (both ovarian and testicular tissue) animals and their prevalence or severity near Superfund sites (EPA designated toxic waste sites). The body of evidence demonstrates some evidence of this indicator and more research is needed, specifically a meta-analysis that is outside the scope of this study.

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Cognitive and Behavioral Effects of Nitrogen Dioxide Exposure in Primary School Children: A Systematic Review

A systematic literature review was conducted to identify relevant studies evaluating the relationship between nitrogen dioxide emissions and cognitive and behavioral health in children. Eight studies were identified, reviewed, and analyzed according to specific inclusion criteria. The results of the review show that there is strong evidence for an inverse relationship between nitrogen dioxide exposure and cognitive and behavioral health in primary school children. However, further research is needed to confirm the observed associations between nitrogen dioxide exposure and cognitive and behavioral health.

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The Synergistic Relationship Between Air Pollution and Ambient Air Temperature and the Combined Effect on Mortality: A Systematic Review

Background: Cardiopulmonary related mortality is a global, public health crisis. With cardiovascular and respiratory diseases accounting for 31% and 14.3% of global deaths, respectively, these rates continue to increase as air pollution and heat waves become more frequent.

Objective: The Navigation Guide methodology for systematic review was used to determine whether there existed a synergistic relationship between high air pollution and high ambient temperature that would increase cardiopulmonary or non-accidental mortality.

Methods: The steps of the Navigation Guide methodology were followed to determine a study question and a search for studies that fit the inclusion criteria. Each study was assessed for bias and confounding, the quality of the literature was rated, and the strength of evidence was assessed.

Results: There were 9 studies identified that met the inclusion criteria. The studies assessed were ecological studies or case-crossover studies. Risk of bias was determined to be “probably low” and the quality of evidence was determined to be “moderate,” with high consistency and precision. No meta-analysis was conducted.

Conclusion: Based on the Navigation Guide methodology for systematic review, it was concluded that there is “sufficient” evidence of a synergistic relationship between air pollution and ambient temperature that increases non-accidental mortality.

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Antibiotic Resistance of *Escherichia Coli* in Human Populations in Response to Decreased Cephalosporin Consumption: A Systematic Review

Widespread use of antibiotics has led to the spread of antibiotic-resistant infections in human populations, with multi-drug resistant bacteria causing over 2 million illnesses and approximately 23,000 deaths annually in the US. *Escherichia coli* is recognized as one of the most commonly antibiotic-resistant bacterial threats. This systematic literature review investigated the change in prevalence of cephalosporin-resistant *E. coli* in human populations in response to a decrease in cephalosporin consumption.

The systematic methodology of the Navigation Guide was employed to conduct searches of the existing published literature in the PubMed and Scopus databases through 19 November 2018. Eleven studies consisting of original research met inclusion criteria and were evaluated individually for risk of bias. Quality and strength of overall evidence across all studies was assessed.

All studies included looked at antibiotic resistance within hospital systems and among patients with a wide range of acute medical conditions, including some with severe illnesses. Among these eleven studies, six found a decrease in prevalence of cephalosporin-resistant *E. coli* following a reduction in cephalosporin use, two studies saw an increase in resistance, and three found no change. Studies that found a decrease in cephalosporin resistance were mostly from China or Southeast Asia, whereas the two studies that found an increase in resistance were from Spain and Germany. There were no studies that met inclusion criteria from North America, South America, or Africa. Among the included studies, the largest risk of high or probably high risk of bias was due to *confounding* (64%) and *recruitment strategy* (55%).

Overall, there was a generally consistent outcome in decreased cephalosporin resistance in *E. coli* in response to decreasing cephalosporin consumption. Studies supporting this were conducted in settings where more strict controls on antibiotic prescription could be implemented, such as in China, where government-control of the medical system may be able to exert more control over antibiotic use. Due to risk of bias in some studies because of issues with study design, there is a need for more robust research in this area with stronger study designs. Additionally, further research conducted in community-dwelling populations and those with less severe community-acquired illnesses is needed to better answer our research question. There is also a need for research in other geographic locations, particularly in the Western Hemisphere. Future systematic reviews on antibiotic use and antibiotic resistance for other organisms and antibiotics would also be highly informative.

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Post-Traumatic Stress Disorder Symptoms and Alcohol Use in Firefighters: A Systematic Review

The purpose of this systematic literature review was to examine if there were any associations between post-traumatic stress disorder symptoms and alcohol use in firefighters. Sufficient evidence was found of an association, indicating that firefighters experiencing higher rates of PTSD symptoms also exhibit higher rates of alcohol use. A causal relationship was not found, and further research would need to be done in order to determine a cause.

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Occupational Risk of Migrant Farm Workers in North Carolina: A Systematic Review

Latnix Migrant Farmworkers in North Carolina face a variety of occupational hazards while working in the fields. These hazards include exposure to the natural elements, pesticides, and tobacco. Sub standard housing conditions and lack of comprehensive workers compensation coupled with these hazards create an extremely dangerous working environment for these farmworkers.

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Acute Particulate Matter Exposure and Suicide in North East Asia: A Literature Review

A systematic literature review was conducted on research exploring the relationship between acute exposures to ambient particulate matter and changes in suicide rates in North East Asian countries. From the eight studies analyzed limited evidence was found and additional research about the association is suggested.

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Green Building Interventions and Respiratory Health in Low-Income Housing: A Systematic Literature Review

A systematic literature review on the impact of green building interventions and respiratory health in low-income housing. This review evaluates the existing research for risk of bias, quality, and strength of evidence. All seven studies included in this review found positive associations between green building intervention and improved respiratory health outcomes like asthma and sick building syndrome (SBS).

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Exploring the Association between Sperm Aneuploidy and Racial and Ethnic Diversity in Men

Recent research efforts have been devoted to the evaluation of sperm aneuploidy frequency, but have lacked racial diversity and mainly focused on white men. The goal of this analysis is to therefore provide an exploratory look at sperm health among District of Columbia area men and examine associations between sperm aneuploidy and men of different ethnic groups and races. Analysis will be done on 132 men recruited and receiving treatment at the George Washington University Medical Faculty Associates (MFA), and will provide additional information on the ways in which diversity may affect male reproductive health.

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Association between Diabetes, Obesity, and Aneuploidy among Men in Washington, DC

Currently, 422 million people are living with diabetes globally, with prevalence only increasing in the coming decade. In the US, diabetes (both type 1 and type 2) prevalence is expected to increase by 54% by the year 2030, especially among men, whose diabetes prevalence has more than doubled since 1980. Diabetes affects the male reproductive system, as glucose metabolism is an important component of spermatogenesis. Obesity, which is a risk factor for diabetes, and prevalent among 73.7% of American men, can exacerbate these effects. Previous research has evaluated the impacts of diabetes and obesity on male sexual function, including semen quality; however, diabetes and obesity impacts on male reproduction, specifically chromosomal compliments known as aneuploidy, are not well understood.

This study will investigate the impacts of obesity and diabetes and their association with the frequency of sperm chromosomal abnormalities (aneuploidy) among adult men living in Washington, DC.

Men (N=132) between the ages of 18 and 55 were recruited from the three clinics within the Washington DC based GWU-MFA practice (In-Vitro Fertilization (IVF), Endocrinology, and General Internal Medicine). Eligible participants were recruited during routine appointments if they had a BMI ≥ 30 or uncontrolled diabetes, as determined by a medically charted hemoglobin A1C value of ≥ 7.0 . Poisson regression was used to model the association between diabetes, obesity, and aneuploidy (SAS GEN-MOD Procedure). Models were adjusted for potential confounders.

13.6% of men in this cohort had a diagnosis of diabetes. Among these men, crude regression models have suggested that diabetic men had suggestively lower mean sperm motility compared to men without diabetes. In contrast, participants with abnormal semen concentrations, motility, and normal morphology did not differ by diabetes status. An expected negative relationship between diabetes, obesity and sex chromosome aneuploidy is expected to be seen.

This is the first epidemiological study to examine the relationship between diabetes and obesity among fathers, and its association with aneuploidy. It is the goal of this study to provide a better understanding of the underlying reproductive effects of these diseases.

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Isoprene Emission Rates from Extreme Heat Exposure Due to Climatic Changes on *Quercus* and *Populus* Tree Genera: A Systematic Review

This systematic literature review explores whether isoprene emission rates from common tree species would be exacerbated in a warming world. When isoprene reacts with other pollutants, such as nitrogen oxides, tropospheric ozone is formed. Ozone is harmful to human health and is shown to decrease lung function among many other negative respiratory effects. If the rates of emissions continue at their current levels, there may be increased rates of asthma-related ED visits and respiratory diseases among the general population.

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Whole Body Exposure to Radiofrequency Electromagnetic Fields and Reverse Cognitive Impairment in Transgenic Alzheimer’s Disease Mice: A Systematic Review

Alzheimer’s disease claims the minds of millions of Americans every year, and scientists have yet to find a cure. Recent studies on transgenic Alzheimer’s mice exposed to radiofrequency electromagnetic fields (RF-EMF) report a reversal in cognitive degeneration. A systematic literature review was conducted to answer the question, “Does RF-EMF exposure affect cognitive function in transgenic Alzheimer’s disease mice?” Following an analysis of quality and strength of evidence across studies for the six most studied outcome measures, the review found limited evidence that RF-EMF exposure to transgenic Alzheimer’s mice improves cognitive function.

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The Effects of Glyphosate on Rat Sperm Mitochondria

Glyphosate is one of the most widely used pesticides in the world, with over 750 products available, including Roundup®; however, there is ongoing controversy around glyphosate's ill health effects. It has been classified by the International Agency for Research on Cancer (IARC) as probably carcinogenic to humans. IARC also concluded that there was "strong" evidence for genotoxicity, both for "pure" glyphosate and for glyphosate formulations. In addition, there are questions about its role as an endocrine disruptor, its differential effects across the lifespan, and its possible impact on sperm health. Glyphosate-based propriety formulations, such as Roundup®, contain unknown additives which may exacerbate these outcomes. This is especially relevant in light of decreasing sperm counts in recent decades.

We sought to evaluate the impacts of these chemicals on sperm by assessing damage to mitochondrial DNA. This method was chosen because mitochondria produce the ATP that is essential for sustaining sperm motility and for successful fertilization. Both structural and functional alterations in mitochondria have been found in sperm with abnormal motility. In addition, mitochondrial DNA copy number is emerging as an important biomarker for sperm quality and fertility.

Epididymal sperm samples were obtained from Sprague-Dawley rats (n=54) after humane euthanasia. Eighteen animals were prenatally exposed and then orally dosed with glyphosate, 18 animals were prenatally exposed and then orally dosed with Roundup®, and 18 animals served as controls. After weaning, 8 animals per group were treated for 6 weeks and the remaining 10 animals per group for 13 weeks before euthanasia. Mitochondrial and genomic DNA damage and mitochondrial copy number were determined after extraction of total DNA from frozen sperm. LA-qPCR was performed to determine mitochondrial and genomic damage, presented in lesions per 10kb. Real-time PCR was performed to determine mitochondrial copy number, which was used to normalize damage data.

On average, 4.97 ng/µl of total DNA were extracted per sample. Mitochondrial copy number averaged 100.14 for controls, 95.94 for glyphosate samples, and 95.36 for Roundup® samples. Statistical comparisons using the Kruskal-Wallis tests of mtDNA damage will be presented. We will be analyzing sperm DNA damage in animals dosed with glyphosate compared to controls and in those dosed with Roundup® compared to both the controls and those dosed with glyphosate.

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The Global Effects of Extreme Water-Related Weather Events on Diarrheal Outcomes: A Systematic Review

A systematic literature review was conducted to assess the link between extreme water-related weather events and diarrheal disease in developed and developing countries. The Navigation Guide Review Methodology was utilized to rate the quality of included studies and to determine the strength of evidence across studies. The strength of evidence was sufficient and demonstrated a positive relationship between extreme water-related events and diarrheal disease in both developed and developing countries.

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Adult Changes in Thought Study (ACT): Military Service, Traumatic Brain Injury, and Late Life Health Outcomes

This project sought to better understand the relationship of traumatic brain injury (TBI) and military service, separately and combined, with incidence of Alzheimer’s disease (AD) and all-cause dementia in individuals aged 65 and older. Data from the Adult Changes in Thought (ACT) study based out of Seattle, Washington was used to conduct Cox proportional hazard regression models to examine these associations, and explore the presence of effect modification by sex and APOE status. No significant results were found for the association between TBI and military service with all-cause dementia and AD. Further study using a cohort with a greater number of military veterans is needed to better inform our knowledge of the risk and protective factors for dementia and AD in this vulnerable population.

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Pesticide Exposure and Diabetes Among Agricultural Workers in Low- and Middle-Income Countries: A Systematic Review

Globally, there are now approximately 450 million people with diabetes. Pesticides are used in high volume around the world and have been associated with numerous adverse health effects. Recent evidence has been emerging suggesting an association between pesticides and diabetes, though most research has focused on high-income countries or environmental exposures to pesticides.

This systematic literature review applied the Navigation Guide to answer the question “Is pesticide exposure associated with diabetes among agricultural workers in low- and middle-income countries (LMICs)?”

Specific inclusion and exclusion criteria were used to conduct a thorough search of the existing literature on pesticides and diabetes. Relevant studies were analyzed for risk of bias and compared to determine the overall quality and strength of the body of evidence, following the Navigation Guide protocol.

Five studies met the inclusion criteria to be included in this review. Each found similar results, though the measures of pesticide exposure and diabetes outcomes varied considerably. There was determined to be a moderate risk of bias, low quality of evidence, and limited strength of evidence of an association between pesticide exposure and diabetes among agricultural workers in LMICs.

All five studies included in this review found at least one positive association between pesticides and diabetes, which is important for this population. Due to inconsistency in study designs and the small number of existing studies on this population, more research is needed on this topic with stronger measures of pesticide exposure and diabetes as an outcome.

The available literature supports an increased risk of diabetes with high exposure to pesticides among agricultural workers in LMICs.

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Dolosigranulum Pigrum Primer Design for Isolation from Nasal Samples

We aimed to design species specific primers for confirmation of *Dolosigranulum pigrum* isolates and detection of *D. pigrum* in nasal samples. Preliminary testing using DNA extracted from nasal swabs indicated that the murJ primer could detect *D. pigrum* from a nasal bacterial community.

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Implications of Non-Therapeutic Antimicrobial Use in Food Animals: Isolation and Antibiotic Resistance of *E. Coli* on Retail Meats Sold in California

Our study examines the effects of a California policy change on rates of contamination by antimicrobial-resistant *Escherichia coli* of food-animal products. We predict that restricted use of non-therapeutic antimicrobials on food-animals will decrease rates of resistant bacteria on contaminated products.

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The Navigation Guide—An Underexplored Phenomenon—Cyanobacteria linked to Neurodegenerative Diseases: A Systematic Review

β -methylamino-L-alanine (BMAA) is a neurotoxin found in cyanobacteria. In the 1960s researchers linked BMAA to ALS-PDC (Amyotrophic lateral sclerosis-parkinsonism-dementia) prevalence within Guam, however this research remained speculative up until recent decades. In vivo and vitro studies have indicated that BMAA may be linked to neurodegenerative diseases, however, the extent to which this relationship is seen in observational human studies is largely unexplored.

The object of this systematic review was to compile existing observational human studies with an exposure of BMAA and a possible outcome of neurodegenerative diseases to see the existence and/or extent of this potentially causal relationship.

Using the Navigation Guide, I applied the following steps to human observational studies: 1) specify the study question, 2) select the evidence, and 3) rate the quality and strength of the evidence. I evaluated each study for a risk of bias and rated the quality and strength of the entire body of evidence.

I identified nine (9) studies that met the inclusion criteria and after following the protocol in the Navigation Guide, the body of evidence suggested limited evidence of toxicity due to poor study design.

Seven of nine studies suggest a positive relationship between BMAA exposure and neurodegenerative disease. Future longitudinal research should combine mapping studies and brain studies to better characterize the relationship between BMAA and neurodegenerative disease.

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Prenatal and Postnatal Mercury Exposure on Neurodevelopment: A Systematic Review of Human Evidence

Evidence has reported the negative effects of prenatal mercury exposure on neurodevelopment, but evidence is limited and inconsistent regarding the effects of both prenatal and postnatal exposure.

The Navigation Guide systematic review methodology was used to determine whether prenatal and/or postnatal exposure to mercury affects neurodevelopment in humans. The Navigation Guide is a systematic and transparent method for synthesizing environmental health research from multiple evidence streams.

The first 3 steps of the Navigation Guide methodology were applied to human epidemiological data: 1) specify the study question, 2) select the evidence, and 3) rate the quality and strength of the evidence. To conduct a comprehensive and replicable search of the literature, a search protocol was developed to identify relevant studies using specific inclusion criteria. Each study was assessed for risk of bias and then the overall quality and strength of the body of evidence was determined.

The search resulted in 541 human studies, 8 of those studies met the inclusion criteria. Out of the 8 studies, 2 studies reported that both prenatal and postnatal exposure were associated with impaired neurodevelopment, 2 studies reported only a postnatal association, 1 study reported only a prenatal association, and the remaining 3 did not find a prenatal or postnatal association. The risk of bias across studies was “low” to “probably low”, but the overall quality of evidence was given a “low” rating due to inconsistency and imprecision across the body of evidence.

There is “inadequate” evidence of association between prenatal and postnatal exposure to mercury and neurodevelopment. The available evidence is insufficient to assess the effects of exposure. Generally, evidence that prenatal exposure to mercury has a toxic effect on neurodevelopment, is imprecise and unconvincing. The majority of studies reported postnatal mercury exposures were not associated with impaired neurodevelopment or the results were inconclusive. It is likely that a new study would change the certainty of the direction of the effect of exposure prenatally and postnatally on human neurodevelopment.

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Understanding Black Women’s Psychosocial Experiences with Seeking Treatment for Uterine Fibroids

Black women are disproportionately impacted by uterine fibroids and are more likely to undergo surgical treatment for fibroid management compared with other women. We conducted semi-structured qualitative interviews with 37 Black/African American women, to understand what factors shape Black women’s treatment decisions, explore what information Black women desire during the decision-making process, and evaluate how discrimination based on intersections of race, class, and gender are featured in treatment-seeking experiences. Our preliminary findings suggest that patient-doctor interactions, social networks, and potential long-term health effects of fibroids influence Black women’s treatment decisions. Our results also suggest that healthcare providers should consider the social and historical context of Black women’s healthcare experiences when discussing fibroids care, remain transparent about the lack of scientific information on fibroids, and invite an open dialogue with patients regarding fibroid management.

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Risk of Antibiotic Bacterial Infection as a Result of Household Dog and/or Cat Exposure: A Systemic Literature Review

Humans have close relationships with their household pets that extend past just ownership—“companion animals” have become extensions of the family in many cases. Traditionally domestic pets, such as dogs and cats, also act as service or emotional support animals that provide benefits beyond just companionship for many private citizens. However, pets are also capable of harboring antibiotic resistant bacteria that can be transmitted to their human counterparts. As such, a systemic literature review was conducted to compile research surrounding antibiotic resistant bacterial infections in humans in connection with the ownership or co-habitation of pets—specifically dogs and/or cats. This research would then, hopefully, determine the adverse risks posed to individuals living amongst pets of acquiring antibiotic resistant bacteria infections. Qualifying studies underwent a critique process and were excluded or included based on myriad characteristics. Upon completion of the review, ten articles were selected and were reviewed through the Navigation Guide model to assess for risk of bias, quality of evidence, and strength of evidence. The studies selected were able to isolate antibiotic resistant bacteria from humans and a majority of studies took corresponding samples from animals that were in close contact with human counterparts. The outcomes of these studies were unable to yield conclusive risks posed to humans by their household pets. Studies were predominantly cross-sectional in nature and small in scale. Overall the studies were unable to determine risk posed to humans but do make the case for further research. The studies further supported the ease of interspecies transmission and the ability for animals to be reservoirs of antibiotic resistant bacteria in infections. As animals continue to rise in popularity and foster tight familial bonds, coupled with the prevalence and rise of antibiotic resistant bacteria infections, this area of research may prove necessary in the future to protect animal and owner alike.

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Does Food Insecurity Predict Obesity and Educational Achievement: A Systematic Literature Review

The objective of this study was to determine whether food availability predicts health outcomes among children in the U.S., such as obesity rates and academic performance. Though there was some inconsistency in the findings, based on the Navigation Guide methodology, we concluded that there is inadequate evidence of correlation between food insecurity and obesity rates, yet limited evidence of correlation between food insecurity and educational achievement. Given these findings, further research is warranted to inform policy action to mitigate the effects food insecurity.

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Florida Red Tide Exposure: Analyzing the Respiratory Effects Experienced by the Gulf Coast Population

Florida red tide occurs in the Gulf of Mexico annually and has been linked to complaints of negative respiratory symptoms. Little is known about the exact association and long term effects of the exposure.

We applied the Navigation Guide to conduct a systematic review of the existing body of literature on Florida red tide exposure and respiratory effects.

We applied inclusion criteria to studies found through searches of 5 scientific databases. Included studies were analyzed for risk of bias and overall strength and quality of evidence. Included studies provided self-reported symptoms and quantitative measurements of pulmonary function before and after red tide exposure.

We identified 6 studies that met our inclusion criteria. We found that selection bias, exposure misclassification, and confounding were common sources of bias among the majority of studies and gave the overall body of evidence a “low” quality rating.

In conclusion, following the protocol of the Navigation Guide, our inclusion criteria yielded a body of research that displays an “inadequate evidence of correlation” between red tide exposure and respiratory effects in Florida Gulf Coast sample populations.

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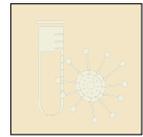
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The Association of Blood Lipid Levels and Late-Life Brain Amyloid Accumulation in the ARIC-PET Amyloid Imaging Study

Elevated LDL-c and total cholesterol in midlife and declines in LDL-c and total cholesterol from midlife to late life are associated with incident dementia. Whether these risk factors are associated with brain amyloid burden remains unclear. Our objective was to assess the association between blood lipid levels in midlife and change in lipid levels from midlife to late life on brain amyloid burden.

The Atherosclerosis Risk in Communities Study is a prospective cohort study that enrolled participants ages 45 to 65 from four U.S. counties beginning in 1987. Total cholesterol, low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c) and triglycerides were previously determined based on measures in stored plasma from baseline (1987-1989) and Visit 5 (2011-2013). At Visit 5, a subset of non-demented participants at were recruited to complete florbetapir PET scans for the ARIC-PET amyloid imaging study. We quantified the association between blood lipid levels at Visit 1 and change in blood lipid levels from Visit 1 to Visit 5 and global cortical SUVR >1.2 using multivariable logistic regression.

We considered data from 330 participants in the ARIC-PET amyloid imaging study. The mean age of participants at the time of PET imaging was 77.4, 57% of participants were female, 41% participants were black, and 26% had mild cognitive impairment. The association between midlife total cholesterol and late-life amyloid burden was marginally significant in minimally adjusted models (OR: 1.058 per 10 mg/dL difference in total cholesterol, 95%CI: 0.995-1.126) but was attenuated in fully adjusted models (OR: 1.008, 95%CI: 0.968-1.049); associations with other lipids were uniformly null. Likewise, the association between change in HDL from Visit 1 to Visit 5 was marginally significant in minimally adjusted models (OR: 0.825, 95% CI: 0.676-1.007 per 10 mg/dL difference in Visit 5 minus Visit 1 HDL-c) but was non-significant in fully adjusted models; associations with change in other lipids from midlife to late-life were uniformly null.

Midlife lipid levels and change in lipids from midlife to late-life were not independently associated with late-life amyloid burden. The role of lipids in promotion of dementia may be independent of brain amyloid accumulation.

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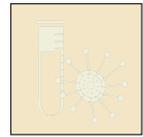
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A Triple Threat: Alcohol Use Disorders in the Presence of Comorbid Chronic Pain Conditions and Depressive Disorders in the Collaborative Psychiatric Epidemiology Surveys, 2001-2003

Frequently patients with chronic pain conditions have comorbid depressive disorders. The relationship between the diagnoses is often bidirectional, with the effects of one condition exacerbating the effects of the other. Alcohol use disorders (AUD) are also independently associated with both conditions. This study aims to determine the prevalence of alcohol use disorders among patients with comorbid chronic pain conditions and depressive disorders in a nationally representative sample of US adults and ascertain the characteristics of patients with all three diagnoses.

This cross-sectional analysis utilizes data from the Collaborative Psychiatric Epidemiology Surveys (CPES), 2001-2003. The sample includes respondents who reported having a chronic pain condition during their lifetime. The outcome is a dichotomous measure of past 12 month AUD, meeting DSM-IV criteria. The exposure is represented as a categorical variable with four groups: no depressive disorder(s) or chronic pain conditions during past year, at least one depressive disorder but no chronic pain conditions during the past year, at least one chronic pain condition during the past year but no depressive disorders during the past year, at least one depressive disorder and at least one chronic pain condition during the past year. Models determining prevalence and patient characteristics were obtained using logistic regression. All analyses account for complex survey design effects.

Results show an elevated association between having a comorbid chronic pain condition and a depressive disorder and an AUD during the past 12 months, $POR=1.914 (0.394, 9.573)$. This association is not present for the other exposure categories: past year chronic pain but no depressive disorder and past year depressive disorder but no chronic pain. Subsequent models concur after adjusting for potential confounding variables. The prevalence of past year comorbid chronic pain conditions and depressive disorders is 10.93% ($SE=0.6931$), among adults reporting any chronic pain condition during their lifetime. The prevalence of AUD among adults with comorbid chronic pain and depression is 3.82% ($SE=1.132$).

This analysis provides empirical support for the association between psychiatric illness and chronic pain. An association between AUD and comorbid chronic pain and depression signals a need for clinicians to conduct additional screening for AUD when evaluating treatment plans and diagnostic recommendations among adults receiving treatment for chronic pain and depression.

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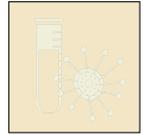
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Dental Health Assessment in Autistic Youth—Results from National Survey of Children’s Health

The purpose of this analysis is to assess the overall dental health of autistic youth aged 10-17 years and compare it with youth of similar age group diagnosed with other developmental delays. Data were from the 2016-2017 National Survey of Children’s Health that included parental reported measures of oral hygiene and behaviors of youth including dental health status, preventive visits and cavities. Weighted percentages, chi-square tests and regression analyses with design effects in SAS 9.4 were used. Preliminary results show parents of youth with autism and developmental delay are more likely to report fair/poor Oral Hygiene Index when compared to youth with only an autism diagnosis.

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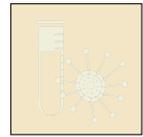
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Evaluating Companion Diagnostics to the Anal PAP Test to Improve Prediction of AIN2+ (HSIL) Histology in HIV-Infected MSM

About 95% of anal cancer cases are caused by high-risk HPV (HR-HPV) infection. Incidence has risen in the last decades primarily due to the HIV/AIDS epidemic; rates in HIV+MSM (137/100,000) vs. HIV- uninfected men (2/100,000). Screening consists of anal Pap test and digital anorectal exam (DARE) and HR-HPV DNA testing. Patients with >ASCUS grade anal Pap cytology or abnormal DARE are referred for high-resolution anoscopy (HRA) to obtain biopsies for histologic evaluation. Unfortunately, anal Pap screening under-estimates dysplasia grade compared to histology. Among MSM, HPV DNA testing has limited utility because prevalence of anal HPV infections is high (~80%). Screening individuals for HR-HPV DNA, although sensitive for detecting infection, is not specific for predicting anal dysplasia. A more specific test is needed. 113 participants were enrolled. Eligibility criteria included: HIV+MSM with >ASCUS anal Pap or abnormal DARE undergoing HRA. Prior to HRA, anal swabs were collected and placed in PreservCyt media and screened for HPV DNA, intracellular HR-HPV E6/E7 mRNA expression and DNA content for Post G1 cell cycle, and HR-HPV 16/18 E6 oncoprotein. 92/113 (81%) of specimens had >1 HR-HPV types detected; HR-HPV16 and HR-HPV18 were detected in 35% (40/113) and 12% (13/113), respectively. AIN2+ (HSIL) specimens contained more HR-HPV types compared to specimens with <AIN1 (LSIL): 3.2 vs. 1.8 ($p < 0.00001$). Of the specimens with adequate cells, 59% (20/34) tested positive for intracellular HR-HPV E6/E7 mRNA expression and Post G1 cell cycle. Of these, 30% were AIN2+ (HSIL). Of the 53 HR-HPV16/18 positive specimens identified, 4 (7.5%) had detectable E6 oncoprotein levels; 2 were AIN2+ (HSIL) and 1 was also positive for E6/E7 mRNA expression and Post G1 cell cycle. Analytical sensitivity and specificity for these 3 biomarkers were calculated independently and compared with histology: HR-HPV DNA: 93% & 19.7%; HR-HPV E6/E7 mRNA & Post G1 cell cycle status: 60% & 41.7%; and HR-HPV 16/18 E6 oncoprotein: 6.7% & 97.1%. HR-HPV DNA genotyping test proved the most sensitive test for detecting infection while HR-HPV16/18 E6 oncoprotein test was the most specific test in predicting AIN2+ (HSIL). Identifying more specific companion biomarker(s) for predicting anal dysplasia in high-risk groups will provide stronger evidence to justify HRA if positive or to reduce unnecessary HRA, if negative. This remains important even in the HPV vaccine era as many HIV+MSM were never vaccinated and vaccine uptake in this population continues to be lower than the target goals.

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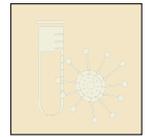
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Impact of Recent Sexual Violence on Systemic Chemokine and Anti-HIV Immune Mediators in Women

There is considerable overlap between the epidemics of violence against women and HIV/AIDS both of which adversely and disproportionately affect women's health. Sexual violence is associated with increased risk for HIV acquisition/transmission in women yet the biological mechanisms linking the two are poorly understood. For our longitudinal study, women who had been recently sexually assaulted were recruited from the Washington, DC metro area. We found systemic dysregulation of critical protective immune mediators, suggesting a period of increased HIV acquisition/transmission may exist in women following sexual assault.

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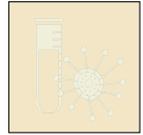
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Perceived Control, Race/Ethnicity, and Cognitive Limitations Among Older Adults: Evidence from the Health and Retirement Study

Prior research has shown that perceived control plays an important role in shaping cognitive functioning in late life. However, much less is known about racial/ethnic variations in the link between perceived control and cognitive functioning among older men and women. Here, we address this gap in the literature by examining how perceived control interacts with race/ethnicity and gender to shape cognition among older adults.

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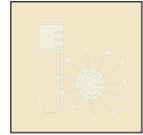
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Evaluating the Burden of *Escherichia Coli* Colonization, Including ST131-*H30*, Within a Cohort of Veterans and Other Members of their Household

To understand the colonization rates and proportional density of *Escherichia coli*, *E. coli* multilocus sequence type 131, and ST131-*H30*, self-collected fecal swabs from a cohort of veterans and respective household members were subject to bacterial DNA extraction and 16S rRNA gene sequencing. A large proportion of the cohort were colonized with some type of *E. coli*, but only a small portion carried the virulent subclone ST131-*H30*. Results from this study can support future research that aims to identify determinants of *E. coli* ST131-*H30* colonization.

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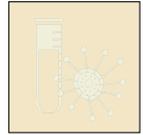
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Cerebral Tissue Oxygen Saturation and Fractional Oxygen Extraction in Preterm Infants

The use of near-infrared spectroscopy (NIRS) to measure cerebral tissue oxygen saturation may prove to be a valuable instrument in the medical management of preterm infants with regard to oxygenation therapy. Normal cerebral tissue oxygen saturation is not well established for preterm neonates and medical management often requires a delicate balance of oxygen saturation and respiratory support to avoid hypoxia and hyperoxia and their associated long-term disease burden. Using NIRS collected data, we have established normal ranges of cerebral tissue oxygen saturation under various hemodynamic conditions that may provide a better understanding of cerebral tissue oxygenation. A better understanding of cerebral tissue oxygenation may lead to better clinical management and health outcomes of in preterm neonates.

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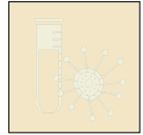
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Interaction Between Intellectual Disability and Cerebral Palsy on the Co-Occurrence of Autism Spectrum Disorder and Epilepsy

Intellectual disability (ID) is possibly a reason for the higher co-occurrence of Autism Spectrum Disorder (ASD) in children with epilepsy. Cerebral Palsy (CP) has also been found to co-occur with ASD (6.9%-hypotonic, 18.4%-spastic subtype) and with epilepsy (41%), but it is unclear if the co-occurrence of ASD and epilepsy varies by the presence of both, ID and CP. The purpose of this study to evaluate effect modification of CP and ID on ASD-epilepsy co-occurrence.

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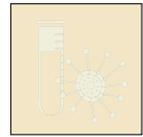
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The Association between Healthy Eating Index (HEI)-2015 and Diabetes: Findings from the National Health and Nutrition Examination Survey (NHANES) 2007-2014

The Healthy Eating Index-2015 (HEI-2015) measures the adherence to the 2015 Dietary Guidelines for Americans in the US. We assessed the association between overall diet quality, as measured by the HEI-2015, and diabetes status using data from the National Health and Nutrition Examination Survey (NHANES) 2007-2014. Although participants with diabetes had significantly different scores in several HEI-2015 components when compared to those without diabetes, there was no association between total HEI-2015 score and diabetes status in this nationally representative sample. Future studies are needed to evaluate the HEI-diabetes association in longitudinal settings and to address measurement errors in diet.

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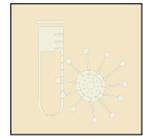
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Differential Gene Expression Patterns in BRCA-1 Breast Cancer Patients Using the RNAseq123 Workflow

The project set out to identify differentially expressed gene patterns in 116 BRCA-1 breast cancer patients using the R based RNA-seq workflow known as RNAseq123. Normal samples and cancer samples from each patient were pitted against each other, with the hopes of discovering RNA expression patterns that were either significantly up-regulated or down-regulated in the breast cancer samples.

The design of the experiment first entailed uploading the csv file containing the genes and their corresponding expression levels from each of the 116 patients onto the R studio platform. The data was obtained from the BioMuta database and subsequently parsed prior to being uploaded into R studio. Using the DGElist function, the data was organized in a way that would optimize the ability of the machine to use the workflow. From there, steps were taken to ensure the removal of lowly or non-expressed genes. Subsequent measures were then taken to normalize and account for natural variance in extraction and isolation techniques of the RNA samples. With regards to the statistical analysis, the benchmark set for statistical significance was conservative, set at a Benjamini-Hochberg adjusted p value of >0.05 , as well as a minimum 2x fold change for the t-test to be significant. Finally, the linear modeling was done using the limma library previously loaded into R studio at the onset of the workflow analysis.

After reducing the amount of genes to be analyzed from the full genome of 20,531 to 14,301 moderately to high expressed genes, it was determined that the expression of 478 genes were significantly elevated in the tumor samples relative to the control samples (p value < 0.05). The expression of 1,394 genes were down-regulated in the tumor samples relative to the control sample (<0.05), while 12,429 genes did not exhibit any significant differences in expression patterns between the tumor and normal samples. Several of the genes determined by the workflow that were highly expressed in the tumor samples have already been the subject of scientific research, such as COL1A2 and COL1A1.

Due to the relative ease of using the workflow once developing a basic understanding of R programming, it is natural to assume that the same RNAseq123 could be used to assess the variances in gene expression in other cancer types, if not in other disease states all together. In that regard, future directions may entail translating said findings back to the bench-side setting for further research.

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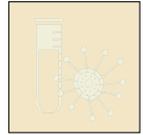
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Disease Activity in Systemic Lupus Erythematosus is Correlated with Educational Attainment

Systemic Lupus Erythematosus is a rheumatological, autoimmune disease that affects about 1.5 million Americans and impacts multiple areas of the body, including the joints, skin, and heart. The aim of this project was to investigate a possible relationship between education attainment and disease activity scores in patients with SLE. Data analysis of 36 patients found that there is a slight trend, in which higher education levels correlates with lower disease activity scores.

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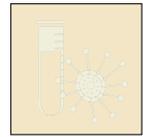
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Trends in Tobacco Use and Related Harm Perceptions by Asthma Status: 2012-2016

This study examined the trends in e-cigarettes, hookah, cigarettes, and hookah and related harm perceptions by asthma status (asthmatic, former asthmatic, non-asthmatic) from 2012-2016, and variations by sex using data from 2012, 2014, and 2016 Florida Youth Tobacco Survey. Each weighted multivariate logistic regression model used one tobacco use behavior/perception as the dependent variable and survey year, asthma status, and demographics as independent variables. While an overall decline in current cigarette use was observed during 2012-2016 (from 10% to 5%), the decline was slowest in asthmatic youth (AOR=0.89, $p<0.05$) compared with non-asthmatic youth (AOR=0.82, $p<0.05$; asthma-year interaction $p<0.05$). Given the detrimental effect of cigarette smoking among asthmatic youth, the slow decline in cigarette smoking in this population warrants additional interventions.

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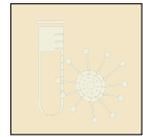
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Worth a Shot: Motivations for the HPV Vaccine in Women up to Age 45

In October 2018, the U.S. Food and Drug Administration approved the administration of the Gardasil 9 vaccination for men and women up to 45 years of age, expanding the previously approved age range of 12- 26. The Gardasil 9 vaccine protects against 9 strains of HPV , which can lead to cancer and other diseases. The CDC estimates that 14 million people are infected with HPV each year. Further, 33,700 men and women are diagnosed with HPV related cancers each year, 31,200 of which could have been prevented by vaccination. Most educational materials and public health programs surrounding the HPV vaccine are targeted towards adolescents. Therefore, many women who are in the 27-45 year age range may not be aware of their ability to get the vaccination, thus leaving them at risk for contracting HPV and developing HPV related cancers.

A cross-sectional study design will be used to assess knowledge and motivations of a convenience sample of women aged 27-45 surrounding HPV and the HPV vaccine. A survey will be given to women aged 27-45 at a gynecology practice located in Washington, D.C. The results of this study will then be analyzed to assess factors associated with getting or refusing the vaccine, as well as stated intent to receive the vaccine.

The relationship between knowledge level and motivations towards getting the HPV vaccine will be examined in this study. This will help to identify future public health initiatives to reach the newly approved age range of adults aged 27-45.

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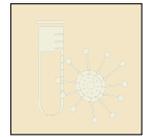
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Effects of Alcohol Consumption on Nephropathy, Retinopathy, and Neuropathy in Type 1 Diabetes in the Diabetes Control and Complications Trial (DCCT)

Effects of long-term alcohol consumption have not been well studied in populations with diabetes, though regular alcohol consumption is common among American adults and it is estimated that at least 10% of Americans have diabetes. Individuals living with diabetes who are heavy alcohol consumers may be at heightened risk for diabetic complications. Using the well-phenotyped Diabetes Control and Complications Trial (DCCT) cohort of 1,246 adult subjects with type 1 diabetes, a secondary analysis was conducted to determine if relationships exist between alcohol consumption and nephropathy, retinopathy, and neuropathy at baseline, follow-up year 5, and DCCT closeout. This secondary analysis found that HbA1c did not vary between drinkers and non-drinkers throughout the DCCT, leading to non-significant odds of developing nephropathy, retinopathy, and neuropathy. Non-heavy alcohol drinking did not substantially impact development of renal, retinal, or neurological complications within the DCCT cohort.

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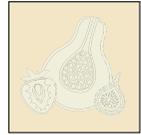
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EXERCISE AND NUTRITION SCIENCES



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Racial Differences in Reasons for Stopping and Starting Physical Activity

Only about half of American adults meet physical activity (PA) guidelines established by the CDC. One reason why so few Americans meet recommended levels of PA may be that individuals start a PA regime but then stop or have their routines interrupted. Therefore, one approach to improving PA may be to learn more about what leads individuals to stop an established routine and what prompts individuals to resume. One objective of the present study was to identify the most commonly mentioned reasons for stopping and starting back up PA routines. A second objective was to test whether there were racial differences in reasons individuals stop and resume their PA routines.

Participants (n = 711) were recruited from a primary care waiting room during September 2017. Participants completed a brief questionnaire that assessed variables related to the study objectives. Consistent with the study objectives, analyses focused on those who reported having established an exercise routine for at least two weeks in the past year (N = 434; female=59%; White =44%, African American=36%, Asian=6%, Hispanic=4%, or other race=7%). Frequencies were run to achieve study objective 1. Logistic regression analyses were run to test whether there were differences in the reasons given for stopping and starting back up PA between African American and White participants. Sample size for other racial groups were too small to make comparisons.

The most commonly listed reasons to stop PA were being busy (27%), health problems (26%), lacking motivation (18%), travel (16%), and work (15%). The most commonly listed reasons to resume PA were to manage weight (24%), gain health benefits (19%), improve fitness (8%), increase energy (6%), mediate mood (6%), and manage stress (5%). Logistic regression analyses comparing African American and White participants revealed no statistically significant differences in reasons for stopping PA. Regarding reasons for resuming PA, results showed that African American participants were almost twice as likely to start physical activity for weight management compared to White participants (Exp β = 1.97, 95% CI =1.10 to 3.51, p = 0.02).

These data imply that disparities between African American and White adults with respect to PA is unlikely to be related to reasons why they stop PA. Results also imply that it may be worthwhile to investigate how to ensure that subjects who are motivated to start physical activity for weight management reasons are able to sustain PA.

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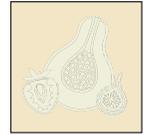
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

The Effect of Prolonged Low-Calorie Sweetener Consumption in Overweight and Obese Young Adults

Consumption of low calorie sweeteners (LCS) is associated with development of metabolic diseases in observational studies. Findings primarily in rodent models demonstrate that LCS-induced alterations in the gut microbiome may contribute to the development of these metabolic abnormalities. This study investigates the effects of eight weeks of LCS exposure in young adult females with overweight and obesity (n=8) by comparing microflora in stool samples before and after ingestion of 12 oz. of diet soda containing sucralose and acesulfame-potassium three times daily for eight weeks. An additional stool sample was collected one week prior to beginning the intervention to measure normal microbiome variation. DNA was extracted using a PowerFecal DNA isolation kit and sequenced using shotgun metagenomic sequencing on an Illumina Nextseq 500 at the GW Genomics Core. Bioinformatics techniques were then applied to characterize microbiome diversity and compare the microflora composition of each individual one week prior to baseline, at baseline (pre-intervention), and post intervention. Cleaned reads were mapped to existing bacterial genomes using Pathoscope. Results were visualized and conceptualized in R using packages ggplot, phyloseq, and mvabund. Preliminary results indicate that there is varying microflora composition between individuals, much of which may be due to normal gut microbiome variation. A total of 1156 unique prokaryotic organisms were identified in this study. Greater than 50% of the mapped bacteria were from the genus *Bacteroides*. In particular, the genera *Oscillospira*, which is associated with greater diversity of gut microbiome, and *Roseburia*, which is associated with weight loss and reduced glucose intolerance in mice, were identified. Notably, greater consistency in microbiota composition was observed between visits than between different individuals, suggesting that any effects of LCS on the gut microbiota were less marked than differences in composition that already exist between individuals. More robust conclusions will be made following the completion of the analysis

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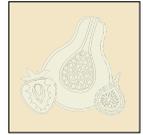
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Adipocyte-Derived Exosomes from Visceral Adipose Tissue Explants and Urine Contain MicroRNAs Related to Macrophage Cholesterol Efflux Capacity

Our research is aimed at understanding adipocyte-derived exosomal microRNAs in health and disease. Furthermore, we are interested in identifying exosomal microRNAs in biological fluids, such as urine and serum, that may be developed as biomarkers for diagnostics and to monitor disease progression/reversal.

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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Social Network Characteristics Are Correlated with Dietary Patterns Among Middle Aged and Older South Asians (SA) Living in the United States (US)

Dietary choices may be influenced by social norms and cultural backgrounds. By using data from the Mediators of Atherosclerosis in South Asians Living in America Social Network study, we found perceived dietary behaviors of network members were significantly associated with dietary patterns among middle aged and older South Asians in the United States.

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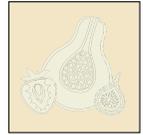
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Exploring Determinants of Caffeinated Sugar Sweetened Beverage Consumption Among Children

This study investigated determinants of caffeinated sugar-sweetened beverage (CSSB) consumption among children by conducting qualitative one-on-one interviews with parents of children 8-17 years old who reported child consumption of ≥ 1 serving CSSBs/day. Child CSSB consumption was primarily driven by modeling behaviors of parents and older siblings, although sweet and/or “acidic taste” and “being tired of water” were also frequently mentioned. Several reported behavior changes following child CSSB intake were noted, many of which may be attributable to effects of caffeine. These qualitative results will be integral in designing an acceptable and feasible intervention to reduce consumption of CSSBs among children.

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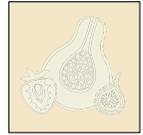
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Differences in Sugar Content in Fast Food Products Across Three Continents; Feasibility of Reductions

Excess intake of added sugars increases the risk of adverse health outcomes, including obesity, type II diabetes, cardiovascular disease, and metabolic syndrome. The purpose of this study was to evaluate the sugar content of fast food menu items available at four multinational chains and to compare sugar content across continents, specifically in North America, Europe and Australia, using data gathered from each chain's online nutrition information, as available. Differences in mean sugar content per 100g of each product were observed between countries in several product categories, suggesting that reductions in sugar content of various menu items are indeed possible.

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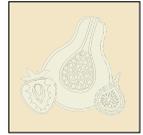
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Prolonged Low-Calorie Sweetener Consumption Disturbs Inflammatory Pathways in Adipose Tissue among Overweight and Obese Young Adults

With consistent high rates of consumption of low-calorie sweeteners (LCS) among the US adult population, further research is needed to better understand the metabolic effects of prolonged LCS consumption. By studying a healthy population under controlled conditions, we found LCS exposure to affect 1117 genes, the majority of which were involved in immune and inflammatory pathways. A trend toward increasing circulating levels of IL-6 was also observed ($p=0.05$). These data will serve as the basis for testing clinically relevant metabolic effects of prolonged LCS exposure in a randomized trial with a larger cohort and longer duration.

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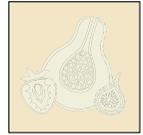
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Impact of Competitive Season Stress on Indices of Motor Control in D1 Softball Players

The relationship between physiological stress and full body motor control in softball athletes is unclear, directing this study to examine the relationship between cortisol levels on motor control in Division I softball players throughout their competitive season. Upper and lower body motor control testing was conducted and salivary cortisol samples were taken three times over the competitive season. Improved upper body motor control performance in a throwing-based sport was expected due to training-based influences, and corresponded with an increasing team game-winning percentage as the season progressed. Cortisol sampling revealed a moderate level of physiological stress that progressively rose over the course of the competitive season, demonstrating that optimal performance may exist at a moderate level of arousal in this population as rationalized by the Inverted U Hypothesis.

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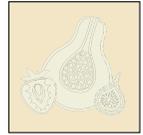
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Fathers Feeding Practices and Hispanic Preschoolers Intake of Soda: The Moderating Effect of Family Communication

Family structure and functioning can have a major impact on children's intake of foods because children learn by observing and modeling their parents' behaviors. As a result, if the child sees their father consuming soda beverages, the child may also consume more soda.

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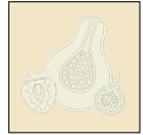
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Investigating Associations between Low Calorie Sweetened Beverage Intake and Diet in Youth with Type 2 Diabetes

Beverages containing low-calorie sweeteners (LCSB) offer a lower-calorie alternative to sugar-sweetened beverages (SSBs), yet whether they help to reduce total calorie and sugar intake and encourage weight management is unclear. This study examines associations between LCSB consumption and dietary intake in youth with type 2 diabetes (T2D), using data collected from participants enrolled in the Treatment Options for Type 2 Diabetes in Adolescents and Youth (TODAY) study. LCSB consumption was associated with higher calorie, carbohydrate, total fat, saturated fat, and protein intake. These findings challenge whether LCSB are an effective strategy to reduce total calorie intake and promote weight management, as intended.

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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

DC Fueling Learning Study: Physical Activity Engagement Among Elementary Schoolchildren in District of Columbia Public Schools

The DC Fueling Learning study seeks to begin to evaluate the physical activity environment among DC Public elementary schools. Data was collected from four elementary schools using accelerometers and surveys to assess school-time physical activity, physical activity self-efficacy and social support, and school physical activity environment. This evaluation will be utilized as a starting point in understanding school-time physical activity behaviors and identify areas of greatest need for improving the policies and programs of participating schools along with the broader D.C. Public School system.

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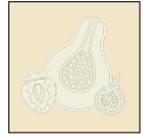
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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Associations between Low-Calorie Sweetener Beverage Consumption and Diet Quality in Children and Adolescents

This study aims to investigate the association between LCSB consumption and diet quality in children and adolescents, and to compare the diet quality of LCSB consumers with that of water consumers, consumers, or combined consumers of both LCSBs+SSBs. Dietary data collected from children and adolescents enrolled in The National Health and Nutrition Examination Survey (NHANES) 2007-2016 were used to assess diet quality using the Healthy Eating Index (HEI-2015) total and subcomponent scores. Consumption of LCSBs or SSB+LCSBs does not appear to improve diet quality compared to water. These findings reinforce recommendations that SSBs should be replaced with water rather than LCSBs.

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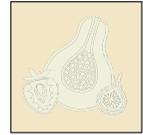
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EXERCISE AND NUTRITION SCIENCES



SCHOOL OF MEDICINE AND HEALTH SCIENCES

The Effects of Altitude Training Masks Worn During Low-Intensity Bouts on Performance

Altitude training masks (ATMs) are frequently used during exercise to enhance physiologic adaptations, yet few studies have examined the effects of ATMs when used during recovery periods. Purpose: To examine the effects of ATMs used only during low-intensity recovery intervals in a high-intensity interval training (HIIT) program in healthy young adults. Methods: Participants engaged in 18 HIIT over a 6-week period using a treadmill. HIIT sessions were comprised of 6-8, 60-second high-intensity bouts at a relative work rate corresponding to 95% of participants' maximal heart rates, alternating with 90-second low-intensity recovery bouts at a relative work rate corresponding to 20% VO₂max. Participants were randomly assigned to an experimental group (EXP) which wore an ATM only during the low-intensity bouts or to a control group (CON) which did not use an ATM. Cardiopulmonary exercise tests (CPET) were performed before and after the HIIT. Results: 10 participants completed the study in the EXP group (6 females; 26±4.1 years; BMI: 24.2±1.6 kg/m²) and 10 in the CON group (7 females; 24.3±3.5 years; BMI: 22.8±2.1 kg/m²). Both groups experienced improvements in VO₂max (EXP: 39.9±4.6 vs. 42.8±6.0 ml/kg/min, p=0.02; CON: 39.7±6.1 vs. 43.9±8.3 ml/kg/min, p=0.01; baseline vs. follow-up, mean±SD). The EXP group alone saw improvements after training in time to anaerobic threshold (169±31.2 vs. 213±56.2 sec, p=0.04), increased peak work rate during CPET (44±26.9 vs. 88±54.3 Watts, p=0.03), and increased minute ventilation during peak exercise (108±15.5 to 113.64±19.6 L/min, p=0.04). No other changes were observed in the CON group. Conclusion: Using ATMs only during the low-intensity bouts of HIIT appears to have afforded participants with unique training adaptations not observed in standard HIIT. Conventional use of ATMs employs the masks during exertional portions of exercise training, not solely during recovery periods. These findings suggest that ATMs may serve as a valuable training adjunct even if used only during recovery periods in HIIT.

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EXERCISE AND NUTRITION SCIENCES



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Low-Calorie Sweetened Beverage Consumption Does Not Reduce Total Energy or Sugar Intake among Children

Beverages containing low-calories sweeteners (LCSB) are used as alternatives to sugar-sweetened beverages (SSBs), yet their effects on the overall diet and effectiveness for weight management are unclear. The objective of this analysis was to examine energy and macronutrient intake among children who report LCSB and SSB consumption. The findings of this analysis challenge the utility of LCSB consumption as a strategy for weight management in children.

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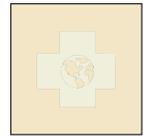
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

“As Parents, How on Earth Are We Going to Handle This Issue”: Provider and Parent Views on Sexuality-Related Challenges During Adolescence among International HIV-Infected Adoptees in the U.S.

As the number of internationally adopted children with HIV has increased since 2010 in the U.S., more children may have additional educational needs, particularly related to sexuality, as they mature. After conducting 48 hour-long, semi-structured interviews with parents and providers, the qualitative analysis shows that many parents’ adoption decisions are driven by faith, which can influence the child’s ability to gain vital sexual education given their HIV status. Parents of internationally adopted children with HIV could benefit from the support of healthcare providers to better understand the importance of sexual and reproductive health during adolescence.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Comparison of Cardiovascular Disease Rates in Women between United States and Costa Rica

Cardiovascular Disease (CVD) is the number one cause of death globally taking the lives of 17.7 million every year. Majority of deaths are due to strokes and heart attacks. Risk factors of developing cardiovascular disease include abuse of alcohol, obesity, tobacco smoking, and people with sedentary lifestyles. Risk factors of death due to CVD include hypertension, hyperglycemia, and hyperlipidemia. This project aimed to compare trends in the rates of cardiovascular disease between the United States and Costa Rica. Data from the Global Burden of Disease, World Health Organization, World Bank was used to analyze prevalence and death rate of cardiovascular disease along with factors such as gross domestic product, life expectancy, and differences in health system. The prevalence of cardiovascular disease is lower in Costa Rica than the prevalence of CVD in the United States. This research analyzed differences in many factors such as access and cost of health care and healthcare delivery systems that may contribute to the difference in prevalence of cardiovascular disease between both countries. Cardiovascular disease is a global burden and causes of CVD must be continued to be assessed.

La enfermedad cardiovascular (ECV) es la principal causa a nivel global, cobra la vida de 17,7 millones de personas cada año. La mayoría de estas muertes, son debido a eventos cerebrovasculares y síndromes coronarios. Los desencadenantes de la enfermedad cardiovascular incluyen el abuso de alcohol, la obesidad, el consumo de tabaco y un estilo de vida sedentario. Los factores de riesgo de muerte por ECV incluyen hipertensión, hiperglucemia e hiperlipidemia. Este proyecto tuvo como objetivo comparar las tendencias en las tasas de enfermedad cardiovascular entre los Estados Unidos y Costa Rica. Los datos de la carga mundial de enfermedades, la Organización Mundial de la Salud y el Banco Mundial se utilizaron para analizar la prevalencia y las tasas de mortalidad por enfermedades cardiovasculares junto con factores como el producto interno bruto, la esperanza de vida y las diferencias en el sistema de salud. La prevalencia de enfermedad cardiovascular es más baja en Costa Rica en comparación con el mismo indicador para los Estados Unidos. La enfermedad cardiovascular produce una carga global, además las causas de ECV deben continuar siendo monitorizadas.

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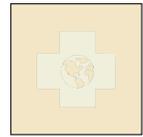
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Physical Violence during Pregnancy and Infant Mortality: Evidence from Pakistan Demographic and Health Survey 2012-13

Violence against women is not only a significant human rights violation but also a vital public health concern. Pakistan not only has the highest rates of violence against women, but also has the highest levels of infant and child mortality when compared to other countries in the region. In view of the current infant mortality levels and the limited research, the current study aims to understand the association between violence on mothers and infant mortality in Pakistan. The analysis based on data from Pakistan Demographic and Health survey 2012-2013. The unit of analysis was a child, and it was restricted to the last child born in the previous five years to a woman who had had at least one previous birth within three years prior to that birth; this limited our sample to 1502 individuals. Kaplan-Meier Survival Analysis and Weibull Regression analyses were performed to analyze the association between physical violence during pregnancy and infant mortality by different socioeconomic, demographic and health care indicators. The entry point for the survival analysis was any child born alive under the age of one year in the survey. The exit point was mortality, current age, or, one year. Survival time was calculated in terms of days. In Weibull regression analysis accelerated time to failure/event were used to calculate the association between violence and infant mortality. Our analysis showed that almost 9% of children whose mothers experienced violence during pregnancy died, whereas only 4.5% children died of those whose mothers did not have such experience. We found that the infants whose mothers were ever exposed to physical violence during pregnancy had 85% faster time to death (accelerated time to failure/death) when compared to infants whose mothers did not experience physical violence during pregnancy, the association was statistically significant. The study successfully identified the risk factors of infant mortality and its association with mother's exposure to physical violence during pregnancy, results supported the hypothesis that physical violence on mothers during pregnancy has an association with infant mortality. Infant mortality was associated with living in rural areas and certain provinces (region) having low educational attainment or having low socio-economic status. Further research is needed into the matter to investigate further and better understand the relationship between physical violence and infant mortality.

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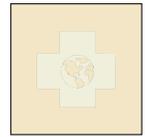
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Survey of Animal Husbandry and Zoonotic Disease Risk Factors in the Somali Region, Ethiopia, 2016 and 2017

In Ethiopia, there are multiple endemic zoonotic diseases present, and the country, as a whole, is considered to have one of the heaviest burdens due to zoonosis outbreaks. Lack of research has been an issue in determining the transmittance and risk factors involved, especially in nomadic populations. The goal of this exploratory, cross-sectional study is to assess associations between animal health-seeking behavior and medicine use to the rate of self-reported febrile symptoms and use the results to create an effective multi-disciplinary, longitudinal study in the same Somali, pastoralist population. Preliminary data analysis has shown an association between symptomatic illness and providing food to livestock; supplementing with additives, vitamins, and medicines; and having veterinary care.

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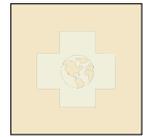
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

What Resources Do Indian Emergency Medicine Providers Access in the Treatment of Acute Toxic Ingestions?

Indian Emergency Departments (EDs) see a significant number of toxicologic cases each year, approximately half of which are attempts at deliberate self-harm. However, the available data are limited to deaths or certain cities or states in India. Additional data are needed on the most common agents and treatment practices. The objective of this study was to understand trends in the presentation and management of poisonings in India. Between September 2015 and May 2016, an online survey was administered to ED practitioners. Respondents were queried about common poisonings, treatments, and educational resource utilization, including use of India's national poison center hotline. 152 individuals responded to the survey. The most common poisonings encountered were organophosphates (79.4%), sedative/hypnotics (74.5%), household cleaning agents (58.8%), paracetamol (47.1%) and acid/alkali agents (44.4%). Use of poison specific antidotes was relatively low, reported by less than 50% of all respondents. Over 40% of respondents reported having no access to a poison center. Providers practicing in the Eastern (64.2%, 95% CI (45.4-83.2)) and Southern states (56.6%, 95% CI (45.7-67.5)) were much more likely to report no poison center access as compared to providers practicing in the Northern (0) or Western States 8.3%, 95% CI (-3.5-20.3). Most providers instead used hospital protocols, textbooks, or online resources to guide treatment and education efforts. Poisonings represent a major public health issue presenting to Indian EDs. Organophosphate ingestions are common, but these data suggest that medication overdoses are also common. Despite frequent presentations of potentially life threatening ingestions, often EDs have limited resources including lack of access to poison specific antidotes or poison center consultation. Although India has a 24-hour national poison center hotline, most providers in the South and East were unaware of this resource, suggesting an opportunity for better provider education.

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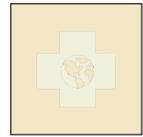
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

“After They’ve Finished Their Meals, I Have My Meal from the Leftovers; I Have to Adjust:” How Gender Norms affect Anemia Rates in Odisha, India

Maternal anemia is associated with increased risk of preterm delivery, higher maternal mortality and can affect cognitive development leading to worse health outcomes throughout the lifespan. Anemia also leads to poor physical capacity, influencing work productivity. Half of women of reproductive age in India have iron deficiency anemia compared to only 23% of men. Most research focuses on biological reasons for this discrepancy and access to iron-folic acid and iron-rich foods. However, recent research in India shows that inequitable gender norms may affect a woman’s ability or desire to take iron supplements and to eat iron-rich food. To examine how and why gender norms may be affecting anemia rates among women of reproductive age (WRA), 25 key informant interviews and 16 focus group discussions with WRA, adolescents, husbands and mothers-in-law (n = 148) were conducted in Odisha, India. Key informants were purposively and focus group participants were randomly sampled. The data was analyzed using applied thematic analysis in Nvivo software. Results show that unequal gender norms impact behaviors that are directly related to high rates of anemia. Women are often serving their husband, children, and in-laws first and “adjusting” to whatever is leftover which may include nutritionally deficient foods. Men, the main breadwinners, often spend their money on alcohol, money that could be spent on iron-rich food for the household. Women reported that extreme fatigue is a normal part of being a woman and that a woman’s plight is to take care of her family. Given that fatigue, the primary symptom of anemia, is normalized women may be less likely to seek treatment. Women tend to prioritize the health of their family over her own which could affect her ability or desire to go to the health center to get tested for anemia or to obtain iron supplements. Pregnant women are more likely to take iron supplements for the health of the baby, rather than for her own health. Non-pregnant women of reproductive age, not currently diagnosed with anemia, tend to focus on chronic illnesses and thus do not engage in preventative measures such as taking supplements. More upstream barriers, like gender norms, may be impinging on a woman’s ability to take iron-folic acid and to eat iron-rich foods. Understanding how gender norms contribute to anemia could change the narrative from a biomedical issue to a social justice issue.

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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

How Domestic Violence Affects Women’s Mental Health in Varanasi, India

The purpose of this research is to assess and evaluate how domestic violence impacts women’s mental health in Varanasi, India. This reaserch resulted in the identification of 12 factors that influenced the survivors’s ability to meet the requirements in the definition of mental health. As a result of these 12 factors, it was concluded that the survivor’s mental health was adversely affected by the domestic violence they faced.

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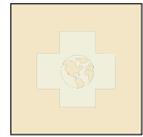
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Assessment of Patterns in Surgical Backlog Within Ethiopian Public Hospitals as a Primary Step in Quality Improvement of Safe Surgeries

The Lancet Commission on Global Surgery established the goal for nations to achieve universal access to safe, affordable surgical and anesthesia care when needed. In Eastern sub-Saharan Africa, over an additional 17 million surgical procedures are needed annually to prevent morbidity and mortality. The Commission set out universal targets to achieve the proposed goals; one of which is for 100% of countries to track surgical volume and preoperative mortality rate (POMR). The Ethiopia Federal Ministry of Health's Health Service Quality Directorate recognizes this importance by listing it under its National Health Care Quality Strategy. This investigation looks to study the details of surgical backlog among Ethiopian public hospitals.

Standardized surveys were sent out to the surgical department of various public hospitals throughout Ethiopia. Among the questions asked was the total number of patients on the waiting list for elective surgery under one of nine surgical departments; General, Orthopedics, ENT, Pediatrics, Plastics, Neuro, Urology, Ophthalmology, and OB-GYN. In addition to the survey, first person interviews with the chairs of various surgical departments were conducted at Gondar Hospital.

When looking broadly at all centers, the departments with the greatest backlog were General at 2044 cases, Orthopedics at 652 cases, and ENT at 496 cases. When looking at Gondar Hospital which has 1,762 backlog cases, the pattern varies; 45% are within General Surgery while 30% within ENT. The procedures with the highest backlog are tonsillectomy at 20%, and thyroidectomy at 14% of all hospital cases. Across all of Gondar Hospital's departments interviewed, the main causes of the backlog are due to either space or equipment limitation.

Assessing the tremendous baseline of surgical backlog is the first step to tracking the hospitals' surgical volume and POMR. It is recommended that future steps be taken to minimize the backlog and determine evidence based methods to prevent future occurrences. The success and limitations of these future steps can be used to inform strategies at other Ethiopian public hospitals.

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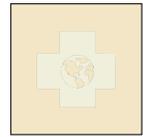
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Gender Attitudes in Adolescence: Evaluating the Girl Rising Gender-sensitization Program in India

Gender sensitization and empowerment programs during adolescence, when gender attitudes are formed, have the potential to diminish gender inequity. The Girl Rising ‘Gender-sensitization program’ was implemented in 254 schools in India to support adolescents in identifying, articulating, and sharing their gender-related experiences. A quasi-experimental study was conducted with a one group pre- and post-test with a sub-sample of schools in rural Punjab and Rajasthan, India (n=2,894 adolescents). Multivariable regression analyses adjusting for gender, grade, and district found that gender equality scores increased by 0.66 points ($p < .001$), gender roles/privileges/restrictions mean score increased by 0.41 points ($p < .001$), and gender attribute mean score increased by 0.17 points ($p < .001$). Gender-sensitization programs can play an important role in forming and changing gender attitudes during adolescence, and have the potential to alter their short and long-term beliefs.

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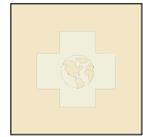
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Survey of Zoonotic Disease Risk Factors in the Somali Region, Ethiopia, 2016 and 2017

Contact with livestock and consumption of raw or unpasteurized products are primary sources of zoonotic infections globally, and particularly among pastoralists and other populations that have close contact with livestock. Little research has been conducted on zoonotic disease risk factors and health care seeking for humans and animals among pastoralist Somali populations. A cross-sectional survey was conducted on a random sample of households from three districts in the rural Somali Region of Ethiopia to identify potential risk factors for emerging zoonotic and food-borne infectious diseases. The preliminary results of this study indicate that contact with dromedary camels, contact with camel milk, and consumption of soured milk products may increase the risk of zoonotic disease. Final results will be presented on research day.

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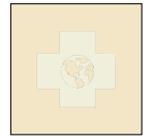
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

A Population-Based Case-Case Study Evaluating the Geographic Distribution of Breast Cancer in Urban versus Rural Areas of Gharbiah, Egypt

In this case-case study for the period of January 2009-December 2010, we evaluated the geographic distribution of breast cancer in Gharbiah, Egypt. Based on data retrieved from the Gharbiah Cancer Registry, we analyzed 1,680 non-inflammatory breast cancer (non-IBC) and 65 inflammatory breast cancer (IBC) cases in this study period. Our results show different geospatial distributions of non-IBC and IBC incidence rates across all districts of Gharbiah Governorate. Our findings suggest these different geospatial distribution patterns are related to the local intense and geographically variable environmental exposures. Future studies should explore these environmental factors, in addition to socioeconomic and genetic factors, to gain more insights into the etiology of IBC and non-IBC in this population.

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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

The Safety and Efficacy of Bivalent Killed Oral Cholera Vaccines in Cholera Endemic and High-Risk Areas: A Systematic Literature Review

Cholera is a disease that is common in environments with poor water quality, sanitation and hygiene. It can cause extreme dehydration that can lead to death if not treated quickly. The bivalent killed oral cholera vaccine is one measure that could provide a layer of protection for populations living in cholera endemic or high-risk areas. This systematic literature review assesses a collection of studies to determine if these vaccines increase immunogenicity in the study populations.

The Navigation Guide systematic method was used to identify and assess risk of bias and strength and quality of evidence across five studies.

The body of studies presents moderate quality of evidence and sufficient strength which supports the positive association between 2-doses of a bivalent killed whole cell oral cholera vaccine and an increase in vibriocidal antibodies. This suggests that the cholera vaccine increases the immunogenic response to cholera providing potential protection from the bacteria. The body of studies also present a moderate quality of evidence and sufficient strength to support the safety of 2-doses of a bivalent killed whole cell oral cholera vaccine.

This systematic literature review assessed the question “Are killed bivalent oral cholera vaccines an effective and safe way to increase immunogenicity in populations living in cholera endemic or high-risk areas?”. The body of studies shows the vaccines to be safe and effective in increasing immunogenicity in populations living in cholera endemic or high-risk areas.

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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

A Study on Forensic Odontology as Future Perspective among Private Dental Practitioners of Ahmedabad, Gujarat-India

Forensic Odontology is based on the fact that, the natural teeth can withstand degradation from extreme conditions even after the death of an individual. Hence, teeth are considered to be very crucial for identification during the investigative procedures, especially when there is lack of any other evidence. Law enforcement in India has traditionally sought the assistance of government-employed personnel and, therefore, forensic dental referrals are commonly made to forensic medical departments at government hospitals or dentists in government service. However, these professionals are often not necessarily required to have undergone formal training in forensic dentistry, who may not have a thorough understanding of the nuances of forensic dental casework, evidence collection methods, evaluation techniques and report writing. This lack of expertise has resulted in forensic dental evidence not being used in a manner to serve the interest of the judiciary and history shows us that many important cases have taken more time than it should have in ideal conditions. There is a dearth of Forensic Odontologists in India. The aim of the study is to analyze the level of awareness, feasibility and future perspective of FO among private dental practitioners of Ahmedabad City. It is a cross-sectional study, in which 210 private dental practitioners participated voluntarily from each of the six zones of Ahmedabad. The sample size was assessed using simple random sampling and then it was divided in six zones by stratified random sampling. A self administered questionnaire with a multiple-choice question was designed. Chi-square test was done using SPSS 20. In this study, we found that >50% of dentists are aware regarding the basic principles of FO and >70% of dentists maintain patient's details as dental records followed by radiographs. A significant finding was that around 58.7% and 72.7% of dentists were aware regarding testifying as an expert witness in court to present dental evidence and the awareness of any formal training courses of FO in the country respectively. The dentists were aware regarding basic principles of FO but revealed poor attitude and practice regarding implementing it in everyday life. This study will enhance the need of organizing training programs, also we might be able to motivate the dentists to actively participate in medico legal cases which can be solved by knowing the basic principles of FO.

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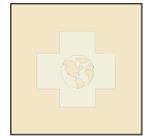
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

The Use of Participatory Visual Methods With Community Health Workers: A Systematic Scoping Review of the Literature

With the need to design and evaluate Community Health Worker (CHW) programmes from a more human-centered perspective, researchers and program managers are exploring the role of participatory visual methodologies (PVMs). Studies have shown that PVMs encourage participants to both document and reflect on their personal experiences using visual methods. As a result, the ideas, images, and voices of CHWs can be more deeply integrated in the design, implementation, and evaluation of healthcare programmes. Although the use of PVMs in global health with different marginalized groups have been published, there has yet to be a systematic review to data that assess their use with CHWs. This review identifies, maps, and assesses the quality of current literature that describes the use of PVMs with CHWs. It includes material from the grey literature and 10 major databases between 1979-2018. A Critical Appraisal Skills Programme (CASP) Qualitative checklist was used to assess the overall quality of the included studies. 12 original studies met the inclusion criteria. The studies were located in North America (n=9) or sub-Saharan Africa (n=3), with photovoice (n=6) and digital storytelling (n=5) being the most commonly used forms of PVMs. The overall quality of the evidence described in these articles was high, but it was notable that seven studies did not fully report the ethical considerations of their work. Major themes of these studies indicated that PVMs can (1) assist in CHWs' reflective practice and community understanding of important health topics, and (2) are a way of identifying key issues in the community to potentially leverage social action. Importantly more work needs to be done to consider the ethical issues of using PVMs with CHWs, including ownership of the images and confidentiality.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Essential Neurosurgical Facilities and Equipment Needed to Address Neurotrauma in Low and Middle Income Countries

In 2015, the Lancet Commission summarized the surgical burden and accessibility of surgical services worldwide. The Low- and Middle- Income Countries (LMICs) are especially at risk due to low proportion of neurosurgeons to neurosurgical disease. A tremendous need to establish hospitals and facilities that are properly equipped and staffed for neurotrauma is necessary to meet this burden. Without proper investment and intervention, LMICs will continue to have tremendous economic loss and profound disability and death. Evaluation of current facility deficits in LMICs is necessary to adequately address global neurotrauma burden.

We define “referring hospital” in our research as the third-level hospital per the World Health Organization (WHO)/World Bank definition and the level 2 or 3 hospital per the World Federation of Neurosurgical Societies (WFNS) definition. Using the WFNS/ WHO/ Program in Global Surgery and Social Change Global Neurosurgical facility database, we assessed the country-wide 4-hour access to referring hospital for LMICs, which were then grouped into three categories: $\geq 80\%$, $< 80\%$ and $< 60\%$ access. Using the National Surgical Obstetric and Anesthesia Plan guideline as a working framework, evidence was gathered from literature search and expert opinion regarding key elements such as facility geographic distribution, referral patterns, and essential equipment.

Currently, the WFNS neurosurgical facility database only has complete data for 70 countries among 195 countries in the world. 34 countries meet the requirement of 80% or more of the population lives within 4 hours of a WFNS level 2 or 3 facility. 6 countries had between 60-80% of the population living within 4 hours of a WFNS level 2 or 3 facility and 30 countries have less than 60% of the population living within a WFNS level 2 or 3 facility.

Based on extensive literature search and expert opinion, in order to scale up neurotrauma care in LMIC's, facilities should be evaluated to meet minimum requirements of having a CT scanner, essential neurosurgical equipment, and intensive care units capable of delivering neurotrauma care. Countries should have at minimum, 80% of the population living within 4 hours of a neurotrauma facility. It is recommended to investment in biomedical engineering with a focus on innovative solutions in low resource settings Telemedicine can be used to bridge physical distance and knowledge gaps for e-consultation, education, and collaboration between neurosurgeons in different settings.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Health Consequences of Hurricane Maria on Puerto Rico

On September 20, 2017, Hurricane Maria impacted Puerto Rico and devastated the island, leaving millions without power or access to clean water or electricity in its aftermath. Puerto Rico is still working to rebuild the damage caused by the storm. Hurricane Maria's impact on the island was profound, resulting in significant morbidity and mortality. In the immediate aftermath many individuals were left without electricity, refrigeration, telecommunications, running water, health services, and other necessary services.

This literature review aims to describe existing literature pertaining to Hurricane Maria and its health consequences on Puerto Rico since the hurricane impacted the island in September 2017. It was conducted by a systematic search of PubMed and SCOPUS for literature published from 2017 through 2019, using a set of inclusion and exclusion criteria and the PRISMA guidelines.

Current literature addresses to varying degrees the effects of Hurricane Maria on: excess mortality, various acute and chronic diseases, and the logistical, environmental, and psychological challenges faced by those in the wake of Hurricane Maria. Several estimates of excess mortality were conducted with a large spread between them, however studies with the most rigorous methodologies put the excess mortality in the thousands.

The search criteria were intentionally broad in order to access any literature that addressed the effect that Hurricane Maria had on the health of individuals living in Puerto Rico during and after Hurricane Maria. Even with such broad inclusion criteria, it is clear that many areas need to be further investigated in order to elucidate the health consequences that this devastating natural disaster had on those affected.

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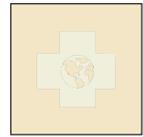
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

The Development of an Emergency Medicine Residency in Kigali, Rwanda

Emergency medicine is quickly becoming its own discipline in various low and middle income countries, including Rwanda. The Human Resources for Health (HRH) initiative was launched in 2012 to address the country's lack of trained emergency physicians. Through this initiative, the Rwandan Ministry of Health partnered with a group of U.S. universities for support and education. Faculty from U.S. medical, health management, and dentistry schools traveled to Rwanda to assist in hospitals, and in various medical / nursing schools. The HRH program aims to develop Rwandan medical specialists to address the issues of health worker shortages, poor quality of education, and management of health facilities. One program under the HRH initiative is the Master of Medicine in Emergency Medicine (MMed) at University Central Hospital of Kigali (CHUK). This paper provides a description of the history, development, and current state of emergency medicine in Rwanda, with specific focus on Rwanda's first emergency medicine residency program at CHUK.

A literature review was conducted using PubMed. Data and descriptions regarding emergency care specifically at CHUK were gathered from relevant websites and peer reviewed articles. Information on CHUK was also obtained directly from hospital personnel during the authors time at CHUK.

As of January 2019, CHUK has graduated 6 emergency medicine residents. The program currently has 8 fourth years, 6 third years, 4 second years, and 1 first year. Graduated residents now hold positions at Rwandan hospitals including: King Faisal Hospital, Rwanda Military Hospital, and Butaro. Additionally, 3 graduates stayed at CHUK, furthering the development of the hospital. At CHUK, these 3 hold positions in the areas of: 1) research, 2) clinical duties, and 3) academics. It has also been observed that emergency medicine training has been associated with significant reductions in mortality in patients presenting to CHUK.

CHUK is well on its way to becoming a sustainable emergency medicine residency. The program currently has 19 residents in training and has graduated 6 students; these 6 are the first emergency medicine physicians in the country. Of these 6 graduated residents, 3 are continuing work at CHUK—which is promising for the future of the program. Furthermore, the decrease in mortality demonstrates the importance of emergency medicine training in a resource-limited setting such as Rwanda.

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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Physician Underproduction in a Large Academic Medical Center

Physicians underperforming at less than 80% of their expected wRVU production were targeted for a three-part survey with their Departmental Chairman. 119 physicians (16%) of the clinical staff underperformed their clinical wRVU compensation, resulting in \$6.8 million in lost reimbursement. Evaluation of work effort showed 94% of underperforming physicians lacked enough clinical hours. Finally, barriers to physician productivity, beyond physician control were evaluated.

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CHILDREN'S NATIONAL MEDICAL CENTER

Parental Perceptions Regarding Alternative Emergency Medical Services Dispositions

Background: The proportion of patients arriving to emergency departments (ED) by Emergency Medical Services (EMS) has been steadily increasing. Many of these patients may not need emergency services at all, and could be seen more efficiently in a primary care or urgent care office. There is very little literature regarding parental preferences for alternative (non-ED) dispositions for pediatric patients after 911 has been called. In particular there is a paucity of data regarding the views of racial and ethnic minority parents, and those who rely on public insurance. There is no published literature regarding parental attitudes towards a 911-nurse triage line.

Objective: To assess parental attitudes towards alternative EMS dispositions (including a nurse triage line), and to evaluate whether these attitudes vary by patient insurance status and race/ethnicity.

Design/Methods: Single center cross-sectional study using a convenience sample of parents/guardians in an urban tertiary care pediatric ED waiting room. Participants completed a 15 item-questionnaire (5 point Likert scale questions) regarding attitudes towards data sharing, shared decision making, and alternative EMS destinations. Responses by insurance status and race/ethnicity were analyzed using chi square analyses.

Results: Of 203 completed surveys, the majority of respondents were publicly insured (59%) and non-Hispanic (NH) black (74%). Most respondents (94%) want to be involved in decisions regarding EMS destination for their children and 89% support data sharing between EMS, hospitals, and primary care offices. Smaller majorities support EMS being able to transport children to clinic settings (69%) or treat and leave children at home (54%). 61% of respondents agree with following the advice of a nurse triage line. Patients with public insurance show lower levels of support for some aspects of an alternative EMS disposition system. We did not identify significant differences by racial group. On completion of enrollment of additional Hispanic patients we plan to conduct a principal components analysis to identify clusters of questions with similar responses, and then conduct logistic regression analyses on selected questions to identify factors associated with acceptance of alternative EMS systems.

Conclusions: A substantial majority of parents in our study were in favor of many aspects of alternative EMS disposition systems. Support for alternative EMS disposition systems may vary by insurance status.

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Impact of Expected Change in Weight-related Quality of Life on Risk Tolerance for Obesity Treatments

This study aimed to quantitatively assess the relationship between weight-related quality of life and the degree of risk that U.S. adults with obesity will tolerate in order to achieve their ideal body weight via pharmacological or surgical intervention. A nationally-representative sample of non-institutionalized U.S. adults (aged 18-64 years) with obesity completed a 35-question interview designed to assess opinions about the impact of excess weight on quality of life and the expected utility of obesity treatments. Expected change in weight-related quality of life was positively associated with the likelihood that participants would accept a small risk of death from anti-obesity medication ($p < .001$) or bariatric surgery ($p < .001$) to achieve their goal weight, controlling for age, gender, race, household income, current BMI, diagnosed prediabetes, and prior discussion of obesity-related risks/treatment options with a health professional. Participants' expected changes in weight-related quality of life aligned well with actual changes reported by adults from interventional studies who achieved clinically-significant weight loss through pharmacological or surgical treatment. Expected change in weight-related quality of life predicts treatment-related risk preferences among adults with obesity who have not previously used pharmacological or surgical obesity management strategies. Incorporating formal assessment of weight-related quality of life into clinical consultations may improve the quality of shared decision-making processes and increase the likelihood of treatment engagement and satisfaction among adults with severe obesity.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

The Relationship between Industry Payments on Research Productivity and Career Success of Academic Radiation Oncologists

The Physician Payments Sunshine Act in 2010 required industry funding of physicians to be publically reported, now enabling assessment of the effects of industry funding on physician productivity in the field of radiation oncology. The goal of this paper is to further investigate whether there is a direct correlation between industry payments and physician productivity and success, as defined by total publications, h-index, or academic rank, for academic radiation oncologists.

This study examined the relationship between industry payments, research productivity, and academic title in academic radiation oncologists. Industry payments data was obtained from the Center for Medicare and Medicaid Services Open Payment database, and bibliometric data was obtained from Scopus. Statistical analyses were performed using on Stata/IC 15.1. Significance was defined as $p < 0.05$.

The annual mean general payments to Professors, Associate Professors, Assistant Professors, and Instructors were \$3626, \$1293, \$622, and \$217 respectively. The annual mean research payments were \$15813, \$7022, \$1616, and \$293 respectively. Our analysis revealed a significant direct correlation between industry funding and H-index for associate professors, assistant professors, and clinicians/other, but this relationship was not significant for professors and instructors. While both general and research payments was significantly associated with H-index when examined separately, this association was insignificant for general payments when controlling for academic rank, region, degrees, research payments, and gender. A multivariate model showed that an increase in \$10,000 annually in research payments was associated with a 1.19-times increase in odds to be in the top quartile of publications and a 1.10-times increase in odds to be in the top quartile of h-index.

Increased research productivity is significantly associated with increased academic rank and industry payments. However, when controlling for confounding variables, research payments, and not general payments, are a significant driver of this relationship.

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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Physical Activity Among Resident Physicians: A Literature Review

Physical inactivity is the 4th leading risk factor for death globally. Physicians, regardless of training level and specialty, are a subset of workers who experience high job demand and high stress levels at work. A literature review was conducted to examine the prevalence, benefits, and barriers to physical activity among resident physicians.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Impact of Smoking Status on Remission in Hidradenitis Suppurativa

Hidradenitis suppurativa (HS) affects approximately 1-4% of the population. HS is a chronic, recurrent, inflammatory disease of the apocrine sweat glands characterized by recurrent abscessing inflammation. The disease has several known risk factors, one of which is smoking. HS severity is correlated with smoking. However, until now no studies have investigated the impact of smoking on remission rates with therapeutic interventions including surgery and biologic therapy. The purpose of this study is to identify the correlation of smoking status on HS disease activity.

This study was conducted through the Wound Etiology and Healing Study (WE-HEAL Study), a biospecimen and data repository approved by The George Washington University IRB (041408). All subjects gave written informed consent for longitudinal collection of their data while they receive treatment according to standard of care. Demographic data, baseline medical comorbidities, smoking exposure and disease activity scores were abstracted from the electronic health record (EHR) and stored using REDCap in the WE-HEAL study database.

At datalock, there were 132 patients observed in the HS cohort. Patients were subdivided into groups based upon smoking status: smoker, non-smoker, former smoker (smoking cessation occurred prior to baseline visit), and quit smoking (smoking cessation occurred after baseline visit). Disease activity was assessed using Hurley Stage and Hidradenitis Sartorius Score (HSS). Remission rates were evaluated using the Hidradenitis Suppurativa Clinical Response (HiSCR).

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Cross-Disciplinary Integration in FDA Team Science

The Food and Drug Administration (FDA) is responsible for assessing the safety and effectiveness of new drug products before they can be legally marketed and used in clinical practice. This is a critical translational activity on the biomedical research continuum. In order to conduct these assessments, the FDA forms teams with varying degrees of cross-disciplinarity, ranging from cooperative multidisciplinary interactions to more intense collaborative problem-solving transdisciplinary interactions. An initial literature review has suggested gaps in knowledge regarding how these cross-disciplinary teams operate, specifically when their integrative capacity and processes are considered. These gaps hamper the FDA's ability to develop practical guidelines to promote the team effectiveness of its assessments and to evaluate the success of interventions that promote cross-disciplinary integration. To address this gap, a mixed-methods, comparative case study has been designed to research the cross-disciplinary integration of FDA teams. The inquiry leverages the theoretical framework of integration postulated by O'Rourke, Crowley and Gonnerman (2016) and a context specific process model of FDA's assessment of new drug products to create a conceptual framework for further research which includes evaluation indicators related to integration processes, both quantitative and qualitative. Characterizing the cross-disciplinary integration process using this framework may suggest how purposeful selection of FDA teams with high and low integration for a comparative case study of the skills, abilities and practices at the team level can inform practical guidelines to promote effective cross-disciplinary integration.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Motivation, Threat, and Engagement Intensity in Cross-Disciplinary Health, Biomedical, Policy, and Education Teams: Pilot Analysis

This is a second phase mixed methods study that follows original research to test a psychometric tool, the *Motivation Assessment for Team Readiness, Integration, and Collaboration (MATRICx)*, that assesses motivations and threats collaboration in health and biomedical teams. The aim of this study is to investigate the relationship between motivations, threats, degrees of engagement, and satisfaction of human need among team members working in established knowledge producing teams.

A mixed methods comparative analysis study is being conducted. The qualitative method being used is semi-structured in-person interviews with individual members of knowledge producing teams. Following the interview, participants are asked to complete the MATRICx instrument, which utilizes quantitative methods. Data from the qualitative interviews will be triangulated with the quantitative survey data to support further interpretation of the meaning of the constructs of the MATRICx. An initial pilot of one teams qualitative data was completed in spring 2019.

Based on preliminary analysis from coding of the initial four interviews, several findings can be deduced. A total of 85 codes were identified across one team. Three codes were identified across all four participants which included collaboration, role definition, and collegial. Prioritization, meeting schedules, and team identity were also frequently used codes across three of the four interviews. There were an additional 39 codes that were only used one time across the interviews. Additional analysis will be conducted to determine if these individual codes should remain independent or recoded through the iterative coding process.

Since this study has only analyzed a subset of data, data collection and analysis will continue as the research team continues. Coding will continue as an iterative process following the methods outlines for the study to ensure intercoder reliability and continuation of thematic analysis as more data is analyzed. Once qualitative data is analyzed and quantitative data is collected, merging and integration of the data will occur.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Pediatric Horner Syndrome from an Otolaryngologic Perspective

Horner Syndrome, is classically described as the clinical triad of miosis, ptosis, and anhidrosis. In pediatric patients the condition may be congenital in origin or arise from neoplastic, infectious or traumatic conditions, including operative causes. Because the neural pathways of Horner's syndrome involve the cervical region, pediatric otolaryngologists may be involved in the management of acquired causes. Understanding the neural pathways, the pathophysiology, variable presentation, and the diagnosis is important in the appropriate management, particularly in malignant conditions. The primary objective of this study was to identify atypical presentations of pediatric Horner syndrome to prevent misdiagnosis in outpatient otolaryngology clinic. This was a case report with retrospective chart review of pediatric patients diagnosed with ptosis, congenital or unspecified, miosis, and neuroblastoma. We present two patients with Horner syndrome with particular emphasis on pediatric otolaryngology management and evaluation. Case 1 is a 5-month-old female presenting first to ophthalmology with concern for left eye ptosis later found to have a Level II neck mass on MRI and subsequently referred to otolaryngology. An excisional biopsy performed showed poorly differentiated neuroblastoma. Case 2 is a 9-year-old female presenting to ophthalmology clinic with pupillary asymmetry and positive cocaine test in the left eye. An MRI showed a left neck mass with concern for carotid body tumor versus ectopic thymic tissue. These two cases emphasize the high level of suspicion required in pediatric otolaryngologists in order to avoid missing malignant etiologies.

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Retrospective Analysis of Mandibular Fractures at a Level I Trauma Center from 2008-2017

Mandible fractures are a niche area within the world of otolaryngology. These fractures, along with other fracture sites, vary in occurrence based on the location along the mandible. For example, in rural areas, certain mandible fracture sites are more common than others, and motor vehicle accidents are the most common mechanism of action. Based on the Trauma Center type, multiple factors also can vary. The goal of this study was to determine the changes in specific variables at an urban Level I Trauma center during a ten-year (2008-2017) period including its title I re-verification in 2013. The variables analyzed consisted of patient demographics, fracture locations, etiology/ mechanism of injury, season of injury, treatment used, and insurance type. Overall, there was a steady rise in the number of mandible fractures over the ten-year period. While comparing the pre-verification and post- verification cohorts, there were significantly less condyle fractures, more 26-35 year olds, and more patients who were assaulted. Limitations to this study consisted of the lack of Hispanic sub-group within the hospital system and possible skewing of mechanism of injury (i.e. some patients may admit to an assault, while others may only admit to a fall). Overall, mandible fractures are multifactorial and certain factors may be dependent on geographical location.

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Development and Evaluation of a Self-Administered Ambulatory Online Assessment Tool for Assessing Cognitive Functioning in Older Adults

As the US population ages, the prevalence of Alzheimer's disease is expected to rise. By 2050, it is expected there will be 14 million people living with Alzheimer's disease in the US. So simple, rapid and accurate tools will be needed to identify individuals with cognitive impairment that have Alzheimer's disease or mild cognitive impairment that can progress to Alzheimer's disease. This study aimed to create and evaluate a self-administered online web based cognitive screening tool to detect cognitive impairment in older adults. Prior to deployment with an older adult sample, work was done to develop and refine the web-based visual memory subtest component of the cognitive screening tool, using React. React is a Javascript library that can be used to develop web based interactive user interface elements. Once the survey is deployed to older adults for testing, the primary outcome measured will be the scores on the online cognitive test. Performance will be composed of the accuracy on the test subcomponents and the time taken to complete the subcomponents. Statistical analysis will be done using methods to analyze differences in performance on the online test components between clinical groups (ie, normative aging versus mild cognitive impairment). The proposed methods are t-tests and analysis of variance tests. Pearson correlations will be used to explore associations between the online cognitive test variables and relevant clinical and demographic variables. The analyses will be done using SPSS. We are currently in the process of pilot testing the tool with staff to ensure accuracy of data obtained. Subsequently, we will distribute the survey and collect data from a sample of currently enrolled older adult participants in studies in the Oregon Center for Aging & Technology. The data analysis will reveal the usability and accuracy of the tool in discriminating between normal aging and mild cognitive impairment.

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Burnout and Resident Physicians: A Review of Contributing Factors

"Burnout," a psychological syndrome that develops in response to chronic emotional and interpersonal stressors on the job, occurs more frequently in medical professional trainees than in age-matched non-medical peers. There are three dimensions of burnout: emotional exhaustion, depersonalization, and decreased personal achievement. Burnout is a significant concern among medical residents as it has been associated with reduced ability to learn, increased medical errors, and delivery of suboptimal patient care. There is a personal cost to burnout, with risks of depression, suicide, and substance use being significantly increased in distressed medical residents. Despite implementation of the 80-hour weekly work limit and various interventions put in place by various residency programs, burnout during medical training remains a complex issue to be addressed.

The aim of this literature review is to investigate the protective and risk factors in burnout in resident physicians.

A literature review was conducted November 2018 to January 2019 using the PubMed and Google Scholar databases to search for articles published in English pertaining to burnout in resident physicians.

There are a number of contributing factors to burnout in resident physicians, and these can be broadly categorized into demographic, personal, and occupational factors. In terms of demographic factors, most studies demonstrate no sex differences while a few studies report higher rates in males. Other demographic risk factors include: younger age during training, being married or having a spouse who works part time or is unemployed. Some studies report that physicians in specialties at the front line of care (e.g., emergency medicine, internal medicine, and family medicine), or are in surgical specialties (e.g., OB/GYN, general surgery) are at the greatest risk of burnout. Various personal factors are correlated with burnout. Higher rates of burnout are seen in residents who are experiencing family-related stress, more dissatisfied with support systems, with poor coping skills for stress, with other health risk-behaviors (e.g., smoking, recreational drug use). Work characteristics including high workload, lack of control over time management, low level of autonomy in job, and stressful relationships with supervisors and co-workers are occupational risk factors for burnout.

These risk factors, identified by multiple studies, can be utilized to design personal, organizational, and societal interventions to address burnout in resident physicians. Future directions of this work will be discussed, including recommendations for training programs and policy level changes.

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Improving Use of Ultrasound in Cardiopulmonary Resuscitation to Minimize Duration of Pulse Checks

Bedside ultrasound has played an increased role in cardiopulmonary resuscitation (CPR) over the past several years. It is mainly utilized to detect spontaneous cardiac movement (SCM) and identify reversible causes of cardiac arrest including cardiac tamponade, pulmonary embolism, and pneumothorax. While using bedside ultrasound in CPR adds value, high-quality CPR emphasizes that the time spent during the resuscitation providing compressions should take priority, with a goal of limiting pulse checks to <10 seconds. Recent studies have suggested that the use of bedside ultrasound during CPR increases pulse check time and decreases the quality of CPR provided.

This prospective study investigated the effect of educational intervention on the length of pulse checks involving ultrasound use. Cardiac arrest resuscitations are currently video-recorded in a number of our resuscitation bays. Videos of resuscitations were independently evaluated by two reviewers for data points including use of ultrasound during pulsecheck, duration of pulse check, and patient outcome. Written feedback was given to providers about length of pulse checks and compression fraction ratio. In addition, selected cases were analyzed in multidisciplinary grand round presentations, providing qualitative and educational feedback on the resuscitation. Specific strategies were highlighted, including limiting pulse check time, emphasis on compressions, as well as the “record then review” method for pulse checks with ultrasound. The primary endpoint was the length of pulse checks with and without ultrasound use, while the secondary endpoint was patient outcome. Average pulse check times with and without ultrasound were also calculated longitudinally to evaluate the effect of our educational interventions.

47 cases were reviewed over 10 months, with a total of 166 pulse checks. The mean length of pulse checks without ultrasound was 12.7 ± 9.6 seconds ($n=127/ 76.5\%$). The mean length of pulse checks that utilized ultrasound was 16.5 ± 11.0 seconds ($n=39/ 23.5\%$). Pulse checks using ultrasound were significantly longer than those without ultrasound ($p=0.0081$). Pulse check times decreased globally over time with educational interventions both with and without use of ultrasound ($p=0.0178$), with an even greater significant decrease in pulse check time with ultrasound use ($p=0.0074$).

Previous studies have shown that ultrasound use prolongs pulse checks. Our data supports this conclusion, but importantly provides evidence that educational efforts targeting use of ultrasound during CPR can improve pulse check times. With educational intervention, our recorded pulse check times have decreased significantly overall, with marginally significant changes for pulse checks without ultrasound and with a greater significant change for pulse checks using ultrasound. These findings suggest that there is a need for further study of educational interventions in order to make pulse checks with ultrasound efficient enough to deliver high-quality CPR with maximal chest compression fractions. These findings highlight that while poorly implemented ultrasound use during pulse checks may be a barrier to high-quality CPR, it is possible to optimize ultrasound use in order to maximize the benefits of resuscitation ultrasound and minimize interruptions in compressions.

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Impact of Smoking on Outcomes Following Knee and Shoulder Arthroscopy

Arthroscopy of the knee and shoulder are two of the most commonly performed orthopaedic surgeries. Optimization of modifiable risk factors such as smoking status is crucial for good outcomes. Approximately 15.5% of Americans smoke, and the prevalence of smoking is highest in males ages 25-64, a group which also encompasses the majority of patients undergoing arthroscopic procedures.

The purpose of this study was to determine whether there is any association between preoperative smoking and perioperative and early postoperative complications in a large population following shoulder and knee arthroscopic surgery.

The National Surgical Quality Improvement Program (NSQIP) database was queried retrospectively for patients who underwent knee or shoulder arthroscopic sports medicine procedures between 2010-2016. These patients were identified using the current procedural terminology (CPT) codes.

Deaths and complications recorded in the first 30 days postoperatively were included. Complications were categorized as cardiac, renal, wound (including all surgical site infections), sepsis, thromboembolic, or pulmonary. A composite outcome was defined as a patient experiencing any of the above complications. Univariate and multivariate analyses were performed examining associations between preoperative smoking and any of the complications individually or for the composite outcome.

134,822 cases were included in the study. In univariate analysis, smoking was associated with increased rates of complication in knee arthroscopy with the following: ACL reconstruction or medial and lateral meniscectomy, and shoulder arthroscopy with the following: debridement, decompression, or rotator cuff repair. Multivariate analysis, demonstrated that smoking was an independent risk factor for any complication/mortality event in shoulder arthroscopy with decompression (OR=1.46; 95% CI: 1.030-2.075), or debridement (OR=1.933; 95% CI: 1.211-3.084) and knee arthroscopy with medial and lateral meniscectomy (OR=1.97, 95% CI:1.407-2.757).

Preoperative smoking is an independent risk factor for complications after several arthroscopic procedures, though with variability between types of procedure. In our study, patients who smoked were significantly younger, and presumably healthier, which may account for some of this variability. Advantages of the NSQIP database are high reliability, national validation, and a large sample size. Limitations include the retrospective nature of the study, lack of data on surgical technique and simultaneous procedures, and self-reporting of smoking status. Our data highlights that even in generally low-risk arthroscopic procedures, smoking may increase the risk of serious perioperative and early-postoperative complications, and adds to the evidence base regarding the dangers of smoking in orthopaedic surgery patients.

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A Systematic Review of Complications and Recurrence following Treatment of Dupuytren's Contracture with Injectable Collagenase Clostridium Histolyticum

To investigate complications and recurrence of Dupuytren's contracture following injectable collagenase clostridium histolyticum (CCH) treatment through a systematic literature review and meta-analysis.

A systematic literature review identified 14 studies that met inclusion criteria, 7 of which investigated complications and 7 of which investigated recurrence following CCH treatment. Studies included were identified from an existing systematic review. Studies excluded did not report complications or recurrences, had recurrence follow up periods of <12 months, or were retracted from publication. Dupuytren's contracture was defined as a fixed-flexion contracture of the metacarpophalangeal joint (MCPJ) or proximal interphalangeal joint (PIPJ) of $\geq 20^\circ$ in one or more non-thumb fingers. Clinical success was defined as a reduction in contracture $\leq 5^\circ$ immediately following CCH treatment.

Complications were reviewed in 1620 patients and 2591 joints (MCPJ=1201, PIPJ=1390) with a mean follow up of 6.9 months (SD=5.9). Initial MCPJ contractures were reduced from 47.4° (SD=4.4) to 7.5° (SD=0.5) within one month of CCH. 66.2% of MCPJs reached clinical success. Initial PIPJ contractures were reduced from 49.2° (SD=6.9) to 21.6° (SD=2.5) within one month of CCH. 28.4% of PIPJs reached clinical success. 55.2% of patients reported at least one treatment related adverse event: major events included tendon and pulley rupture (n=9; 0.56%), tendonitis (n=1, 0.06%), and anaphylaxis (n=1, 0.06%) while minor events affecting over 25% of patients included peripheral edema (90.3%), contusion (64.6%), extremity pain (30.6%), injection site pain (26.4%), and injection site hemorrhage (25.2%).

Recurrences were reviewed 840 patients and 877 joints (MCPJ=609, PIPJ=268) with follow ups ranging 12 to 96 months. Initial MCPJ contractures were reduced from 48.3° (SD=7.0) to 22.8° (SD=34.8) within one month of CCH. 97.9% of MCPJs reached clinical success. Recurrences occurred in 197 (32.3%) of MCPJs. Initial PIPJ contractures were reduced from 43.9° (SD=8.7) to 15.7° (SD=6.9) within one month of CCH. 90.3% of PIPJs reached clinical success. Recurrences occurred in 126 (47.0%) of PIPJs. Interventions were performed in 15% of patients with recurrences.

Trends in CCH outcomes, complications, and recurrences can be identified by systematic review. Meta-analyses will be performed to further investigate CCH therapy complications and recurrences.

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Laparoscopic Hand-Assisted Resection of a Rare Intra-Adrenal Schwannoma

Schwannomas are well-differentiated mesenchymal tumors of the of Schwann cells that are usually benign. A lack of specific radiographic characteristics makes definitive preoperative diagnosis difficult. Therefore, despite the benign nature of these tumors, the gold-standard for symptomatic tumors is surgical resection. Here, we report the surgical management of a 37-year-old male whose pre-surgical evaluation identified a tumor in the right retroperitoneal space between the right adrenal gland and intraperitoneal porta hepatis. As a result of both the preliminary pathologic diagnosis and the close proximity of the tumor to the porta hepatis, laparoscopic hand-assisted surgical resection of the retroperitoneal tumor was performed. Postoperative pathologic diagnosis demonstrated a benign intra-adrenal schwannoma. This case highlights the importance of a broad differential diagnosis for any large retroperitoneal tumor and the requirement for post-operative pathologic diagnosis to characterize the definitive tumor location and malignant potential of the tumor.

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Ketamine Sedation for Acute Agitation in an Emergency Setting

Ketamine may be a safe and effective pharmacological option for managing acute agitation in the emergency department (ED) and prehospital settings. The aim of this review was to summarize all available literature regarding the use of ketamine to sedate agitated patients in the ED and prehospital setting. As part of a systematic review, we queried multiple databases for any publications describing the use of ketamine to control agitation in either the ED or prehospital settings. After applying inclusion and exclusion criteria, data were extracted from each article using structured data sheets. Results of all studies were combined into a single table and a meta-analysis was performed to evaluate for efficacy and safety defined as successful sedation and no need for intubation. Thirteen studies met the inclusion criteria. Ten studies were in the prehospital setting and three in the ED which included a total of 674 patients. For the patients in whom adequate sedation was measured 79.0% were successfully sedated with ketamine. Compared to 10.2% of patients who were sedated with a control medication, 28.8% of the patients who were sedated with Ketamine required airway management. Overall, ketamine achieved adequate sedation in agitated patients treated in the ED and prehospital setting. However, a high percentage of patients required intubation following the use of ketamine. Future high-quality studies are needed to assess the effectiveness and safety of ketamine for this purpose.

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Connect ER: A Technology Enhanced Post-ED Follow-Up Program

Ensuring patients have a follow-up appointment with a primary care physician following discharge from an Emergency Department has been shown to improve patient outcomes. The Connect ER program at the GWU Hospital emergency department (ED) provides a convenient telemedicine link for patients to access a medical provider post-ED discharge, when many patients often struggle to obtain timely access to follow-up care.

Explore patient perceptions of telemedicine, barriers to successful telemedicine referral for follow-up with the GW Connect ER program, and demographic trends in telemedicine perception and usage.

The study is an ongoing prospective review of patients seen in the GW ED who are given the GW Connect ER Program discharge information and phone number as a follow-up option. We use Cerner to create a report of all patients who have a Connect ER referral and call them within 15 days of their ED discharge to conduct a survey assessing the status of their follow-up since discharge, their perceptions of telemedicine, technological competency, and basic demographic information. We will assess the relationship between perceptions of telemedicine and patient usage of Connect ER with other patient information, through chi-squared tests for categorical variables, and analysis of variance for continuous variables.

Our outreach and analysis is ongoing. However, there is critical evaluation of several key aspects of the study that should be discussed. First, the efficacy of information delivered in discharge instructions can vary greatly due to a number of factors, including whether or not the instructions were thoroughly reviewed with the patient, the patient's ability to interpret the information, and the level of importance that the discharge instructions carry from a patient's perspective. These and other factors can play a role in whether the information about Connect ER is found and understood by patients. Second, patients may see follow-up as unnecessary. This perception may limit the number of patients who engage with telemedicine or Connect ER, though not because of telemedicine specifically. Finally, once a patient is considering using telemedicine, they may not question the digital modality of the virtual follow-up visit, but rather whether or not their primary physician can access the documentation from the visit. These are some of the challenging aspects to this study that we will consider when drawing any conclusions from the data.

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Attitudes Toward Electronic Sexual Health Assessments Among Adolescents in the Emergency Department

Adolescents account for nearly half of all newly diagnosed sexually transmitted infection (STI) cases in the United States, and frequently access health care via emergency departments (EDs). However, there are many barriers to ED-based STI screening. Electronic sexual health assessments may overcome some of these ED-specific barriers. Thus, the objective of this study was to assess adolescents' attitudes toward electronic sexual health assessments to guide STI screening in the ED. We performed a secondary analysis of data from two cross-sectional studies evaluating the acceptability of computerized sexual health assessments in the pediatric ED setting. Each study participant completed an electronic questionnaire that elicited sexual behavior information as well as the participant's attitude toward electronic sexual health assessments. In addition, we abstracted the electronic health record to determine if a sexual history was documented by each treating clinician and, if so, we assessed each adolescent's preferred method of sexual health assessment (electronically obtained versus clinician obtained). We performed multivariable logistic regression to identify demographic factors associated with acceptance of electronic sexual health assessments. Of the 1159 adolescents surveyed, 935 (80.7%, 95% CI 78.3, 82.9) found electronic sexual health assessments to be an acceptable method by which to provide sexual health information. The majority (n=874; 75.4%; 95% CI 72.8, 77.9) preferred the electronic questionnaire over a written questionnaire or a face-to-face interview with a clinician. Acceptance of electronic sexual health assessments was associated with female gender (aOR 1.4; 95% CI 1.0, 1.9), Hispanic ethnicity (aOR 1.6; 95% CI 1.0, 2.4), sexual experience (aOR 1.4; 95% CI 1.0, 1.9), and private insurance (aOR 1.8; 95% CI 1.2, 2.7). In conclusion, electronic sexual health assessments are acceptable to adolescents and represent an effective alternative to face-to-face assessments by optimizing patient privacy and ED efficiency. Future studies should evaluate strategies for integrating sexual health assessments into the ED workflow.

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Association of *GREB1* Polymorphisms with Bone and Muscle Health Phenotypes

Previous studies have noted that the oestrogen in breast cancer 1 gene (*GREB1*) locus is associated with variation in bone mineral density (BMD). In one study, genetic variants of *GREB1* were found to be associated with BMD at the lumbar spine and femoral neck in Caucasian adults. The current study sought to expand the understanding of the role genetic variation in *GREB1* polymorphisms rs5020877 and rs10929757 plays on BMD measures in three cohorts of children and young adults. Applied Biosystems Taqman Allelic Discrimination Assays and the Applied Biosystems QuantStudio 7 Flex Real-Time PCR System were used to genotype DNA samples. Hardy-Weinberg Equilibrium (HWE) was assessed for each SNP, analyses were separated by sex, and analysis of covariance (ANCOVA) tests were utilized. Where *post hoc* pair-wise comparisons were performed, resulting p-values were adjusted for multiple comparisons via Sidak method. Our analysis found that variants in rs5020877 were significantly correlated with lumbar spine bone mineral content (BMC) ($p=0.034$) and left hip BMD ($p=0.049$) in African American males from a pediatric fracture cohort. In the same group, rs10929757 variants were significantly associated with total body BMD ($p=0.027$), and left hip BMD ($p<0.008$) in females. In addition, rs5020877 variants were significantly associated with baseline one-repetition maximum strength in the non-dominant arms of Caucasian females ($p=0.021$) in an exercise study cohort. The rs10929757 SNP was significantly associated with bone phenotypes in African American males and females, while the rs5020877 SNP variant was associated with a muscle strength measure in Caucasian females. The results of this study suggest that variations in the *GREB1* gene may contribute to measures of both muscle strength as well as bone quality. However, given the low incidence of the rare allele for either SNP, further study is needed to verify these findings.

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Examining How Housing Counseling Interventions Impact the Health Outcomes in Individuals with HIV in the DC Area

People living with HIV/AIDS have at least three times the rate of homelessness as the general population. In Washington, DC, 2% of residents are living with HIV, with 15.3% of them experiencing homelessness. The primary objective of this study is to provide a descriptive comparison of health markers for individuals who have a diagnosis of HIV and received a housing intervention from Housing Counseling Services (HCS). This is a retrospective study examining data from HCS databases and the HIV/AIDS, Hepatitis, STD, and TB Administration (HAHSTA) surveillance databases. The health outcomes evaluated include viral suppression (VS) and retention in care (RIC). Proportions of individuals with VS and/or RIC were compared across client subgroups (sex, race/ethnicity, age, housing situation at time of intake, type of support received from HCS, e.g.) using chi-square or rank sum tests. Of 734 HCS participants matched to HAHSTA surveillance data, 621 (85%) had data available at intake to evaluate the VS outcome. The sample was predominately male (67%), NH black (89%), had MSM as the HIV transmission risk factor (44%), and had rental housing (58%). Overall, 477/621 (77%) had VS at intake. A lower proportion of individuals with VS were homeless with intake from the street (4.8% among VS vs. 11.1% among not VS, $p < 0.0001$). Out of the 734 HCS participants matched to surveillance data, 634/734 (86%) were retained in HIV care at the time of their HCS intake. A higher proportion of individuals retained in care were NH Black (89.3% NH Black among RIC vs 84.0 NH Black among not RIC). A higher proportion of those retained in care had Housing Voucher program support (29.5% with Housing Voucher program support among RIC vs 15.0% with Housing Voucher program support among not RIC, $p = 0.0024$). In unadjusted analysis, among clients presenting to HCS for intake, being homeless (intake from the street rather than a shelter) was associated with not being virally suppressed. However, this association was not observed for retention in care. Although this analysis was not able to directly evaluate the receipt of housing services on VS and RIC, this will certainly be important for future study. Our results may imply that people who access HCS may need additional wraparound support for maintaining RIC and VS.

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Antibody-Secreting T Cells Engineered for Tripartite Immune Response Against HIV

Antiretroviral therapies have improved outcomes in HIV/AIDS patients but are unable to cure infection. Several strategies appear promising though they have only shown transient decrease in viral load: (1) strong virus-specific CD8+ T cell responses seen in elite controllers, (2) neutralizing antibodies from patient sera prevent virus from infecting cells, and (3) a subset of participants of the RV144 vaccine trial able to elicit high levels of ADCC. The simultaneous use of all three as the basis of a single therapeutic has never been explored. We sought to genetically modify HIV-specific T cells from HIV-naïve donors (dHXTC) to secrete a neutralizing antibody directed against HIV envelope (10-1074).

We designed two transgene constructs. The first, a 10-1074 antibody comprised of 10-1074 heavy and light chains fused to IgG3 Fc to elicit ADCC, with truncated CD19 as selectable marker. The second, a 10-1074 bispecific killer cell engager molecule composed of the 10-1074 single chain variable fragment (scFv) and CD16 scFv. We then modified HIV-specific T cells to express these constructs by expanding cells from HIV-naïve donors using antigens expressing overlapping HIV antigens in the presence of cytokines.

T cells retained antigen specificity against HIV gag, nef, and pol (untrans: 113.74±/91.56 INF γ SFC/1x10⁵ cells against HIV peptide vs 8.25±/12.60 INF γ SFC/1x10⁵ cells against irrelevant peptide, n=6; 10-1074 Ab: 121.47±/75.23 against HIV peptide vs 5.92±/7.00 against irrelevant peptide, n=6; 10-1074 BiKE: 140.70±/31.66 against HIV peptide vs 26.30±/33.78 against irrelevant peptide, n=5) following transduction (10-1074 Ab: 30.58±/22.90%, n=7; 10-1074 BiKE: 44.63±/19.04%, n=6) with the 10-1074 constructs. These cells secreted 10-1074 antibodies (10-1074 Ab: 138.28±/82.57 ng/mL, n=5, p=0.0203 compared to untransduced cells). Functional analysis of the secreted engineered 10-1074 bnAb in culture supernatants showed higher neutralization of HIV compared to their untransduced counterparts (10-1074 Ab: 44.05±/14.19% compared to 6.49±/1.00% in untransduced, n=3), the ability to elicit ADCC as shown by increased NK cytotoxicity (10-1074 Ab: +10.5%, n=2; 10-1074 BiKE: +19.40%, n=3), and a greater anti-viral response in a p24 viral inhibition assay.

These preliminary results show that HIV-specific T cells can be engineered to mount a tripartite attack against HIV. We demonstrate: (1) direct T cell cytotoxicity targeting processed HIV antigens, (2) bnAb ability to elicit ADCC against surface expressed HIV envelope and (3) neutralize free HIV. This tripartite approach allows for synergy between immune arms, broadens the target range of the immune therapy, and provides further insight into what defines an effective anti-HIV response.

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Characterizing Antibody Responses in ART-Treated Patients

Although antiretroviral therapy (ART) suppresses HIV replication, ART-treated individuals must maintain therapy to avoid rebound from a viral reservoir. Strategies to limit or clear this reservoir are urgently needed. Recent research has indicated that patients living with HIV longer prior to treatment may harbor more diverse reservoirs, but also that these patients often exhibit higher anti-HIV antibody titers. The roles virus diversity and length of treatment play in the humoral immune response must be further studied to inform multi-pronged approaches to clearing infection. Here, we aim to elucidate roles for autologous antibodies in these treatments by characterizing the functional anti-HIV antibody response in individuals with different lengths of ART.

Plasma was collected from 8 HIV-infected males on ART. Bulk IgG was isolated from plasma in order to remove ART from downstream assays. IgG was quantified by ELISA and normalized concentrations were tested for binding affinity to gp41 and gp120 proteins by indirect ELISA. IgG was then tested for breadth of neutralization in TZM-bl assays against a global HIV pseudovirus panel.

IgG binding against gp41 was present in all plasma and was highly correlated with titer against gp120 ($r = 0.86$, $p = 0.01$). Surprisingly 3 of the 8 individuals had low or undetectable titers to gp120. On average, plasma exhibited heterologous neutralization against 8 of 12 viruses on a global HIV panel. This neutralization was typically not potent. The strongest neutralizers were two participants who had been infected for 75 and 57 months prior to receiving ART, the longest periods of replication in the study. Potency of neutralization against the global HIV panel correlated with time of infection before ART ($r = 0.83$; $p = 0.02$), but not with duration of ART.

Our findings agree with published studies of untreated individuals that length of infection correlates with neutralization of a global panel. Interestingly, we found that durations of treatment were not associated with differences in neutralization. These data suggest that individuals who are treated early with ART may have less neutralization breadth than those treated late, but not lower antibody titers.

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Metabolomic Profiling of Serum Samples in Malaria: A Comparison of Naïve versus Immunized Mice

Malaria is a life-threatening parasitic infection caused by Plasmodium species and transmitted by Anopheles mosquitoes through blood meals during which they deposit the parasites in the skin of the mammalian hosts. However, there are still remaining gaps in our understanding of the relationship between Plasmodium and its host, especially during the clinically silent stage before the onset of symptoms when the parasite replicates in the liver. Metabolomics is the study of chemicals in biosystems and is a very powerful tool that can investigate metabolism in-depth as well as its byproducts and associated networks. It can therefore help us gain a better understanding of the pathogenesis of malaria, and ultimately identify biomarkers of immunity that can be useful in furthering malaria drug and vaccine research. The goal of this project is to identify metabolites that are differentially expressed in the serum of mice immunized with radiation attenuated sporozoites that confers sterile immunity versus that of naïve mice. The serum samples were all collected during the parasite liver stage that lasts up to 48 hours after the mosquito's blood meal in our mice model. This was achieved by (1) preparation of serum samples collected from immunized and naïve mice 20 and 40 hours after the mosquito's blood meal for liquid chromatography and mass spectrometry, (2) untargeted metabolomic analysis and putative metabolite identification using Compound Discoverer, and (3) statistical analysis using MetaboAnalyst to determine significantly differentiated metabolites. A total of 1831 features were extracted from the samples, and of those 362 distinct differential features between the 4 groups were selected after principal component analysis, partial least square discriminant analysis, and hierarchical clustering. Of those, 21 and 28 putatively identified metabolites using the advanced mass spectral database mzCloud were found to be significantly different between the 2 groups at 20 and 40 hours after challenge respectively. KEGG analysis showed that those metabolites are involved in multiple pathways, including purine metabolism, the TCA cycle, and primary bile acid biosynthesis. Research is still ongoing, with the goal of validating our findings using targeted metabolomics and understanding the role of these differentiated metabolites in the development of malaria.

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Evaluation of Longitudinal Antibody Responses in Zika-Infected Individuals from Colombia

Since the Zika epidemic in 2015, there have been striking associations between Zika virus (ZIKV) infection and neurological complications, sequelae which are most devastatingly seen in fetal development. As a result, there is an urgent need for a vaccine against Zika. However, in order to elicit protective, neutralizing antibodies there is a critical need-to-know of how pre-existing immunity to Dengue virus affects the antibody response to Zika infection. We have previously observed that people who developed Guillain-Barre syndrome (GBS) had higher titers of Dengue and Zika neutralizing antibodies than those who did not develop GBS during Zika infection. This study hypothesizes that in regions endemic for flavivirus infection, individuals who developed GBS and had high neutralizing antibody titers will have antibodies that target different viral epitopes from those who do not. To conduct this study, clinically diagnosed plasma samples taken from Zika-infected persons living in Colombia, South America were tested for the presence and strength of memory antibodies at two different time points after virus clearance. Sera were collected at 1-year (mean 1.3 years) and 2 years (mean 2.3 years) post-Zika infection and were tested against the ZIKV E (envelope) protein. As expected, all serum samples bound highly to ZIKV E monomer protein with detectable waning in titer over one year. In order to map the targeted viral epitopes, we ran competition ELISAs using known monoclonal antibodies, 4G2 and ZK67. These antibodies target the fusion loop (FL) and Domain III (DIII) of the E protein respectively. Interestingly, we found that the majority of sera contained antibodies targeting the FL but not DIII. Therefore, we investigated whether there were clinical differences in people who did or did not develop Guillain-Barre syndrome (GBS). We found that FL responses were significantly stronger in people who did not develop GBS, and that DIII responses were undetectable in all patients. Our future direction is to expand this dataset to map epitopes found on the ZIKV E dimer, which will better reflect the natural conformation of ZIKV E protein.

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Yield of Aerobic, Anaerobic, and Fungal Blood Cultures from Neonates Admitted to the Children's National NICU

Blood cultures are the most sensitive method of detecting a bloodstream infection; however, obtaining adequate volume of blood in a neonate can be difficult. In the NICU at our institution, standard practice is to obtain aerobic and anaerobic blood cultures from neonates with suspected sepsis, and the practice of drawing a fungal blood culture is physician-dependent. The aim of this study is to assess the yield of pathogen isolation from aerobic, anaerobic, and fungal blood cultures in order to inform effective management in neonates while minimizing unnecessary testing.

We completed retrospective review of charts of NICU patients from whom aerobic, anaerobic, and/or fungal blood cultures were drawn between 1/1/2015 and 12/31/2016. The yield of positive culture was calculated, and the organisms isolated from these cultures were reviewed. The medical records of those patients that grew organisms in only one bottle were reviewed to determine if the organism was a likely contaminant, using the CDC/NHSN definition of bloodstream infections.

Over the two years, 1,518 aerobic blood cultures were drawn, of which 71 were positive (4.7%), 934 anaerobic blood cultures were drawn, of which 33 (3.5%) were positive, and 496 fungal blood cultures were drawn, of which 1 (0.2%) was positive. Of 48 instances in which there was a positive culture from at least one blood culture bottle at a time when both an anaerobic and an aerobic blood culture was obtained from the same patient at the same time, 26 yielded an organism in both bottles (54% of positive cultures), 15 yielded an organism in the aerobic bottle alone (31% of positive cultures), and 7 yielded the organism in the anaerobic bottle alone (15% of positive cultures). Of the 7 cases in which an organism grew from the anaerobic bottle but not the aerobic bottle, 4 (2 *S. epidermidis*, 1 *Corynebacterium* sp., 1 *S. simulans*) were considered contaminants by the primary team and not treated, 2 (*S. capitis*, *Streptococcus* sp.) were treated but would have been considered contaminants by CDC/NHSN definition, and 1 (*S. aureus*) was treated as a true infection. The single positive fungal culture grew *Candida albicans* at 89 hours to positivity.

The majority of true bacterial and fungal pathogens which grew by blood culture could be isolated from aerobic culture bottles. The low yield of anaerobic and fungal blood cultures in this study calls into question the utility of their routine use in neonates.

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Exhaustion in Memory CD8 T Cell Subsets during Chronic *Toxoplasma gondii* Infection

Toxoplasmosis is an infectious disease caused by apicomplexa parasite *Toxoplasma gondii* (*T. gondii*). According to the Centers for Disease and Control (CDC), toxoplasmosis is one of the leading causes of mortality among foodborne diseases in the United States. Cell-mediated immune response to toxoplasma gondii infection is critically related with CD8 T lymphocyte cells. However, due to over expression of inhibitory receptors, CD8 T cells ultimately lose their functionality which is manifested by decrease in their cytokine producing ability and other effector mechanisms. This stage is referred to as “state of T cell exhaustion”, and it results in the decreased host ability to prevent optimal control of infection. Recent studies from our laboratory have demonstrated that during chronic toxoplasmosis, CD8 memory T cells exhibit a progressive loss of polyfunctionality accompanied with elevated expression level of programmed cell death protein 1 (PD-1). CD8 memory T cell response, which is comprised of central memory T cells (T_{cm}) and effector memory T cells (T_{em}), will be further investigated during the early chronic phase (Week 5-6 post-infection (p.i.)) and late chronic phase (Week 7-8 p.i.) of the infection. C57BL/6 mice infected with 10 cysts of Me49 strain of *T. gondii* via oral gavage, were sacrificed at week 5 and week 8 p.i.. Toxoplasma specific CD8 T_{cm} (CD62L⁺CCR7⁺) and T_{em} (CD62L⁻CCR7⁻) were analyzed by multicolor flow cytometry analysis. Antigen specific splenic CD8 T cells were defined using a previously published surrogate marker strategy (CD44^{hi}CD11a^{hi}). Flow cytometry analysis revealed an increased expression of multiple inhibitory markers associated with T cells exhaustion, including PD-1, Tim-3, TIGIT, 2B4, CTLA-4, and Lag-3 on both CD8 T_{cm} and T_{em} at week 8 p.i.. However, CD8 T_{cm} exhibited higher expression of all inhibitory markers compared to T_{em} which is correlated with a loss of functionality.

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Analysis of DNA Break Repair Inhibition in *Trypanosoma Brucei*

African trypanosomes (*Trypanosoma brucei spp.*), the cause of African Sleeping sickness, are masters of antigenic variation and can change their dense variant surface glycoprotein (VSG) coat to new variants, thereby escaping host immunity. Switching VSG gene expression is thought to occur predominantly following DNA break formation at naturally unstable telomeric ends. Trypanosomes appear to not have a classical non-homologous end-joining pathway (NHEJ), which predominates in mammalian DNA double-stranded break (DSB) repair. Rather, DSB repair in *T. brucei* occurs through homologous recombination (HR) and microhomology mediated end-joining (MMEJ). Mechanisms of HR predominate in DSB repair and are currently the only known mechanisms that can result in the activation of a new VSG gene, a process called "VSG switching". Thus, tracking DNA break formation events that occur can elucidate whether the break will be repaired in a manner that results in blunt end-joining or the expression of a new VSG through HR. While *T. brucei* DNA break repair pathways are only partially known, the factors that regulate the outcome of a DNA break repair are unknown. Here, we investigate the consequences of inhibiting two subsequent steps of HR, end resection by MRE11 and the coating of single-stranded DNA filaments with RAD51, which then promotes homologous pairing. We sought to determine if known chemical inhibitors of mammalian DSB repair, developed in cancer research, function in *T. brucei* based on a collection of phenotypes, both previously published and novel to this investigation. We determined that both RAD51 inhibitor RI-1 and the MRE11 inhibitor mirin, have the anticipated effects on cell growth and sensitivity to DNA damage. However, we also observed distinct behaviors of each inhibitor on both the processing of DNA breaks and the progression of cell cycle. These data further support previous *T. brucei* literature that suggests MRE11 does not exclusively function upstream of RAD51. Furthermore, our findings indicate both MRE11 and RAD51 may integrate signals for non-canonical processes of DNA break repair and cell cycle progression checkpoints, whose identification could yield novel drug targets against African trypanosomiasis. Chemical inhibitors thus provide a new avenue for further studying the factors regulating VSG switching in *T. brucei*.

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Novel *In-vitro* Model for Assessment of Biofilm Formation by Uropathogens

Catheter-associated urinary tract infections (CAUTI's) are one of the most common nosocomial infections, resulting in over 560,000 infections, 8,000 deaths, and upwards of \$1.7 billion in added medical costs each year in the US. Despite several decades of research, a urinary catheter designed to inhibit biofilm formation continues to elude clinical adoption. One reason for this poor track record relates to the in-vitro models employed for urinary catheter research, which have mostly relied upon nutrient-rich defined media, and laboratory bacterial strains. These in-vitro models poorly mimic in-vivo conditions under which CAUTIs develop, and lead to failed therapeutic candidates in the clinical domain. To address this problem, we have devised a more clinically relevant in-vitro model for assessing biofilm inhibition on non-vital surfaces.

A total of 46 subjects met the clinical criteria for urinary tract infection (UTI) and were enrolled from an urban emergency department. 100 mL of UTI urine was collected and transported to the laboratory. 1 cm² flat silicone surface that was either uncoated or coated with one of two enzymes previously shown to inhibit biofilm formation were individually incubated in 5 ml of fresh uti urine for 4 days at 37°C with rocking. Subsequently, each silicone surface was then removed, stained with a fluorescent nuclear stain and imaged with an epifluorescence microscope. Biofilm images were evaluated with Image J software. Samples were stored and subsequently DNA was extracted for additional biofilm assessment using universal 16S primers in conjunction with ddPCR. Urine culture results were extracted from patient medical records for use in data analysis. Of enrolled subjects, 37 had culture results indicating uropathogens and were included in data analysis.

Silicone surfaces coated with amylase, (active amylase has previously shown antibiofilm activity), demonstrated a significant increase in biofilm coverage whether all uropathogens were evaluated, or just those urine samples that grew out E. coli. Silicone surfaces coated with acylase, an AI-1 inhibitor, showed a similar trend which, however, did not reach statistical significance.

We have shown that biofilm formation on silicone surfaces by clinical uropathogens in a clinically relevant medium (UTI urine) can be assessed via image analysis. Further we have shown that engineered enzymatic surface coatings previously shown to inhibit biofilm formation by representative strains of biofilm-forming bacteria did not inhibit biofilms on silicone surfaces in our model. Work to assess biofilms with greater sensitivity using ddPCR is currently ongoing.

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Recurrent Pericarditis in a Young Man with Asymptomatic Chlamydia Urethritis

A 33 year-old previously healthy man presented with a third episode of chest pain, dyspnea on exertion, and fevers. He had been discharged 2 weeks prior on colchicine and indomethacin after being diagnosed with acute pericarditis. Lab work showed mild leukocytosis, and an increased ESR and CRP. Echocardiogram showed pericardial effusion and tamponade physiology. Chest CT showed mediastinal lymphadenopathy and pericardial effusion. A pericardiocentesis was performed, with 400mL of grossly purulent fluid, with lymphocytic predominance, drained. A pericardial drain was also placed. Thorough history taking revealed that the patient had unprotected intercourse with female partners in recent months. A broad STI panel was sent, and urine PCR was positive for Chlamydia. The patient was started on azithromycin, which was switched to doxycycline due to side effects. The pericardial drain output reduced drastically, and it was removed after 7 days. Fluid cultures were all negative, and a validated Chlamydia PCR test for pericardial fluid was not available. Broad heumatological workup was negative, except for an isolated positive anti ds-DNA. Symptoms did not reoccur. Chlamydial infections are a relatively uncommon cause of acute pericarditis and myocarditis worldwide, although there are significant uncertainties surrounding its incidence. In the era of rising STI incidence, improved characterization of their complications is imperative. The abovecase highlights the importance of keeping a broad differential when encountering “idiopathic” pericarditis and related clinical entities, and of using clinical diagnosis to complement the reliance on molecular testing, especially when considering unusual sites of infection.

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Pilot Study of the Safety and Feasibility of Ultrasound-Guided Fine Needle Aspiration following Hepatitis B Vaccination of Healthy Adults

Assessing adequate immune response after vaccination is a critical component in developing vaccines to prevent diseases. Researchers have devised techniques to help quantify immune responses and determine the efficacy of vaccines. However, research shows low frequencies of antigen-specific T helper follicular cells, immune response cells in blood, making it difficult to assess adequate induction of this important cell type after vaccination. To remedy this, it has been postulated that sampling lymph node centers directly may increase the likelihood of detecting these cells. This study serves as a preliminary model in assessing the efficacy of detecting T- follicular helper cells against the hepatitis B virus surface antigen in lymph nodes (LN) of human participants. If deemed effective, this technique will be implemented in a HIV vaccine trial. The primary purpose of this study was to assess the safety and feasibility of conducting ultrasound-guided axillary LN fine needle aspiration (FNA) following the second and third doses of the ENGERGIX-B hepatitis B vaccine. Additionally, we were interested in characterizing the cellular composition using flow cytometry after the second and third doses of the vaccine. Three volunteers were enrolled who were negative for HBsAg, HBsAb, HBcAb, HIV and HCV. They received the Hepatitis B Vaccine on a 0, 1, & 6-month schedule via intramuscular injections to the deltoid. Baseline screening axillary ultrasound was performed. LN aspirations were conducted 2 weeks post-2nd and 3rd doses of the vaccine. New nodes since baseline were sampled in each volunteer each time point. Aspirates transported to NIH within 1 hour of collection. In 2 of 3 volunteers, new post-vaccination axillary LNs were detected by ultrasound and successfully aspirated; the 3rd volunteer did not have LNs of sufficient size to be accessed. LN-FNA yielded significant numbers of detectable lymphocytes: 1.0×10^6 in participant 1 and 0.3×10^6 in participant 2. Using a labeled hepatitis B surface antigen probe, HBV++ germinal center B and T cells were detected in both volunteers, although these events were rare. These results suggest that antigen-specific T helper follicular cells can be detected in LNs after recent immunization. This reinforces the idea that ultrasound-guided axillary LN-FNA is a useful tool in assessing adequate immune response after vaccination. This studying is currently recruiting volunteers and additional data is expected.

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Survivin Promotes Autoreactive Immune Cells in Myasthenia Gravis: An Animal Model and Human Study

Myasthenia gravis (MG) is a T cell dependent, B cell mediated disorder which targets the neuromuscular junction with autoantibodies directed against the postsynaptic membrane. The majority of patients express antibodies to nicotinic acetylcholine receptor (AChR). We have shown that survivin, a member of the inhibitor of apoptosis family, is expressed in autoreactive lymphocytes from MG patients. Our objectives are to reduce survivin in an experimental autoimmune MG (EAMG) mouse model and to demonstrate survivin as a potential target in human B cells.

Animal model: MG was induced in C57BL/6J female mice through multiple immunizations of Torpedo AChR. The EAMG mice were stratified into three treatment groups: control PBS, and two groups that received different levels of survivin antibody (20ug and 100ug). Mice were assessed for weakness. Mice splenocytes were obtained and stained for T cell marker (CD3e), B cell marker (CD19) plus intracellular survivin. Splenocytes were analyzed by BD FACSCelesta followed by FlowJo software. ELISAs were used to determine AChR-specific IgGs.

Human study: The peripheral blood mononuclear cells (PBMCs) were obtained from MG patients and healthy controls (HCs) by using density gradient media (Ficoll). PBMCs were stained with PBMC marker (CD45), T cell marker (CD4), B cell marker (CD20), plus intracellular survivin. The intracellular survivin expression on human CD20+ or CD4+ lymphocytes were viewed by BD FACSCelesta followed by FlowJo software.

The EAMG mouse model demonstrated survivin expression in CD3- CD19+ splenic B cells, but less in CD3+ CD19- splenic T cells. The treatment with anti-survivin effectively reduced survivin in splenic B cells in a dose dependent manner, and corresponded to reduced levels of AChR-Specific IgG subtype production. In the human study, survivin was expressed in CD4- CD20+ human B cells, whereas, CD4-CD20+ survivin+ lymphocytes of MG patients are significantly higher than HCs.

The animal study demonstrates that survivin does have a pathological role to promote autoreactive B cells and expression of autoantibodies. The expression of the survivin in Human B cells suggest that survivin could be used as a potential therapeutic target.

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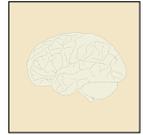
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CNS Specific B Cell Ablation Reduces Microglial Reactivity and Disease Severity in Models of Multiple Sclerosis

Multiple sclerosis (MS) is an autoimmune, demyelinating disease of the central nervous system (CNS) that results in severe functional deficits. MS is characterized by myelin damage, infiltration of peripheral immune cells and microglial activation. Although peripheral B cell depletion therapies using monoclonal antibodies have been shown to be effective in treating MS patients, it is unknown whether CNS specific B cell depletion is sufficient to ameliorate disease pathology. Given there is a persistence of B cells within MS lesions, we hypothesized that CNS specific B cell ablation would reduce disease severity by downregulating microglial reactivity and myelin damage. In the current study, we utilized an inducible caspase 9 (iCP9) transgenic mouse line with a CD19 promoter to specifically ablate CD19+ B cells in the CNS of mice induced with experimental autoimmune encephalomyelitis (EAE), an animal model for MS. We report that induction of EAE with myelin oligodendrocyte glycoprotein (MOG₁₋₁₂₅) in CD19-iCP9 transgenic mice leads to an infiltration of B cells into the CNS. Injection of a chemical inducer of dimerization (CID) into the cisterna magna selectively activates CNS iCP9 in CD19-iCP9 mice induced with EAE, resulting in apoptosis of CNS CD19+ B cells. We assessed EAE disease severity after CID treatment and examined levels of myelin damage and microglial activation in the CNS. CID treatment in the CNS of EAE mice resulted in ablation of CD19+ B cells in the cortex and spinal cord but not in the spleen. B cell ablation in the CNS resulted in a downregulated microglial response and reduced myelin damage compared to control EAE mice. Furthermore, CNS-CID treatment resulted in decreased disease severity in EAE compared to controls. Together, our data suggest that CNS infiltrating B cells upregulate microglial activation and contribute to myelin damage in EAE and as such provide novel insight into the underlying mechanism of MS pathology.

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Analysis of Thymus Tissue from Myasthenia Gravis Patients for Survivin Expression

Myasthenia gravis (MG) is an autoimmune neuromuscular disorder caused by autoantibody directed to postsynaptic membrane of the neuromuscular junctions. Early onset MG (EOMG) with autoantibodies to acetylcholine receptor patients often demonstrate thymus pathology of hyperplasia and germinal center formation (GC). Survivin (SVN) is an intracellular protein that belongs to the inhibitor of apoptosis family which has been found to influence apoptosis and proliferation. The purpose of the study is to evaluate thymus from EOMG patients for survivin positive cells and evaluate the expression in the GCs. We investigated the expression of SVN using immunohistochemistry in paraffin-embedded thymus sections from fifteen EOMG patients. The tissue was processed and stained with anti-survivin antibody and scanned into a digital images (Aperio scanner, 40x) for histological cells analysis using QuPath v0.1.2. By annotating the areas with cells only and excluding other area that contain capsule, fat and connective tissue, images were processed based on the intensity threshold parameter of 0.3. However, due to some variability due to multiple factors include sectioning, staining, tissue condition, the intensity threshold was adjusted and manual counting of multiple random fields was performed to ensure the accuracy of threshold change. Both SVN positive and negative lymphocyte were counted in the tissue field. To count the SVN+ in germinal center (GC), the germinal center were identified by H&E section on serial sectioned slide. Ellipse tool was used to annotate the germinal centers and allow for identification of SVN+ cells. Five thymus samples from EOMG patients did not demonstrate GC in the sectioned area. The higher SVN expression correlated with higher number of GC formation. The thymus sections showed more SVN+ cells in non-germinal center. Sections with minimum thymus content and high fat demonstrated less germinal center formation and higher SVN+ cell ratio. The higher expression of SVN outside GC might suggest a potential anti-apoptotic role. SVN expression could be driving the GC formation or maintenance.

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Refinement of Axonal Function during Development of the Mouse Optic Nerve

The optic nerve is a pure white matter tract and in the adult, virtually all the axons are myelinated. In the mouse optic nerve, myelination begins around postnatal day 7 and continues until around 5 weeks of age. During this period, the nerve increases in axon number and cross-sectional area; however, changes in optic nerve function after this period are unknown. In this study, axonal conduction in the mouse optic nerve (aged 4-12 weeks) was measured using a suction electrode method. Nerves were dissected behind the retina and at the optic chiasm prior to being inserted into stimulating and recording suction electrodes in an oxygenated artificial cerebrospinal fluid bath for extracellular recordings. Electrical stimulation induces simultaneous firing of action potentials in axons, generating compound action potentials (CAPs). The resultant CAP waveform was used to provide a relative measure of the total number of responsive neurons and to distinguish axon populations by speed of conduction. A K-means cluster analysis was used to compare axon population speeds across age groups. The average CAP area (a measure of the number of functional axons) increases through development until 8 weeks of age, where it decreases. Between 4 and 5 wks, the cluster analysis shows a wider distribution of axon population speeds. After 5 wks, there is a gradual increase in the number of axon populations contributing to the fastest speeds per age group and a corresponding decrease in those contributing to the slowest speeds. At older ages (8 and 12 wks), this population is absent, suggesting that slower conducting axons are unique to younger ages and are lost as the optic nerve matures. Given that myelination and nerve growth are considered complete by 5 wks, we hypothesize that the dynamic axon populations reflect an additional period of axon conduction refinement which may be a consequence of changes in myelination or axonal loss.

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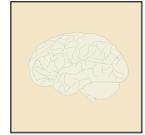
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A Subfornical Organ-Paraventricular Nucleus Neuronal Network Contributes to Non-Alcoholic Fatty Liver Disease via Hepatic Sympathetic Outflow

Non-alcoholic fatty liver disease (NAFLD), characterized by hepatic steatosis, leads to an increased risk for metabolic and cardiovascular diseases. Our recent work indicates that obesity-induced NAFLD is mediated by elevations in hepatic sympathetic nerve activity. However, the neural pathways that contribute to hepatic sympathetic overactivity and subsequent NAFLD development remain unknown. The subfornical organ (SFO), a circumventricular region that lies outside the blood brain barrier, senses circulating stimuli. The SFO sends dense, excitatory projections to the paraventricular nucleus of the hypothalamus (SFO→PVN), an integrative nucleus with direct hepatic spinal projections. Taken together, we hypothesized that an SFO→PVN excitatory neuronal network causes hepatic steatosis via elevations in liver sympathetic outflow. In male C57Bl/6 mice, an intersectional viral strategy was used in which a retrograde transported canine adenovirus was targeted to the PVN to express Cre-recombinase in SFO→PVN neurons (CAV2-Cre-GFP). This was combined with SFO-targeted delivery of a Cre inducible designer receptors engineered against designer drugs (DREADDs) excitatory construct. The pharmacological ligand clozapine-N-oxide (CNO; 3 mg/kg) was administered daily over 6 days to activate SFO→PVN neurons (n=4). Short-term activation of SFO→PVN neurons resulted in hepatic steatosis (2.6 ± 0.02 vs 2.9 ± 0.02 density $\times 10^7$, saline vs CNO, $p < 0.05$) that was paralleled by elevations in liver tyrosine hydroxylase protein (1.8 ± 0.4 CNO fold saline, $p < 0.05$), the rate-limiting enzyme for catecholamine synthesis within postganglionic nerve terminals. Based on this, we combined the above viral strategy with selective hepatic denervation or sham surgery (n=5-6). Oil Red O staining demonstrated that hepatic denervation prevented liver lipid accumulation in response to 6-day activation of SFO→PVN neurons (1.9 ± 0.01 vs 1.7 ± 0.01 density $\times 10^7$, CNO sham vs CNO denervation, $p < 0.05$). Importantly, this occurred independent of changes in body weight and food intake. Hepatic denervation was confirmed by a reduction in liver tyrosine hydroxylase protein expression (0.3 ± 0.1 vs 1.8 ± 0.3 vs 0.4 ± 0.1 -fold saline sham, saline denervation vs CNO sham vs CNO denervation, all $p < 0.05$). Lastly, male C57Bl/6 mice that were fed a high fat diet (10 wks) underwent intersectional viral targeting for expression of an inhibitory DREADDs construct in SFO→PVN neurons. Remarkably, acute inhibition of SFO→PVN neurons in obese mice resulted in an approximate 45% reduction in hepatic steatosis (n=4/group). Collectively, these findings indicate that activation of SFO→PVN neurons causes liver triglyceride deposition via hepatic sympathetic outflow. Furthermore, in the context of obesity, inhibition of this forebrain-hypothalamic autonomic circuit results in a marked reduction in NAFLD.

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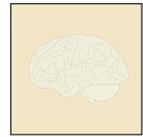
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Serotonergic Regulation of the Development of Affective Behavior

Early life stress (ELS), or exposure to stressful events during childhood, has been shown to lead to both short- and long-term effects on an organism's physiology, including the central nervous system (Syed et al., *Chronic Stress (Thousand Oaks)*, 2017). Due to the high levels of neuronal plasticity found in the early-life critical period, stress during this time period can alter neural circuits to increase susceptibility to mental illnesses later in life (Sheth et al., *Chronic Stress (Thousand Oaks)*, 2017). It has been linked with the development of several psychiatric disorders later in adulthood, such as major depression and generalized anxiety disorder (Syed et al., *Chronic Stress (Thousand Oaks)*, 2017). Furthermore, ELS is associated with deficits in cognitive and affective functions, such as memory, processing of social and affective stimuli, and reward processing (Pechtel, P. & Pizzagalli, D.A., *Psychopharmacology*, 2011). While research has clearly shown that ELS increases susceptibility to psychiatric disorders, it is still unclear what circuits in the brain are responsible for this.

To gain a better understanding, we focused on the dorsal raphe nucleus (DRN), a serotonin-rich region located in the midbrain and pons. The DRN has been strongly connected with mood disorders, as well as involvement in neuroplasticity, and projects to several regions throughout the brain. In this project, we concentrated on the DRN's relationship with the development of affective behavior via two animal behavior assays. These tests were carried out at three points in early life at four, six, and eight weeks to determine how these behaviors mature. A forced swim test was conducted to study the animal's choice between active or passive response to stress, both with and without the administration of selective serotonin reuptake inhibitors (SSRIs). Similarly, a looming disk test was performed to learn how animals respond to innate threats. Both of these behaviors depend on serotonin, and are altered by ELS. Our future studies will focus on links between ELS, maturation of the DRN, and the development of affective behavior.

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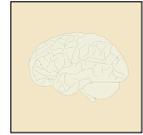
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Roles of Very Long Chain Fatty Acids in Pathophysiology of FASD

Fetal alcohol spectrum disorders (FASD) are caused by prenatal alcohol exposure (PAE). These children suffer from life-long learning and intellectual disabilities, and other behavioral deficits. Our single cell RNA sequencing of cortical neurons from PAE mouse cortex showed the single cell variability in gene expressions. Among the differentially expressed genes, we found enhanced gene expressions in fatty acid synthesis and modification in a specific neuronal population. Among those genes, *Elovl4* is known to be associated with intellectual disabilities. In the endoplasmic reticulum (ER), *Elovl4* elongates fatty acids. Under normal conditions, elongated very long chain fatty acids (VLCFAs) in the ER are shuttled to the plasma membranes; however, the fate and function of VLCFAs synthesized by *Elovl4* remain elusive. Fatty acids crucially regulate neuronal function and structure, and the disturbed fatty acid synthesis is linked to neurodevelopmental disorders such as autism and ADHD. Therefore, we hypothesized that the increase of *Elovl4* in the cerebral cortex is involved in the pathophysiology of the FASD. To examine this hypothesis, we first measured the content of fatty acids in the cerebral cortex after ectopically express *Elovl4*. Compared to the control brain, *Elovl4* overexpression shows the fatty acid profile similar to that of PAE. Second, to define the changes in neuronal membrane dynamics due to *Elovl4* overexpression, the fluorescence recovery after photobleaching (FRAP) was performed in the somal and dendritic domains of transfected neurons. Notably, the *Elovl4* alters the membrane dynamics only in dendritic domains. Lastly, the single pellet reaching task was assessed in the animals overexpressing *Elovl4* in the cortex. Unexpectedly, *Elovl4* overexpression causes excessive self-grooming behavior, indicating indirect effects of *Elovl4* OE on anxiety or/and repetitive behavior due to the changes in other than cortical region. Altogether, these results suggest a potential contribution of *Elovl4* overexpression in FASD-relevant neurobehavior problems, and thus the nutritional or pharmacological intervention focusing on fatty acids may be effective.

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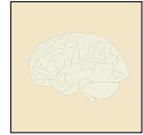
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Impaired Amygdala and Hippocampal Growth in Neonates with Congenital Heart Disease

Congenital heart disease (CHD) is one of the most common forms of birth defects, and has been linked with impaired brain development. The disruption in hemodynamics caused by CHD is thought to prevent the brain from developing normally due to the failure of compensatory mechanisms to meet the high oxygen demands of the brain. A vital region of the brain that may be adversely affected is the amygdala and hippocampus which are structures important to learning, memory, and emotions. By using Magnetic Resonance Imaging (MRI), these structures can be observed and measured in neonates at different stages. The main goal of the study was to observe the amygdala and hippocampal growth in neonates with CHD compared with healthy controls. Neonates with CHD diagnosed by fetal echocardiography were recruited and had no other abnormalities detected by antenatal ultrasound and amniocentesis. Healthy controls were recruited from low risk obstetrics clinics with normal ultrasounds and fetal biometrics. Controls were scanned shortly after birth, while CHD neonates were scanned for pre-operative MRI prior to the cardiac surgery. The MRI scans were performed in GE Discovery 750 3.0T MRI with 8-channel head coil. For volumetric measurements, coronal 3D T2 CUBE sequence was acquired with the following parameters: TR of 2500ms, TE of 64.7 ms, flip angle of 90°, and 1 mm slice thickness. This 3D brain image was then segmented into sub-region to obtain a volumetric measurement. Manual corrections were performed using ITK-SNAP to avoid motion-induced errors. The mean and standard deviation volumes for the left hippocampus, right hippocampus, left amygdala, and the right amygdala were calculated. The p-values were obtained by using linear regression lines and controlling for gestational age. The following means and standard deviations were calculated and are in the order of pre-operative CHD (N=22) and controls (N=34). The left hippocampal volumes were: $651.27 \pm 127.94 \text{ mm}^3$ and $755.41 \pm 140.10 \text{ mm}^3$ ($p=0.0175$); the right hippocampal volumes were: $784 \pm 133.28 \text{ mm}^3$ and $885.76 \pm 152.02 \text{ mm}^3$ ($p=0.0234$); the left amygdala results were: $405.47 \pm 50.45 \text{ mm}^3$ and $468.45 \pm 62.53 \text{ mm}^3$ ($p=0.1855$); and the right amygdala results were: $418.28 \pm 75.35 \text{ mm}^3$ and $475.47 \pm 70.54 \text{ mm}^3$ ($p=0.0458$). The results suggest CHD neonates tend to have lower volumes in the amygdala and hippocampal regions compared to controls, which can be explained by the disruption in hemodynamics in CHD. Further covariates such as gender need to be adjusted and scans at post-operative MRI need to be analyzed to track abnormal development.

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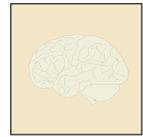
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Determining the Role of NMDARs in Retinofugal Map Formation

In image-forming regions of the visual system, neuronal connections are organized topographically to efficiently relay spatial information. It is well-established that spontaneous activity in the form of retinal waves plays a critical role in the development of topographic maps. However, the mechanisms by which activity mediates map formation remain unclear. Retinal ganglion cells (RGCs) target two image forming regions, the dorsal lateral geniculate nucleus (dLGN) and superior colliculus (SC), each of which is topographically organized. Previous pharmacological studies suggested that NMDARs play a role in the development of retinofugal topography, but whether NMDARs are required pre-synaptically and/or post-synaptically remains unclear. To directly test the role of pre- and post-synaptic NMDARs in retinofugal map formation, we utilized a conditional genetic strategy to specifically ablate NMDAR function in RGCs (pre-synaptic, *Chrn3-Cre*) or in the SC (post-synaptic, *En1-Cre*). Despite clear ablation of NMDAR function in RGCs, we show that topographic maps developed normally in the dLGN and SC using anatomical tracing methods. Further, we demonstrate that NMDARs are not locally trafficked to the pre-synaptic terminals of RGCs, as assessed via calcium imaging. In contrast, our preliminary data suggests that the termination zones of RGCs in the SC are larger in *En1-Cre;NR^{fl/fl}* mice compared to littermate controls. Together, these findings suggest that NMDARs expressed by RGCs are not required for retinofugal map formation, while post-synaptic NMDARs expressed by neurons in the SC may be. Future *in vivo* electrophysiological studies will determine the requirement of post-synaptic NMDARs in establishing functional visual circuits in the SC.

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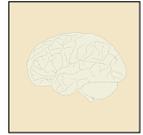
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Intraventricular Injection Approaches to Ablate Optic Nerve Astrocytes

Astrocytes and oligodendrocytes are the major glial cells present in the central nervous system. While oligodendrocytes play a major role in myelin formation, astrocytes are involved in blood brain barrier formation, neuronal guidance, structural support, and glial scar formation. Astrocytes are also involved in various aspects of oligodendrocyte development and myelination. To study the effects of astrocytes on oligodendrocytes and myelination in the optic nerve, we have used intraventricular injection in transgenic mice (GFAP-iCP9) in which apoptosis in a subset of astrocytes was achieved by an inducible form of caspase 9 (iCP9) driven by a fragment of the glial fibrillary acidic protein (GFAP) promoter tagged by DsRed. Data indicate intraventricular injection as an effective method to abolish a subset of astrocytes in the optic nerve, which initiates microglial activation and myelin perturbation 2 days after injection. Furthermore, our studies reveal two populations (GFAP+/DsRed+ and GFAP+/DsRed-) of astrocytes that may be derived from different precursor populations suggesting functional heterogeneity among astrocytes. Future studies will aim at studying the response of oligodendrocytes and myelin at defined time points after astrocyte ablation and utilizing RNA-seq to evaluate the gene expression profiles of the two populations of astrocytes in the optic nerve.

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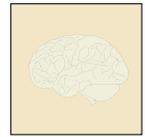
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Cortical Thickness Asymmetries in MRI-Abnormal Pediatric Epilepsy Patients: A Potential Metric for Surgery Outcome

Neuroanatomical morphometric analysis in childhood epilepsy reveals patterns of widespread cortical thinning. The degree of neocortical thinning both ipsilateral and contralateral to the focus is associated with poor epilepsy surgery outcome for MRI-normal adult epilepsy as well as MRI-abnormal childhood epilepsy. We examined if differences in cortical thickness (CT) were related to where focus of epilepsy was located.

Sagittal T1-weighted MPRAGE structural MRI scans were performed on 25 pediatric epilepsy patients (age: 7-17 years) with abnormalities on MRI. Morphometric processing and analyses were conducted using FreeSurfer 6.0. A repeated measures ANOVA was used to examine the effects of focus (temporal or extratemporal), side (ipsilateral or contralateral), and lobe (frontal, temporal, parietal, occipital) on CT. Bivariate correlations were conducted to examine the relationship between CT and patients' age of onset and duration of epilepsy.

Repeated measures ANOVA revealed a significant effect of lobe ($p < .01$) such that temporal CT > frontal CT > occipital CT > parietal CT. Post-hoc analysis showed that parietal lobe CT was significantly less than the frontal and temporal lobes. Across both temporal and extratemporal groups, we found that the temporal lobe was the thickest on the ipsilateral side. This may be because the MRI abnormality, which was largely dysplasia, contributed to a greater CT. Seizure onset and duration was also associated with thinning of the ipsilateral parietal lobe ($r = -0.401$; $p < .05$) suggesting that perhaps the parietal lobe is vulnerable to long-term effects of ongoing seizure activity.

As the majority of this sample (84%) were noted to have successful surgery outcomes, as quantified by an Engel Class 1 or 2 designation post-surgery, our results are also in accordance with previous research which suggests that thicker ipsilateral CT is associated with a good surgery outcome.

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A Developmental Profile of Glucose Transport and Utilization in the Brains of Mice

The brain is known to use glucose and related substrates for energy, as opposed to fatty acids and amino acids. How the brain specifically transports and uses glucose during development, however, has not been completely characterized. The aim of this project is to compile an age-specific, region-specific, and cell-specific profile of glucose transport and utilization during development using a mouse model. This profile, once completed, can be used to better understand changes to metabolism in pediatric disease states such as perinatal hypoxia, epilepsy, hyperglycemia, and mitochondrial disease.

Mouse brains were harvested at ages P11, P15, and P30, which correspond to neonates, young children, and adolescents respectively. Dissected brains were probed by Western Blot for glucose transporters GLUT1, GLUT2, GLUT3, GLUT4, and GLUT8. We expected to see a shift in glucose metabolism between the ages of P15 and P30 based on an observed behavioral shift (increased activity and self-directed search for food).

Results showed a significant increase in GLUT2, a transporter localized to astrocytes, and GLUT8, an insulin-dependent transporter. GLUT3, which is said to be neuron-specific, did not show any significant changes in expression over time.

GLUT2 expression was significantly increased by P30 in the frontal cortex and the hippocampus but showed no significant difference in white matter. The increase in expression of GLUT2 makes sense as the proportion of astrocytes increases greatly during development. In the hippocampus, the astrocyte-neuronal lactate shuttle is implicated in the development of long-term memory; therefore, glucose uptake must be positively regulated here in order to provide enough substrate for the shuttle.

The large increase in GLUT8 expression can be explained by the feeding pattern of mice during development. From birth to P15, the mice are still in their suckling phase, receiving mostly proteins and fatty acids through their mothers' milk. These are broken down into ketones that are used as energy for the brain. By P30, however, the mice are feeding on their own and consume a diet significantly higher in carbohydrates, likely causing greater insulin release. Since GLUT8 is an insulin-dependent glucose transporter, this increase in insulin should cause an increase in expression of GLUT8. Although insulin-dependent GLUT4 should have shown similar patterns in expression, it is only weakly expressed in the brain and more prevalent in other peripheral tissues. Therefore, GLUT8 may be the key insulin-dependent glucose transporter in the brain. GLUT8 activity in diabetic patients, therefore, should be further explored.

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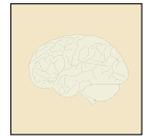
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Cognitive Profiles in Parkinson's Disease Dementia with and without Alzheimer's Disease Pathology

Lewy Body spectrum disorders, including Parkinson's disease dementia (PDD) and Dementia with Lewy Bodies (DLB), frequently coexist with Alzheimer's disease (AD). It has been suggested that concomitant Lewy Body spectrum disorder and AD pathology is tied to a faster progressing dementia, shorter time interval between motor symptoms and dementia, and decreased survival. We aimed to analyze whether this was applicable to idiopathic Parkinson's disease (PD) with and without AD pathology. One of the goals of the Johns Hopkins Morris K. Udall Parkinson's Disease Research Center autopsy study is to examine the relationship between the clinical symptoms of PD and the disease process in autopsy brain tissue. Participants in the autopsy study who were classified as having dementia per the Movement Disorder Society (MDS) Task Force guidelines were included in this analysis. We analyzed demographics, United Parkinson's Disease Rating Scale (UPDRS) scores, cognitive tests in each cognitive domain, and motor symptom to dementia onset interval (MDI). There were 56 participants in total that were stratified into two categories based on autopsy results: (1) pure PD pathology, and (2) PD+AD pathology. The pure PD pathology cohort was comprised of 19 individuals with an average age of 55.8 (SD 9.7), 26% of who were women. Participants had an average of 18.0 years of education and 2 participants suffered from major depressive disorder (10.5%). PD symptom onset to death was an average of 19 years. The PD+AD pathology group had 37 individuals who were older (average age 62.4, SD 8.8) but were similarly highly educated (average education 16 years). Major depressive disorder affected 2 participants (5.4%). The interval between symptom onset and death was 17 years and not statistically different from their pure PD counterparts. Cognitive testing including verbal fluency, Hopkins Verbal Learning Test, Visual Motor Integration, and MMSE subscores were equivocal. There was no statistically significant difference in clinical profile between PD only and PD+AD pathology. Further investigation in larger cohorts should be done to gain a better understanding of the pathophysiology of PDD.

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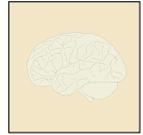
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Frequency, Symptomology, and Course of HIV-Associated ALS: Case Series and Review

The pathogenesis of Amyotrophic Lateral Sclerosis (ALS) is not entirely understood, but there appears to be a relationship between ALS and viral infections including HIV-1. The impact of HIV infection and antiretroviral therapy on the presentation, diagnosis, and progression of ALS is not well-defined.

This is a retrospective chart review in which we analyzed records of patients who presented to the ALS Clinic from September 2006 to June 2018.

We sought to identify HIV-positive patients receiving antiretroviral therapy who were subsequently diagnosed with ALS. Our primary goals were to analyze prevalence of HIV positivity among our ALS patients, describe their ALS presentation and progression, and compare our study cases to ALS characteristics in the general population. We hypothesize HIV-associated ALS is clinically different from ALS in the absence of HIV in several respects, specifically in that it exhibits on average younger age of onset, slower progression, milder symptomology, and better prognosis.

We analyzed records of 322 patients who presented to the ALS Clinic from September 2006 to June 2018, and from that group identified three HIV-positive ALS patients. All three were males with cervical onset classic form of ALS, had been diagnosed with HIV for at least several years, and were undergoing HAART treatment. Each had slower disease progression and younger age of both onset and diagnosis than that described with ALS on average. All three were negative for family history of neurodegenerative disorders.

Although limited in its number of patients, this small case series suggests a distinct profile of patients with HIV subsequently diagnosed with ALS. Confirmation with a large case control study or analysis of a large national database may lead to an emerging focus of ALS research related to the modulation of the immune system and its impact on ALS.

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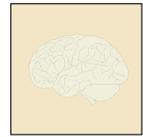
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HIV Negative Factor Protein Disrupts Oligodendrocyte Morphology in the Central Nervous System

HIV-associated neurocognitive disorders (HAND) are a spectrum of cognitive impairments that remain a common consequence of HIV infection. While the advent of combined antiretroviral therapy (cART) has substantially reduced the most severe forms of HAND, milder forms continue to affect 30-50% of HIV-positive individuals. Clinical and experimental studies have implicated preferential white matter damage in HAND pathogenesis, but the mechanisms underlying HIV-associated demyelination remain unknown. Our lab has previously shown that the HIV negative factor (Nef) protein is released from cells as extracellular vesicles and impairs cholesterol efflux from macrophages by downregulating and inactivating a critical cholesterol transporter, ATP-binding cassette A1 (ABCA1). Since oligodendrocytes require a tremendous amount of cholesterol for the synthesis, formation, and potentially the maintenance of myelin sheaths in the central nervous system (CNS), the current study examined the effects of Nef exosomes on oligodendrocyte morphology and myelin structure in the CNS. Cerebellar slice cultures and dissociated cortical cell cultures were obtained from neonatal C57B1/6 mice and treated with exosomes carrying recombinant Nef produced by transfected HEK293T cells. Immunohistochemical analysis of Nef-treated slice cultures showed decreased length of myelin projections along cerebellar axons compared to untreated controls. Furthermore, treatment with Nef exosomes altered complex processes in mature oligodendrocytes *in vitro*. Together, these data suggest that Nef perturbs myelin integrity in the CNS by impairing mature oligodendrocytes. Further work will examine the role of ABCA1 and cholesterol metabolism in Nef-mediated myelin impairment.

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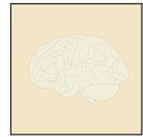
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

VTA GABA Neurons Mediate Sex-Specific Susceptibility to Subchronic Variable Stress

Women are roughly twice as likely as men to be diagnosed with a mood or anxiety disorder. Given that stress plays a significant role in the development of these disorders, sexual dimorphisms in the response to stress are likely to be a critical factor in the enhanced vulnerability of females to mood and anxiety disorders. Across both human populations and animal models, males and females exhibit divergent responses to stress at all levels, from molecular signatures to behavioral adaptations. Subchronic variable stress (SCVS) is a model of depression and anxiety in which female mice develop anhedonia and anxiety, but males do not (LaPlant et al, *Biological Psychiatry*, 2009; Hodes et al, *J. Neuroscience*, 2015). In this study, we use this model to investigate the role of VTA GABA neurons in sex differences in the response to stress.

Dysregulation of the mesolimbic reward circuitry is implicated in the pathophysiology of stress-related illnesses such as depression and anxiety. VTA GABAergic neurons are poised to be a critical node in the regulation of female-specific maladaptive behavior following SCVS. These neurons regulate activity of the mesolimbic dopaminergic pathway, both by gating the activity of neighboring dopamine neurons and through a projection to the NAc. In addition, VTA GABA neurons also project to the ventral pallidum and the lateral habenula, brain regions highly implicated in depressive-like behaviors. VTA GABA neurons modulate reward and anxiety-related behaviors and are activated by acute stressors; however, little is known about neuroadaptations in these neurons in response to chronic or repeated stressors. We hypothesize that SCVS increases activity of GABAergic neurons in the VTA in female animals, and that reversing this will decrease SCVS-induced behavioral deficits.

In our study we show that SCVS causes social and other behavioral deficits in females and that inhibition of VTA GABAergic neurons reverses some, but not all, of these deficits. In parallel, using whole-cell electrophysiology we found that stress increases GABAergic tone in both males and females, but only females exhibit a decrease in the firing rate of dopaminergic neurons. This suggests that there may be an additional protective mechanism in males to maintain activity of the VTA. Our data show that regulation of the VTA microcircuitry in response to stress is sexually dimorphic and may play a role in the development of maladaptive behavioral responses.

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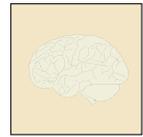
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Exploratory Analysis of the Relationship between Pain and Mood Disturbances in Parkinson's disease

Pain and mood disturbances are distressing non-motor symptoms (NMS) in Parkinson's disease (PD). There is inconsistent data about the correlation between pain, depression, and anxiety in PD, and little information about the relationship between apathy and pain in PD. This study aims to investigate the relationship between pain and mood disturbances in PD, in the hopes that characterizing these may be helpful in providing holistic treatment options for patients.

This is a cross-sectional, observational study of consecutive patients with idiopathic PD, ages 18-85, evaluated at two academic centers. Subjects were assessed with the UPDRS III, King's PD Pain Scale (KPPS), Non-Motor Symptoms Scale (NMSS) and Beck Depression Inventory (BDI). Exclusion criteria included atypical Parkinsonism, cognitive impairment (MMSE < 24/30), severe disability (H&Y stage >4), or other diseases causing acute or chronic pain. Spearman's rank correlation coefficient, ρ , was used for data analysis.

167 patients were enrolled and 88% (n=148) experienced pain (defined as KPPS total > 0). Pain correlated significantly with mood/cognition disturbances on NMSS-3 ($\rho=0.29$, $P<0.001$) and depression on BDI ($\rho=0.37$, $P<0.001$). Pain subtypes of musculoskeletal ($\rho=0.21$, $P=0.009$) and chronic pain ($\rho=0.18$, $P=0.032$) had a significant correlation with mood disturbances (NMSS-3). Selective serotonin reuptake inhibitor (SSRI) use by 46 patients did not lower KPPS, BDI, or NMSS-3 scores. NMSS-3 questions were classified as representing depression, apathy, or anxiety based on DSM V criteria and peer-reviewed definitions. Of the mood disturbances, apathy had the strongest correlation with pain.

The presence of pain in PD is associated with various mood disturbances, including depression, anxiety and apathy. Our data shows that apathy may contribute significantly to this relationship, which was not previously recognized. Future studies using tools specifically assessing apathy might further elucidate this relationship between apathy and pain in PD.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Food Insecurity, Parental, and Infant Weight Status in the First 1000 Days

Childhood obesity is prevalent, and children in low-income households are disproportionately impacted. The first 1,000 days is well established as a critical period of growth and development. Little is known about the link between food insecurity and childhood obesity risk factors during the first 1,000 days. The study objective is to quantify the cross-sectional relationships of food insecurity with maternal and infant weight parameters during the first 1,000 days that are known to increase risk of childhood obesity.

We studied 394 families with a pregnant woman and/or infant under 2 years enrolled in a multi-site Special Supplemental Nutrition Program for Women, Infants, and Children program (WIC) in New York City. After obtaining written, informed consent, staff administered 2-item hunger vital sign screening questionnaire and measured maternal/infant weight, height or recumbent length. For main pregnancy outcome, we defined maternal excess gestational weight gain based on IOM criteria. For postpartum parental weight outcomes, we examined continuous body mass index (BMI) (kg/m^2) and categorical BMI as healthy BMI (8 to <25), overweight BMI (25 to <30), and obese BMI (30 or greater) (CDC guidelines). For infant weight outcomes, we examined age-adjusted, sex-specific weight-for-length z-scores using WHO growth charts, and defined high infant weight-for-length as z-score that is 2 or more. Food insecurity was defined a response other than "never" to either screening question. We examined distributions of all variables and conducted bivariate tests to examine relationships between food insecurity and weight outcomes. Median parental age was 29 years; 99% were female; 94% were Hispanic/Latino; and 39% had annual household income <\$15,000. 249 families had food insecurity. Among the 122 pregnant women, 26% had excess gestational weight gain. Among the 272 postpartum parents, mean BMI was 29.3 ± 6 , 28% had overweight, and 45% had obesity. Among infants, 18% of infants had high infant weight-for-length. Although a higher proportion of women with food insecurity in pregnancy had excess gestational weight gain compared to food secure counterparts, findings were not statistically significant (29% v 22%, $p > 0.05$). Among postpartum parents, 69% with food insecurity had overweight or obesity compared to 79% without food insecurity ($p > 0.05$). For infants, those in households with food insecurity had median weight-for-length +0.84 z-score units while those in food secure households had median weight-for-length +1.02 z-score units ($p\text{-value} = 0.06$).

In this sample of 394 low-income families, over half of the population had food insecurity despite WIC enrollment. Excess parental weight and high infant weight-for-length were prevalent. Interventions to reduce food insecurity and promote healthy pregnancy and infant weight status should include WIC-enrolled families.

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Endothelium Derived Factors Influence Differentiation of Fat Derived MSCs

Fat derived mesenchymal stromal cells have a great potential for therapeutics due to its capability of tissue regeneration and ability to differentiate into several mature tissues such as bone, cartilage, muscle and fat. Metabolic diseases that influence energy expenditure or storage such as prediabetes and diabetes appear to influence the differentiation pathway and as a result also serve as an important biomarker. Cross talk between endothelium and adipose derived MSCs may play a crucial role in energy balance and insulin resistance, in situations such as exercise intervention in prediabetes or diabetes. Here, we investigated if endothelium derived paracrine properties or endothelial conditioned media can affect MSC differentiation in an adipogenic (obesinogenic) environment, such as prediabetes or diabetes.

In vitro, commercially obtained mid passage (8 to 9) human fat-derived stromal cells were exposed to adipogenic media and endothelial conditioned media, ECM, (obtained from culturing mature endothelial cells, HUVECs, 40 fold concentrated) at 1:100 ratio (n=3). MSC differentiation was monitored by RT-PCR and effect on adipogenesis was further assessed by oil-red-O staining of intracellular lipid vacuoles.

We noted a reduced expression of markers for adipogenic differentiation such as PL1N, FABP4, CEBPA and PPARG (24.6, 13.3, 9.8, 4.2 fold, $p=0.00001, 0.02, 0.00001, 0.0001$ respectively). We also observed increased expression of bone formation markers RUNX2 and BMP2 (1.5, 1.3 fold, $p=0.01, 0.01$ respectively) which were increased significantly. We also noted upregulation of endothelial genes such as VEGF and KDR (1.6 and 2.3 fold, respectively). Oil-red-o staining showed reduced lipid droplets where endothelial condition media was added.

We conclude that addition of ECM appear to reduce adipogenesis of mid-passage fat derived human MSCs while augmenting bone formation markers. These outcomes indicate a cross-talk between endothelium and adipose derived cells which may influence differentiation potential towards bone. Further studies are underway to identify specific proteins in ECM that prevents adipogenesis of MSCs in an adipogenic environment.

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Examining Receptivity to Peer Support and the Use of an Adult Pre-Diabetic Online Program for Healthy Behavior Adaptations and Maintenance in Overweight or Obese Adolescents

By NHANES-2012, <1% of American youth meet nutritional guidelines and 2/3 are sedentary, even as the prevalence of obesity, insulin resistance and associated comorbid conditions rise. It is estimated that close to 50% of this health burden could be lifted with improved evidence-based lifestyle habits. Effective motivation of meaningful behavioral change needs to include not only what to do, but why and how—and this takes time. Technology has an emerging role in both the lives of adolescents and in the healthcare system, offering new venues that can increase the exposure time to healthy messaging. We present a small exploratory 16-week study of six adolescents, aged 15-18, recruited from the weight management Clinic at Children’s National Health System. Participants were enrolled in a validated adult online pre-diabetes behavior modification program (ALIVE-PD) previously shown to change behavior and cardiometabolic outcomes favorably. Enrollees participated in group weekly moderated video-chat sessions. The aim was to evaluate program effectiveness in this age group while also studying putative connections between online interactions, peer support, behavior change, and weight management. Receptivity to the messaging was universally positive. All six participants appreciated the freedom to interact with content regularly and when most convenient for their own schedules. All felt that ALIVE-PD programmatic support for behavior modification via goal setting and activity and nutrition tracking contributed positively to maintaining their own healthy lifestyle behaviors. Of the five participants who completed the study, all found that peer support received through weekly video-chat sessions, such as sharing of successes and tribulations, was valuable. The most prominent feedback provided to assist in the development of an adolescent version of ALIVE-PD (100%) was to increase program interactivity by creating a fully-functional mobile application and by including hyperlinks to supplemental material, such as videos and recipes, within the educational content of the program. Other suggestions included increased incentivization and allowing for enhanced personalization of weekly participant goals. Overall, all participants reported this program helped them build a foundation for healthier lifestyle decisions and/or increased their motivation to continue leading healthy lives. Future directions include program conversion to a smartphone-compatible application and exploration of expansion of group membership, such as inclusion of family members, for increased healthy lifestyle support. Exponential growth in smartphone ownership makes m-health interventions both timely and feasible, and this small project contributes to the evidence as to what makes them most effective.

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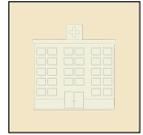
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Antibiotic Resistance—Urgent Care Messaging Study

Antibiotic resistance is a global public health threat that is leaving us unable to fight off infections that were once treatable with antibiotics. It is caused by an overprescription of antibiotics in the outpatient setting, which is perpetuated by “the Yelp Effect.” In our study, we research the effects of online reviews of outpatient clinics on patients’ perceptions, expectations, and knowledge of antibiotics, as well as the effects on clinic, doctor, and reviewer credibility. The results from this study are informing the development of image repair messaging and of studies regarding antibiotic norms.

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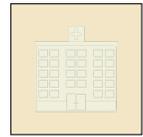
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Pediatric Prescription Fill Rate for Bacterial Infections after Discharge from the Pediatric Emergency Department

Antibiotics are frequently prescribed in the pediatric emergency department (PED), but fill rates after ED discharge are unknown. Medication nonadherence is associated with increased emergency department visits and adverse health outcomes.

To determine antibiotic prescription fill rate overall and by disease category upon discharge from an urban PED.

We performed a retrospective medical record review of PED visits by children aged 0-21 years from Jan 1, 2018 through March 31, 2018, during which oral antibiotics were prescribed to pharmacies participating with Surescripts e-prescribe network as our electronic health record records when these prescriptions are filled. Common diagnoses were grouped using ICD-10 codes for diseases categories of otic, respiratory, urinary, soft tissue/skin infections, and other. Multivariable logistic regression models were used to determine the association of prescription fill rate with diagnosis category after adjustment for patient-level (age, gender, insurance status, interpreter use) and visit-level (diagnosis, triage level) characteristics.

There were 2886 patients with an oral antibiotic prescription. The mean age of patients was 5.6 (+/-4.7) years, and the majority was male (53.3%), publicly insured (70.4%) and Non-Hispanic black race (62.7%). The overall antibiotic prescription fill rate was 66.3% (95% CI: 64.5, 68.0). The fill rate by disease category was: 69.1% for sinusitis, 69.1% for respiratory, 68.1% for pharyngitis, 66.7% for lymphadenitis, 66.5% for soft tissue /skin infections, 65.9% for otic infections, 60.0% for UTI, 64.5% for other and 71.2% if more than one of the above were diagnosed. After adjusting for demographic factors, no differences were identified in prescription filling by diagnosis.

Nearly 40% of patients with bacterial infections discharged from this pediatric ED do not fill their prescriptions. This is the largest study to date of outpatient pediatric ED antibiotic prescription fill rates. The data indicates a timely need to better understand barriers to treatment adherence.

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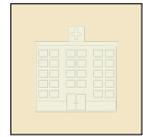
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Assessing Readability of Patient Education Materials: A Modern Role in Female Reproductive Health

Health literacy is defined by the Center for Disease Control as the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions. Low health literacy studies in the past have investigated literacy trends among the elderly and those of low socioeconomic status, but studies have been lacking when it comes to the female population in regards to sexual health and family planning. In this review, I will likely be implementing a meta/content analysis of the studies that have been done previously regarding this population and health topic, while also combing through current patient education materials provided to me through Capital Women's Care (a Washington, D.C., OB/GYN practice) as well as what is available through the internet. In this review, I aim to use primary sources (PubMed, Embase, Web of Science, etc.) to research articles regarding tools for assessing health literacy among this target population published up to 10 January 2018, and to develop inclusion criteria to screen this literature. It is important to understand the reading level of all of these patient education materials to be able to assess their importance and purpose related to females seeking out and following up on their sexual and reproductive healthcare needs. Low functional health literacy is associated with poor health outcomes, and nearly nine out of 10 adults lack the skills needed to fully manage their health care and prevent disease. This staggering figure is enough for one to seek out answers to such a difficult and pervasive issue. Sexual and reproductive health in females is complicated, and requires education that a lot of females in the United States have not had. With this study, I ultimately would like to find information about contraception, sexual health, nutrition, and cost of care that is available to women, examine the information for its understandability and accessibility, and would like to come to a conclusion about its necessity in the realm of healthcare and make suggestions about changes that would be beneficial to the target population.

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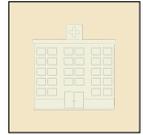
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The Impact of Virtual Reality 360 Film on Helping Behaviors After Natural Disasters

This study assessed whether virtual reality (VR) 360-degree film was more effective than traditional film at influencing people to help victims in Puerto Rico after Hurricane Maria. Study participants watched the same film in either 360-degree format or traditional film format, then were asked about their intentions to help the Hurricane victims. Participants that felt higher levels of transportation by the film (regardless of format) had higher intentions to help hurricane victims, but there was no significant difference between the 360-degree and traditional film formats. The study was only 36 participants and further research is recommended to fully understand the power of 360-degree films.

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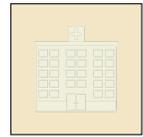
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Best Practices on Use of Medical Interpretation Services for Limited-English Proficiency Patients

Studies show that language barriers in healthcare settings contribute to health disparities, and that patients with limited English proficiency (LEP) are at risk of a variety of adverse outcomes, including limited understanding of diagnosis and treatment plans, low patient satisfaction, medical error, and misdiagnosis. In the United States, a majority of LEP patients are Spanish speakers.

As a medical student, I have become aware of the necessity for clear communication with patients, not only for the purpose of exchanging information, but as a way to connect and build mutual trust. Based on the likelihood that I will work with LEP patients, I was motivated to participate in a medical Spanish immersion program in Ecuador that included clinical rotations. I learned rapidly, and by the end of my stay I was conversational and able to communicate with patients (under the supervision of native-speaking physicians). At the same time, I was acutely aware of my own limitations in speaking Spanish to convey or gather important information to and from patients.

I conducted a review of the current literature to address the following questions:

1. What are best practices for non-fluent clinicians for using Spanish in a clinical setting?
2. What are the recommendations regarding medical interpretation services?
3. What training programs are available to US medical students for working effectively with medical interpreters?

My findings include the following:

Unless a practitioner is fluent and has completed a formal medical Spanish training program, he or she should involve a medical interpreter. The AAMC, CDC, and AAFP have published specific guidelines on how to most effectively work with medical interpreters. These recommendations advise against the use of ad hoc translators (e.g., family members), suggest that communicating through an interpreter is a skill in itself which takes practice, and underscore the importance of clear and short statements from the clinician.

As the demand for healthcare services among LEP patients rises, the potential for miscommunication or misuse of translation services will also increase. Currently, there is limited formal training available to US medical students in medical Spanish. Furthermore, training on how to work with medical interpreters is also limited. My recommendation is for medical colleges (especially those serving large LEP populations) to implement pre-clinical training on how to use medical interpretation services.

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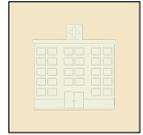
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Latino Immigration and Chronic Disease: A Critical Analysis of Socioeconomic and Psychological Mediators

A critical analysis of chronic disease among Latino immigrants demonstrates the interplay between the individual, socioeconomic, and pathophysiological mediators of disease. To identify the major factors involved, a conceptual framework was developed to explain the relationship between Latino immigration to the US and the manifestation of diabetes and cardiovascular disease. Mediating factors include: self-efficacy, stress, social support, access to healthcare, pathophysiological risk factors and the familial and cultural environment. As the Latino population is the fastest growing and largest minority group in America, increased support among the identified factors will target interventions with broad health and economic implications for the entire nation.

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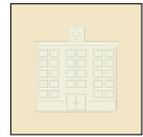
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Maternal Mortality Differences in Afghanistan and Tajikistan

Bordering countries Afghanistan and Tajikistan have vastly different maternal mortality ratios—396 deaths per 100,000 live births versus 32 deaths per 100,000 live births, respectively. It is vital that pregnant women receive proper comprehensive antenatal care during pregnancy to ensure the health of mother and baby. Antenatal care is also incredibly important in reducing maternal deaths, most of which are preventable. There is little known research on the antenatal care practices and/or differences in Afghanistan and Tajikistan.

The purpose of this project is to examine differences in antenatal care practices, behaviors, and disparities that could explain the vast difference in maternal mortality ratios between Afghanistan and Tajikistan. The project will examine other factors or behaviors that would further uncover why the ratios are so disparate. Differences in socioeconomic and geopolitical statuses and social determinants of health will also be considered.

This project will utilize SPSS software to conduct a secondary data analysis on the Demographic and Health Survey (DHS) data from Afghanistan (2015) and Tajikistan (2012) to look at antenatal care variables, and others, to show potential disparities. The project will also consist of a literature/research review to provide background on the topic area.

Analytic techniques will examine socioeconomic and sociodemographic characteristics and use of antenatal care. Other independent variables, like knowledge of contraception and perception of family planning, will also be compared to use of antenatal care. Further results are still ongoing.

Results will be used to guide international development and public health work, and program and intervention development.

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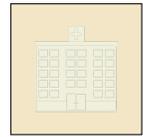
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Reporting Persons With Mental Health Issues: Prospective Study on Gun Control Innovation

School shootings in Parkland, FL and Santa Fe, TX revived debate about early identification of people who exhibit behavior or symptomology associated with violent behavior. People flagged as at-risk may be reported to third-parties such as psychiatrists and law enforcement and may temporarily or permanently become ineligible to possess firearms. Different stakeholders including teachers, therapists, counselors, family physicians, and emergency physicians could be part of an assessment system to flag individuals. Emergency physicians are uniquely likely to see patients who are experiencing some kind of crisis. This study will assist in determining if emergency physicians are willing to take a role in gun control legislated intervention.

An online survey collected information from emergency physicians about: 1) basic demographic characteristics 2) physician knowledge of current firearm eligibility laws 3) physician attitudes about reporting patients to third parties 4) physician attitudes about firearm ownership, permitting and related issues 5) physician political leaning and ideology. The survey will sample emergency departments from a selected urban and rural mix nationwide. Emergency physicians and directors will receive both flyers and emails, directing them to a Qualtrics Web-based survey which includes a consent process. Institutional review board approval for online consent was approved for this study.

A power analysis ($\alpha=.05$; $\beta=.80$) suggested that recruiting between 242 and 346 participants equally divided between rural and urban areas would be very good at detecting minimally acceptable differences.

480 EP responded from 42 states with a mean age of 40 yr. (11 SD) with 50% Attendings in practice <7 years; 80 White 61% Male. Party Affiliations: Democrats 50%, Republicans 30% Independent 20%. Political Ideology: Liberals Outnumber Conservatives 2 To 1. The EP knowledge of gun laws was poor with only 42% obtaining a 70% using the NRA, A summary of federal restrictions on the gun purchasing. Over 80% agree across these 3 measures: limit handgun purchase, background checks and handgun restriction on mentally ill patients.

Emergency Physicians appear willing to report patients with psychiatric illness and ready to play a role in gun control but are not as informed as one would have hoped. Aside from political leanings and pre-survey expectations, this survey found that physicians can be useful and reliable to report patients with mental health to authorities to be sure they do not possess or make future plans for keeping guns out of the hands of mentally unstable individuals.

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Relationship between Parental Psychosocial Stress and Asthma Outcomes among Urban African-American Children

Background: Increased psychosocial stress among parents and children has been associated with worse asthma outcomes, especially in urban children. However, few studies have evaluated the impact of longitudinal changes in psychosocial stress on pediatric asthma outcomes.

Objective: To compare asthma outcomes in children with respect to their parents' reported stress at baseline and changes in their parents' stress over a 12 month intervention period.

Design/Methods: A secondary analysis was performed on data from a recently completed randomized trial of an intervention to mitigate psychosocial stress in African American parents of children with persistent asthma. Children were 4-11 years old, with persistent asthma, and on Medicaid. Asthma outcomes in the children were compared based on (a) baseline levels of self-reported Perceived Stress Scale (PSS) scores in the parents and (b) the change of parental PSS scores from baseline to 12 month follow-up. The primary outcome was change in the child's symptom-free-days (SFDs) over the course of the trial with SFDs being determined from 14-day recall.

Results: A total of 217 African American parent-child dyads were available for analysis. With respect to parental baseline stress, children of parents in the highest tertile of baseline stress had the greatest improvements in SFDs (2.3 ± 5.1) during the 12 month intervention as compared to children of parents in the middle (2.0 ± 4.6) and lowest (1.4 ± 4.3) tertiles ($p=0.4$ for comparison of highest and lowest tertiles). With respect to change in parental stress during the 12 month trial, children of parents who reported a reduction in stress had an improvement of 2.7 ± 4.9 SFDs during the trial as compared to an improvement of only 1.5 ± 4.8 SFDs in children of parents who reported an increase in stress during the trial ($p=0.06$).

Conclusions: Over the course of this intervention trial, there were consistent trends towards better asthma outcomes in children who had caregivers that either (a) had higher baseline stress scores or (b) had better improvements in stress scores at the completion of the trial. This may indicate that stress reduction interventions should be targeted for families with higher levels of stress.

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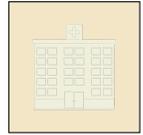
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The Impact of Funding Structure on the Implementation of Violence Against Women Act Grant Projects

Millions of dollars in grants are awarded annually through the Violence Against Women Act (VAWA). This study examined the impact of the funding structure on program implementation, both for current program periods and over time. A dual-methods survey was sent to recipients of 2018 grants for three programs to identify any modifications made to the planned programs due to the project period length and potentially unreliable funding. Anticipated results are that grant recipients with the shortest project periods will be more likely to have made program modifications due to project length, and organizations that have received VAWA grants over multiple years will be more likely to have considered seeking alternate sources of funding recently due to increased funding instability.

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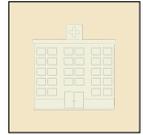
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

What do Adolescents and Women in D.C. Know About Abortion?

A significant research gap exists with respect to risky sexual behaviors, non-use of contraceptive methods, and abortion knowledge. The present study aimed to better understand the differences in abortion knowledge among adolescents and women ages 15-29 living in or receiving health care services in the District of Columbia (n=1,573). This study will provide meaningful knowledge and fill gaps in the abortion literature to both inform and create interventions to ultimately improve the health and well-being of women and girls in DC.

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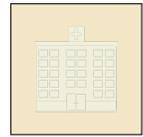
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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Evaluating the Influence of Mindfulness-Based Behavior Change on Social Networks: A Public Health Approach for Lifestyle-Exacerbated Chronic Illness Management

Sustainable lifestyle and behavior modification is a growing focus for global chronic illness prevention and management. Chronic illness secondary to lifestyle is the result of multi-influential behavior patterns. Although social sways on health behavior are well-recognized, interventions harnessing this impact have yet to be implemented. Mindfulness-based behavior change (MBBC) is a novel and sustainable intervention which promotes self-awareness and behavior consciousness in populations challenged with high levels of stress and chronic illness. Our study investigated the impact of participants' MBBC on their social networks. Participants with stress-related chronic health conditions receiving MBBC were eligible. Forty-five participants were recruited and interviewed by telephone about their MBBC experience and perceived benefits and influence on others. Twenty-five additional eligible participants could not be reached (3 separate attempts each). The interview included open-ended and Likert-scale rated questions. The student investigator contacted participants rather than the principle investigator (care provider). Participants ranged from 27-73 years old (median 53 years). Diagnoses included weight management, diabetes, hypertension, anxiety, depression, chronic pain, fatigue, gastro-intestinal disorders, and smoking cessation. 80% had more than one visit at the time of interview (range 1-14 visits, median 2 visits). 69% of participants noticed others benefit a result of their learning the tools and techniques. 41% of participants reported others using MBBC as a result of their example. Participants shared their knowledge with family, friends, and coworkers with similar diagnoses. Mindfulness meditation applications, anti-inflammatory diet, and mindful eating were the most shared interventions. The diagnoses in this study represent common primary care presentations. The positive impact of MBBC on social networks presents a promising cost-effective public health approach to reach higher volumes of patients, identify at-risk individuals, and create community. Future data will explore the motivations behind information sharing and identify the applicability of behavior-based theories at a population-level.

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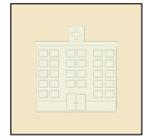
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Opportunities for HIV Prevention in Primary Care for Gay, Bisexual, and Other Men Who Have Sex with Men in Puerto Rico

The incidence of HIV in PR is nearly twice the incidence rate of the United States. Considering emerging biomedical tools for HIV prevention (i.e., PrEP) it is imperative to understand access to and the experience in primary care among Spanish-speaking GBMSM in PR. A secondary analysis was conducted using a dataset collected in 2017 from an on-line sample of 256 sexually active GBMSM in PR. Descriptive and inferential analyses were conducted to determine correlates for HIV testing.

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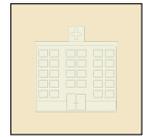
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Comparison of Helicopter and Land Outreach for Cataract Screening in eSwatini

Background: eSwatini is a tiny kingdom (population: 1.367 million) in Southern Africa where much of the country's population lives in rural and hard to reach towns. Cataracts are the leading cause of blindness in most sub-Saharan African nations, including eSwatini. As in most Sub Saharan Africa, the percentage of cases attributed to cataracts is the leading cause expected to be near 50% (Pons 2012). Cataract outreach and screening programs aim to increase the Cataract Surgical Rate (CSR or the number of cataract surgeries per million people per year) in a clinic or hospital as indicated in the WHO and IAPB's *Vision 2020: Right to Sight Report*.

Objectives: To analyze the cost to the clinic and cost saved by patients by using helicopter transport to access rural towns and screen for cataracts and to explore the sustainability of the program as well as its success over other screening programs in achieving the goals laid out by *Vision 2020*.

Methods: Methods included retrospective, hospital-based review of all financial records of outreach activity, literature review, and site visits over a period of two months.

Results: The operating cost of outreach efforts for screening was E 992.27 per patient, and patient transport costs were E 311.43 per patient. For 201 surgery recipients, Good Shepherd Eye Clinic was able to save each patient E 983.81 at a cost to the program of E 1,303.70.

41% of patients identified with operable cataract presented for surgery. The patients identified by the Sight Flight Outreach program in 2017 accounted for 23% of the cataract surgeries performed by Good Shepherd Eye Clinic in that year.

Conclusion: The Sight Flight program provides significant reduction in financial barriers to eliminating preventable blindness in Swazi citizens, contributing to an increased CSR in eSwatini. The efforts specifically target Swazi citizens whose rates of cataract surgery have not been increasing at the same rate as citizens of Mozambique at Good Shepherd.

The program can stand to improve the number of eligible patients who arrive for surgery both to increase CSR of the country and to aid in sustainability of the program by driving down cost per patient by more than half. Given that costs, transportation, and logistics were covered by the program, it is advised that further investigation of non-monetary barriers be investigated.

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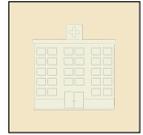
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

GWU Undergraduate Perceptions of JUUL: A Qualitative Study

E-cigarette use among young adults is at an all time high, with the majority of the population using JUULs. This qualitative study explores e-cigarette use and perceptions at GWU among undergraduate JUUL users.

A sample of 14 GWU undergraduate JUUL users were identified through convenience and snowball sampling, and interviewed. Interviews were recorded, transcribed, and analyzed to identify common themes. Follow-up focus groups were completed to ensure trustworthiness and explore additional themes.

Two primary themes emerged from analyzing qualitative data. 1) Students engage in JUULing for the psycho-social benefits. 2) Students have a diverse understanding of the health risks and benefits as they relate to JUUL use.

GWU undergraduate JUUL users perceive the use of JUULs as having psycho-social benefits and report awareness of health risks and benefits.

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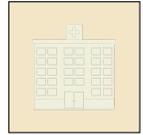
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Perceived and Experienced Mental Health Needs among Puerto Rican Community Responders in the Aftermath of Natural Disasters

For the project, I will conduct a secondary data analysis using qualitative interviews that he conducted in the first semester of 2018. I will use the data he collected to describe the perceived mental health of the community responders both on the Island and in the United States. I will also provide recommendations, informed from a literature review, to address the population's needs.

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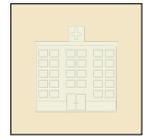
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Metabolic Syndrome (MetS) in Young Adults: Are They at Risk and Aware of It?

The prevalence of young adults (YA) with at least one component of metabolic syndrome (MetS) is on the rise. Individually, elevated components of MetS (i.e., increased abdominal adiposity, high fasting blood glucose, blood pressure, and triglycerides, and low high-density lipoprotein cholesterol) put individuals at risk. In aggregate, those individuals who meet the criteria for MetS (≥ 3 components) are at further increased risk for diabetes, cardiovascular disease, and stroke. It is vitally important to understand the prevalence of YA with MetS, and their associated perceptions of risk.

We examined MetS status, and associated perceptions of risk of individual MetS components in a sample of young adults with overweight and obesity (Body Mass Index [BMI]: 25-45kg/m²).

Baseline data were analyzed from 460 YA aged 18-35 enrolled in a healthy body weight randomized controlled trial. Participants completed the following clinic-based measurements including anthropometric, blood pressure, fasting blood draw. Participants also completed a 5-item questionnaire assessing knowledge of and self-perception of metabolic risk and associated components. Only individuals who had data for all five criteria of MetS ($n=239$; 52.0%) were included in these analyses (78.2% female; 36.4% Non-white; M age 22.95 \pm 4.13 years; M BMI 31.25 \pm 4.24 kg/m²).

About 21% ($n= 50$) of participants met the criteria for MetS, with 66% of those individuals with MetS having never heard of the term metabolic risk. Nearly 70% of all of the participants, regardless of MetS status, had never heard of the term metabolic risk. Further analyses will examine differences in MetS and its components by demographic variables, as well as examine the association between participant risk perception and MetS status.

A disconnect exists between risk for MetS in YA and their associated understanding or perception of risk in a population where one-fifth meet the criteria for MetS, based on preliminary findings. Implications will be discussed in context of informing improvements in patient-health care provider conversations, guiding future research to uncover more insights about MetS in young adults, and tailoring communications about MetS and its risk to young adult populations, including the importance of maintaining a healthy lifestyle across the life course.

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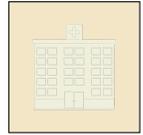
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Developing Strategies to Prevent Dating Violence in Washington, D.C.—A Case Study of Rape Prevention and Education Programs in the U.S.

One in three adolescents in the U.S. is a victim of physical, sexual, emotional or verbal abuse from a dating partner, a figure that far exceeds rates of other types of youth violence. The Centers for Disease Control and Prevention funds rape prevention and education programs (RPE) throughout the U.S. to tackle individual and societal level prevention of sexual violence in all forms. This qualitative case study examines trends, challenges, and successes of these RPE programs through key informant interviews. The interviews were analyzed for themes with the goal to develop strategies to increase the implementation of sexual and dating violence prevention programs and policies in Washington, D.C.

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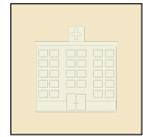
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

The Need for Public Awareness in the Washington D.C. Community for Witnessed Cardiac Arrest

Motivated by a need to understand how best to improve survival for patients arriving to emergency departments in out-of-hospital cardiac arrest, this study investigates CPR data for out-of-hospital cardiac arrest resuscitations brought by emergency medical systems (EMS) to George Washington Hospital (n=44). These represented cases that had data from video recording, chart review, and EMS-provided data parameters including outpatient bystander CPR, bystander, location, and outcomes. Data were described using summary statistics. Of the 44 cases analyzed, 20 of the arrests had been witnessed. Of the witnessed arrests, only 7 (35%) received bystander CPR. Of the unwitnessed arrests, 9 (37.5%) patients received bystander CPR. The rate of bystander CPR for witnessed and unwitnessed cardiac arrests was 35% and 37.5%, respectively. This is comparable to study in 2015 on prevalence of bystander CPR. The literature shows that there is a need for increased public awareness and education about CPR to improve survival for out-of-hospital cardiac arrest. Studies have shown that training initiatives reduce reported likelihood of barriers such as fear of litigation, fear of hurting the patient, and other personal factors as well as increase reported likelihood of CPR. The current case series suggests that additional efforts are needed to increase CPR uptake in the Washington, D.C., area.

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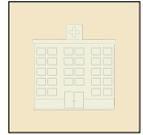
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Children Have Higher Incidence of Traumatic Brain Injury After ATV Crash Compared to Adults

This study is a retrospective cohort study on the risk of not wearing helmets the incidence of traumatic brain injury on persons who suffer an ATV crash, comparing adults to children.

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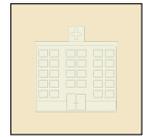
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Depth-Camera Measured Biomechanics of the Lower Extremity Reveal Movement Abnormalities and Targets for Prevention in ACL Reconstructed Patients

This study proposes a new way to promote and improve ACL injury-prevention programs through a low-cost, clinically-accessible depth camera called the Microsoft Kinect 2. The depth camera's ability to accurately quantify knee kinematics in real-time makes it a unique, non-invasive, and quick means of identifying patterns of motion that predispose to ACL injuries. Custom MATLAB software is used to generate numerical values from each patient's kinematic profile. Our preliminary data shows that Kinect-generated values of hip internal rotation, adduction, and knee flexion can be used to analyze ACL injury and re-injury, simply by asking patients to perform three single leg squats. The analysis highlights motions, such as increased internal rotation, that are common in increasing the probability of re-injury. This is an innovative approach to promoting prevention, improving patient quality of life, and reducing healthcare burden/costs. By demonstrating the efficacy of low-cost, user-friendly technology, this study hopes to increase momentum for technology's role in ACL-prevention programs while inspiring patients to take accountability for their health.

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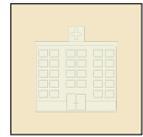
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Newborn Screening in the DMV Area

The vast majority of children in the United States undergo newborn screening shortly after birth, making it a remarkably successful public health initiative. Though a Recommended Uniform Screening Panel (RUSP) has been developed and continues to be updated, comprised of both a core conditions panel and a secondary targets panel, its implementation is not required. Each jurisdiction ultimately decides which conditions to include on its newborn screen (NBS), leading to considerable variation across the country. Here, we assessed the panels in Maryland, the District of Columbia (DC) and Virginia. We considered the differences between the three and compared each panel to the RUSP. Importantly, we also investigated why these differences exist. We found that though all three included a significant proportion of the core conditions panel on their NBS, none included the entire panel. When the secondary targets were considered, we found that both Maryland and DC again included many of the conditions, though not all. Virginia did not include any secondary target conditions. Maryland and DC also included conditions that were absent from both the core conditions and secondary targets panels to their NBS. We identified technical constraints and testing optimization as the main factors contributing to the size of Virginia's NBS as well as to the group of conditions it includes. Continued research is needed to identify the contributing factors in both Maryland and DC. Additionally, the reasons for including conditions not currently on the RUSP in both these jurisdictions remain to be determined.

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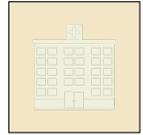
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Parent & Student Knowledge, Attitudes, and Perceptions of Sports Injuries & the Feasibility of Expanding Athletics Activities Diversity in a Community Non-Profit Organization

The purpose of this study is to conduct an assessment of parent and student knowledge and perceptions of youth sports injuries within a community-based non-profit organization's youth football program. This study employs several survey measures and a focus group to measure these variables. Furthermore, a sports interest form (completed by students, athletes, and parents) informs the non-profit organization's strategic planning around the diversity of sports offered through their athletic program.

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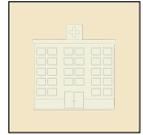
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Scoping Technology-Enabled Public Health Projects in Nepal: Opportunities and Challenges to Pave a Path Beyond “Pilotitis”

Our study aims to map past and extant technology-enabled projects in Nepal using Arksey and O’Malley’s scoping design framework and assess the projects using WHO building blocks of a health system. Our findings will shed light on opportunities and challenges for national and international governing bodies and health systems to chart a course for technology-enabled health solutions to move beyond “pilotitis” in low-resource settings.

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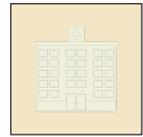
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The Effects of Spiritual Experience and Church Commitment on Mental Health and Work Performance among a Sample of South Korean Immigrants in the United States: A Mixed Methods Study

This sequential mixed methods study measured the effects of spiritual experience and church commitment on mental health and work performance among a sample of South Korean immigrants in the United States. It included the screening survey for assessing level of religious belief and involvement in church activities (quantitative) followed by in-depth qualitative interviews about the relationship between church attachment and mental health as well as work/school performance (qualitative), in order to obtain preliminary findings and generate insights regarding future research. High-active believers who engage in church activities were assigned as Group 1, and inactive/low-active members who still have high-level belief were assigned as Group 2. Both Group 1 and Group 2 contained strong believers, and the screening survey proved that the level of belief were not much different between two groups. There was no guarantee that time dedication for church would improve Group 1's work/school performance because they were suffering from a time conflict between work and church activities and could not focus their energy on one thing. However, there was no doubt that their strong belief was a prime motivation to work or study harder as well as the main factor of developing their mental health and common well-being—though in fact many reported a negative association between intense church involvement and at least some aspects of mental health. This study can serve as a guide to further research on specific factors potentially associated with mental health and social adjustment for Koreans, as well as other immigrants. Specifically, insights from this study shed light on potential elements of religious belief and practice that are related to mental health and work/school outcomes, and on the range of reasons that individuals participate in church. There may be some linkages between the demographics of Group 1 and Group 2 participants that influence level of participation in church activities, but there are not enough data from this study to support any conclusions on that issue.

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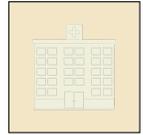
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Integrated Behavioral Health Model Research in Federally Qualified Health Centers

We are working with four Federally Qualified Health Center (FQHC) sites within the D.C. area to collect survey and interview data on patients' and providers' thoughts and experiences with the integrated behavioral health (IBH) in primary care model. The purpose of this research is to better understand the impacts that the IBH model has within the D.C. community. Using the data collected from patients and providers, the goal is to increase knowledge and awareness of the IBH model within community health centers, ultimately leading to an increase in access to behavioral health services and improved coordination of care for all patients within FQHCs.

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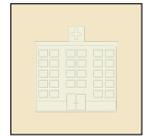
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Monitoring to Innovate with Information Communication Tools (ICTs) and Rapid Response Cycles: A Multi-Level Adaptive Approach for Low-Resource Settings

Real-world operational and methodological constraints in addition to demand for meaningful local stakeholder participation in the monitoring and evaluation process pose challenges in seeking timely, rigorous, inclusive, and nimble monitoring systems. The Reduction in Anemia through Normative Innovations (RANI) process evaluation aims to leverage ICTs and rapid evaluation methodologies to continuously monitor and improve the implementation delivery of several social behavior change communication strategies to increase IFA use and reduce the anemia burden among women of reproductive age in Angul, Odisha. We will use a rapid evaluation multi-level mixed-methods approach grounded in realist, constructivist, and participatory evaluation philosophies to monitor fidelity and receptivity to implementation among study participants and community facilitators. Feedback loops identified via live dashboards and monthly rapid response cycles will aid iterative and collaborative consensus building and decision-making to facilitate timely course corrections by providing a shared understanding of ground realities for a geographically dispersed culturally diverse multi-disciplinary stakeholders and team.

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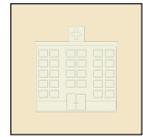
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Screening for Immigration Relief Options and Connecting to Legal Resources in a Primary Care Office Setting

Lack of legal immigration status has been shown to negatively affect patient physical and mental health outcomes. Many undocumented individuals delay seeking medical care due to fear of immigration status exposure. Previous studies have suggested that many undocumented patients may qualify for a form of protected legal immigration status such as Asylum, T-visa, or U-visa, to name a few. At the Children's Health Center at Adams Morgan (CHC-AM), it is estimated that 85% of the patients identify themselves as Hispanic or Latino individuals who live in mixed-status families, in which family members may be a combination of citizens, legal permanent residents, recipients of Deferred Action of Childhood Arrivals, Temporary Protected Status, or undocumented. Their stories strongly suggest that many may qualify for a form of protected legal immigration status. Yet, many do not seek legal counsel due to either lack of knowledge of eligibility for protection or difficulty in finding affordable services. The object of this study is to determine if the anxiety experienced by immigrant patients lessens after increasing awareness of legal immigration protection programs and providing referral to legal services. A team of GW SMHS medical student volunteers is currently recruiting patients at CHC-AM. With each enrolled participant, the students administer a pre-screening survey to assess stress/anxiety levels around immigration status. The students then conduct a free, anonymous online screening tool (www.immi.org). If the screener identifies a potential qualifying legal protection status, a list of local pro-bono or affordable immigration legal services is provided. Students then follow-up with qualifying participants in three weeks to administer a post-screening survey to assess changes, if any, in anxiety levels around immigration status. Research is ongoing. So far, some participants shared that they were not aware of the available protection programs before study enrollment. Others expressed concerns that exposing their immigration status while seeking legal advice would ultimately lead to their deportation. Many stated that they do not have the monetary resources for legal services. Yet others reported anxiety of being unable to provide medical care to their children due to risks of sudden deportation. This preliminary feedback from participants suggests how the stress surrounding immigration status can exacerbate patient health and highlights the need to increase community knowledge of protected legal immigration eligibility. This pilot study thus offers a starting point for understanding how to improve the community health of immigrant patients who may qualify for protected legal immigration status.

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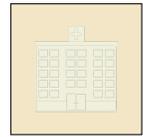
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SCHOOL OF NURSING, CHILDREN'S NATIONAL MEDICAL CENTER

The Social Determinants of Health for Asthmatic Children in Low-Income Communities

Pediatric asthma morbidity is disproportionately concentrated among young children residing in the poorest neighborhoods of Washington, DC. ED visits were concentrated among children residing in Southeast DC. Historically, these geographic disparities in asthma outcomes are linked to socioeconomic disparities.

Our aim was to conduct a review of nursing interventions that addressed the social determinants of health in asthmatic children living in low-income communities.

We searched electronic databases CINAHL and PubMed for studies published within the last 5-10 years. A total of nine studies from 2009 through 2014 from the nursing literature were identified using the following criteria: (1) children with acute asthma exacerbations; (2) residence in low-income communities; (3) an if the child does or does not undergo greater direct socioeconomic challenges and experience stressors, such as unhealthy living conditions and emotional and psychological stressors at a much higher rate or than families with a higher median income. For eligible studies, we summarized soci-economic disparities for asthmatic children living in low-income communities, nursing interventions to address social determinants of health related to asthma, and guidelines for education about caring for children with asthma.

We identified nine studies that met the eligibility criteria with relevant nursing interventions aimed at social determinants of health risk among children with asthma in low-income communities. All nine studies used only the patient's asthma control for evaluation. The study population for all nine studies was generally defined as a child with a history of asthma or acute asthma who lived in low-income communities based on CDC Asthma Surveillance Data and median household income. However, the studies varied in their guidelines for patient intervention. The study published in 2011, had a nurse-led program study implementation of National Asthma Education and Prevention Programs Guidelines by the National Heart, Lung, and Blood Institute to help patients manage their asthma.

Racial and socioeconomic disparities persist among pediatric asthmatic patients presenting to the emergency department. In addition to addressing asthma-related complications, future nursing interventions for asthma care should focus on social determinants of health which include, but not limited to: current living conditions, emotional & psychosocial factors, school days, missed work or daily activities. This self-assessment questionnaire should provide a simple way to address the limitations identified in this review.

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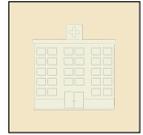
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Culturally Tailored Approach to Assess Facilitators and Barriers of Health-Care Services, Among Recently Resettled Refugees in Prince Georges County, MD

Facilitators and barriers were identified in providing primary healthcare to fifteen recently resettled Afghan refugees and key informants in Prince Georges County, Maryland. In this qualitative research, through a semistructured culturally tailored interview, all participants asserted that the current political environment precludes them from reaching a certain trust level with health care providers and sharing medical information that may cause further stigma and bias. A better understanding of the facilitators and challenges of Afghan Refugees in accessing health care is necessary to shape policy and improve the quality of services for this vulnerable community.

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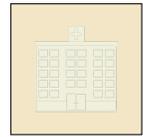
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Knowledge, Attitudes and Practice Patterns of Prescribing Providers Related to Hepatitis C Screening and Treatment – District of Columbia, 2018

Chronic hepatitis C (HCV) carries a significant risk of liver cirrhosis, hepatocellular carcinoma, and the need for liver transplant. Since 2014, directly-acting antiviral medications (DAA) became available and have cure rates over 90%. Despite a greater push to treat patients in the District of Columbia (DC) through less financial restrictions and attempts to expand treatment to the primary care setting, only 25% of HCV patients in DC have achieved undetectable HCV RNA levels. This suggests a possible lack of capacity for providers to diagnose and treat HCV.

The purpose of this study was to identify needs in capacity building and structural and individual-level provider barriers to diagnosing and treating patients with chronic HCV for all prescribers in the DC area, with the overarching goal of expanding HCV care to accelerate HCV elimination.

An internet-based, anonymous survey was sent to physicians, nurse practitioners, and physician assistants in the District of Columbia assessing knowledge, attitudes, and practice patterns related to the diagnosis and treatment of patients with HCV. The primary outcomes were knowledge, attitudes about HCV treatment and interest in further HCV training.

153 (1.5%) prescribers completed the survey, including 35 (23%) nurse practitioners (NP), 86 (56%) primary care physicians (PCP), 11 (7%) specialty physicians (infectious diseases, gastroenterology, or hepatology), and 21 (14%) physicians with unidentified specialties. The majority of providers identified as white females who have been in practice ≤ 10 years. Fifty-one percent, 71%, and 82% of NPs, PCPs, and specialty physicians, respectively, scored 7/9 on HCV screening knowledge (p-value $< .05$). Three percent, 7%, and 55% of NPs, PCPs, and specialty physicians, respectively, scored $\geq 3/4$ on HCV treatment knowledge (p-value $< .0001$). Forty percent of all respondents believe HCV treatment should be provided primarily by specialists, and 35% believe HCV treatment should be provided by primary care providers. Forty-six percent of all providers believe personally building HCV treatment capacity in their clinic would be beneficial while 71% believe HCV treatment is important in their patient communities.

These data suggest that the majority of NPs and PCPs are up to date on HCV screening guidelines, but not treatment guidelines. Given that a significant portion of providers believe HCV treatment should be done in the primary care setting in the era of DAA agents, and that HCV treatment is important in their patient communities, such clinics would benefit from expanding HCV treatment capacity.

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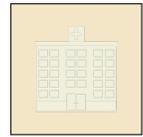
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

“It Allows You to Challenge Your Beliefs”: Examining Medical Students Reactions to Abortion Training at Columbia University Medical Center

As of 2010, 146 million women worldwide who were married or in a union had an unmet need for family planning. Increasing uptake of modern contraceptive use is a process of social change that is mediated in important ways by social networks. We present descriptive results of a study of social networks and social influences on modern contraceptive use in rural Kilifi County in Kenya’s Coast Region.

To inform the social network survey, we conducted formative research with residents in the two communities (n=163). We selected them to represent earlier and later stages in the processes of social change (one with a low modern contraceptive prevalence rate (MCPR) and the other with a high MCPR). We subsequently designed a survey and collected data via whole-networks. We surveyed men, women and adolescents (n=666) in the low MCPR village and (n=1309) in the high MCPR village.

More participants in the low MCPR village reported that contraception use causes infertility (29% versus 12%). Participants in the low MCPR village also reported twice as many social ties with whom they discuss family planning compared to the high MCPR village suggesting a denser social network (0.0007 versus 0.0023). We found similar findings when participants reported discussing child spacing.

In denser networks with more social ties, negative beliefs about family planning can be spread more easily. Study insights have implications for intervention strategies aimed at increasing modern contraceptive use, and for the design of future studies intended to produce an even deeper understanding of these processes.

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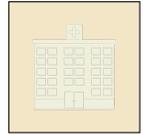
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Examining Fasting Insulin, Glucose, and HbA1c for Insulin Sensitivity among Young Adults with Overweight and Obesity Enrolled in a Weight Management Trial

We compared fasting blood glucose, insulin, and hemoglobin A1c using baseline data collected from 460 young adults ages 18-35 enrolled in an ongoing randomized controlled clinical weight-loss trial. The goal was to determine differences within the subject pool for insulin insensitivity and pre-diabetes based on demographics. We further modeled both pancreatic beta cell function and insulin sensitivity using the homeostatic model assessment for insulin resistance (HOMA-IR).

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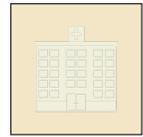
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Understanding Physician Commitment to Practice in Urban Medically Underserved Communities

Nationally, over 84 million Americans live in areas that do not have access to a sufficient number of primary care providers, with the majority being in low socioeconomic urban areas. Many physicians who are recruited or choose to practice in these areas leave after several years, while others remain. Limited empirical research has addressed the experiences of the physicians who choose to stay.

Choosing to maintain a career practice in these communities indicates a commitment. *Commitment* defined as the psychological force that binds an individual to a target or course of action of relevance to that target, is highly correlated with job retention. There is limited understanding of physicians' experiences that lead to and sustain their commitment to practice in underserved communities.

This hermeneutic phenomenological study explored the experience of physician commitment to practice long-term in an urban medically underserved community. It explored how this process developed in these physicians, as well as the influences that strengthened and/or weakened commitment. In-depth interviews of eleven primary care physicians who practice in underserved cities for seven years or greater were analyzed.

Four primary findings emerged from this study:

1. Primary commitment of these physicians was to underserved communities in general and their specific community. Secondary commitment was to their practice clinic organization.
2. Commitment involved: embracing satisfying activities; actualizing individual values; enacting identity; and facing/resolving challenges.
3. Commitment is sustained and reinforced through the intersection of these characteristics.
4. Commitment developed through the merging of commitment to profession with commitment to the underserved. Family, religious upbringing, mentors, and nontraditional educational routes contribute to the development.

This study shows the complexity of the commitment of physicians practicing in underserved communities, broadens the view of commitment as it is applied to organizations, and has implications for policies for health professional retention.

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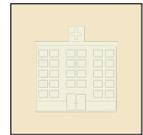
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SCHOOL OF MEDICINE AND HEALTH SCIENCES
CHILDREN'S NATIONAL MEDICAL CENTER

Assessing Barriers to HPV Vaccine Delivery

Current rates of the Human Papillomavirus (HPV) vaccine for adolescents are not yet optimal on a national level. This vaccine is an important addition to the established vaccine regimen as early vaccination is associated with mitigating HPV-associated cancer risk. There is need for improvement particularly in the District of Columbia as HPV-associated cancer diagnoses from 2011-2015 were around 13-16%, representing higher percentages than other areas of the country. In order to reach the American Cancer Society's goal of 80% HPV vaccination rate by 2026, approximately 14.39 million additional adolescents aged 11-12 need to be vaccinated. Despite the efficacy of the HPV vaccine, there has been controversy with its administration.

We conducted a literature review assessing some of the most common barriers associated with HPV vaccination. We also examined the most effective interventions for increasing HPV vaccination rates.

Some common barriers to HPV vaccination from a healthcare provider perspective included lack of knowledge about vaccine, lack of insurance coverage, and belief that parents dictate the success of vaccination rates. Barriers to vaccination from the parent perspective included lack of available information about the vaccine, safety of the vaccine, and not receiving direct recommendation from a physician. Other barriers included poor socioeconomic status, male gender, and young age. Effective interventions to increase vaccine rates or intention to vaccinate included educational fact sheets, informational videos and physician recommendation.

In summary, there are a variety of barriers to HPV vaccination that make it difficult to administer. The best method for increasing HPV vaccination rates will be consistent physician recommendation and providing educational fact sheets or informational videos that can ensure parents and patients are well informed.

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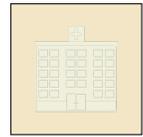
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

Preventing Unintended Pregnancies in Washington, D.C.: What Factors are Related to Effective Contraceptive Use

In 2011, approximately 2.8 million pregnancies in the United States were unintended, which equates to about 45% of all pregnancies, and in 2010, 62% of all pregnancies in D.C. were unintended. Since little is known about effective contraceptive use among sexually active women in D.C., this study examined sociodemographics, and sexual and reproductive health knowledge, attitudes, and behaviors related to effective contraceptive use among this population. Between November 2017 and April 2018, a purposive non-random stratified sample of women ages 15-29 were recruited across all eight wards in the District of Columbia (N = 1,573). This study will inform future family planning interventions and fill gaps in the evidence base surrounding utilization of effective methods of contraception among adolescents and women in the District of Columbia.

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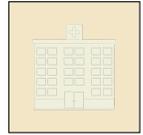
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MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

The Association Between Sleep Difficulties and Experiencing Abuse Among Collegiate Athletes

Collegiate athletes are a vulnerable subpopulation among all college students. Given their competing academic and athletic demands, they are subject to a range of health issues including sleep difficulties. Studies have shown that practice time, travel, competition, academic, and athletic demands are factors that can adversely affect sleep. Additionally, research shows that collegiate athletes are more likely than non-athletes to experience verbal, physical, and sexual abuse. Risk factors of abuse include alcohol, depression, and sleep difficulties. This study aims to explore dimensions of sleep difficulties that are specifically associated with experiencing abuse. Gaining an understanding for these sleep risk factors among this population will allow for consequential prevention and intervention programs to address issues of abuse.

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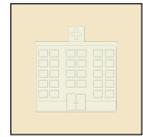
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PREVENTION AND COMMUNITY HEALTH



MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH

How Road-Safety Interventions Can Incorporate Social Norms: A Gender-Driven Approach

Normative influences have been explored across a variety of health domains and have increasingly been the targets of health communication efforts. Despite growth in norms literature, the influence of norms across gender isn't well understood. Within the realm of road traffic safety, males carry three times a greater risk for crash than females; the urgency and stark gender-based differences in road traffic incidence risk provides an opportunity to investigate the normative influences across gender-based differences. The current study applied the Theory of Normative Social Behavior (TNSB) to road traffic safety behaviors in male and female adolescents in order to understand these gender-based differences in normative influences. In this quasi-experimental study, high-school age students were exposed to a road traffic safety presentation in their school. Surveys were administered to both treatment and control schools before the intervention, immediately after, and 6-months after, exploring social norms and high-risk driving intentions. Independent samples t-tests were used to test whether social norms and high-risk driving intentions differed across males and females. Zero-order Pearson correlations and hierarchical regression equations were used to investigate the association between social norms and high-risk driving intentions among males and females. Hierarchical regression equations were also used to investigate the moderating effects of collective norms and injunctive norms on the relationship between descriptive norms and high-risk driving intentions among males and females. Males and females differed in social norms and high-risk intentions. Additionally, descriptive norms were found to significantly predict change in high-risk driving intentions among females ($\beta=0.14$, $p=.001$), and marginally predict it among males ($\beta=0.08$, $p=.085$). The relationship between descriptive norms and change in high-risk driving intentions was moderated by collective norms among males, while it was moderated by injunctive norms among females. The findings support the hypothesis that descriptive norms are associated with behavior intentions, however, the context surrounding road traffic safety risk moderates the influence descriptive norms have on behavior intentions. Among the constructs of TNSB, gender must be considered as a contextual factor that shapes this relationship. In the context of road traffic safety, perceptions of social approval interacts with perceptions of behavior prevalence in females in a way that doesn't occur in males. On the other hand, the influence of descriptive norms on intentions is strongest in males when collective risky behavior is low.

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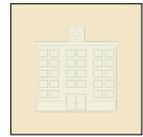
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PREVENTION AND COMMUNITY HEALTH



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Evaluating the Effectiveness of Community Education Regarding Screening of Breast Cancer

Washington, DC, has the highest death rates from breast cancer of any state in the United States. By educating women about early detection, including risk factors, screening options, and self-advocacy, experts in the field anticipate an increase in early detection and therefore a decrease in the death rates from breast cancer. The purpose of this study is to evaluate the effectiveness of community education in proper screening for early-stage breast cancer. During community education sessions conducted by the Brem Foundation in the DC area, participants completed anonymous pre-event and post-event surveys to determine if the event led to any attitude and anticipated behavioral changes towards breast cancer screening and knowledge. Results to date showed participants reported feeling less scared or anxious to get screened for breast cancer following the education session. Additionally, participants were more likely to schedule proper breast cancer screening based on each person's individual risk factors and 97.67% of participants reported increased knowledge post-event. Data is still being collected and analyzed at Brem Foundation education events. Additional research will be collected one year after each event to determine whether the education events result in behavior change (i.e. participants received breast cancer screening) and if participants retained the knowledge gained at the event. This information will be important in understanding how effective community education events are in increasing breast cancer screening and will be useful for identifying strategies to make them more effective.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Reproductive Health Counseling of Female Psychiatric Patients

Reproductive counseling for women hospitalized in inpatient psychiatric settings is a complex topic with recommendations and guidelines contingent upon fertility status, psychiatric diagnosis and any concomitant physical diagnosis, goals for childbearing, and possible risks of medication use to a pregnancy. Using data from female patients of reproductive age hospitalized in the GW Hospital Psychiatry department between 2016 and 2018, we conducted a comprehensive chart review of reproductive health counseling for psychiatric patients. We analyzed data from more than 500 unique cases on information elicited from women in the psychiatric inpatient setting including last menstrual period, history of childbearing, contraception use and plans for future pregnancy, as well as counseling provided on reproductive considerations in the setting of mental health diagnoses and psychotropic medication use. We further stratified findings by patient age, DC ward residency, race and ethnicity, and examined the interaction of these variables with reproductive health counseling. We present a comprehensive, qualitative report on two recent years in patient counseling, and provide evidence-based suggestions for quality improvement in patient care and future research.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

PsychED: Improving Psychiatric Care in the ED

Study Objectives: To clearly identify and articulate what challenges and barriers to care currently exist in the management of psychiatric patients in the George Washington University Hospital Emergency Department. Furthermore, to determine what interventions and systematic changes would be helpful to address the above barriers.

Methods: Use of a clear and concise survey that is distributed to all resident physicians that are rotating in the ED, and to all patients that have a psychiatric chief complaint. The specific questions we are asking include: "Do you feel you had adequate privacy while conducting your interview of the patient?", "Are you satisfied with the physical space you were in while conducting your psychiatric interview?", and "Have you had patients that were assessed for a psychiatric complaint complain about their ED experience?"

Results: Proposal is currently pending IRB approval.

Conclusion: Although there is currently no data yet to analyze, the potential ramifications of this study can change how psychiatric care is managed in the GW ED, such as creating a designated pod for psychiatric patients that provides privacy and minimizes over-stimulation by other patients.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

The Forgotten Neuropeptide-Implications of Angiotensin II in PTSD

Current therapies for post-traumatic stress disorder (PTSD) have limited efficacy, and alternative biochemical pathways need to be investigated. Growing research suggests that angiotensin II (All), a peptide classically known to be involved in cardiovascular homeostasis, may also play a significant role in generalized emotional stress responses, memory, and cognition. Preclinical trials investigating the effects of All on fear memory have produced conflicting results; several studies suggest that All can improve fear memory acquisition and recall, while others demonstrate that it impairs these processes. The purpose of this literature review is to examine the time dependent and chemical mechanisms of fear memory in relation to All and angiotensin receptor blockade.

This literature review examines the methods and results of eight preclinical rodent trials involving fear memory acquisition, retention, and extinction in relation to All. No trend or consensus were discovered regarding the modulation of fear memory by All in the rodent studies that were selected. The results of this literature review indicate that the temporal mechanisms of All modulation in fear memory are complex and likely involve multiple signaling pathways. More research with reproducible results and similar methodology need to be conducted to gain a better understanding of this pathway.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

An Exploration of Freud's Psychoanalytic Theories on the Surrealist Art Movement

As part of my research project between first and second year for the Medical Humanities Track, with inspiration from Dr. Linda Raphael, I sought to begin creation of a database of art images that are relevant to medicine. After working with a librarian at the New York Academy of Medicine, Arlene Shaner, as well as stemming from my deep fascination with Munch's work, *The Scream* (1893), I initially thought I would look at psychological theory and art, particularly displays of intense emotion in art. The librarian mentioned the Neurologist Charcot, who I later discovered was a teacher of Freud. As I delved more into the topic of Psychiatry and Art, I discovered that Freud had a profound influence on Surrealist artists, inspiring the poet André Breton, the father of the Surrealist movement and also a Psychiatrist. All of these connections inspired me to delve more deeply into the influence of Freud's writings on Surrealist art, perhaps two representations of where societal thought was evolving towards at that time. Understandings of the subconscious and the interpretation of dream states was becoming of increasing interest, and what Freud sought to understand, Surrealist artists sought to represent. It is this quest that Psychiatrists undertook to understand the depths of the human mind that came to influence artistic expression, revealing the intimate exchanges of thought between medicine and art. These ideas that I learned through my research ultimately influenced the artists and pieces I chose to include in my database, a way to learn about the importance of Psychiatric theory for artists in one particular artistic movement.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Reducing Electronic Medical Record Pop-Ups and Improving Admission Medication Reconciliation Completion at George Washington University Hospital

Timely and accurate completion of admission medication reconciliation (med rec) is an invaluable step in the prevention of medication errors during hospitalization and adverse outcomes after discharge. Furthermore, maintaining and communicating accurate medication information is a Joint Commission National Patient Safety Goal. Electronic Medical Record (EMR) pop-up messages are utilized to increase awareness of incomplete med recs. Despite these pop-ups, approximately 25% of daytime admissions to the General Internal Medicine (GIM) service at George Washington University Hospital (GWUH) do not have a documented, complete med rec. The primary aim of this quality improvement initiative was to increase the percentage of med recs completed within 24 hours of admission to a GIM team at GWUH to greater than 90% over six months.

The EMR of newly admitted GIM patients was reviewed for absence of med rec pop-ups, which served as an initial indicator of a completed med rec. After establishing baseline completions rates, in-person and email reminders were sent to call teams regarding utilization of a med rec column on the team Admission Tracker Board (ATB). The study was then expanded to all six GIM call teams and definition of “complete admission med rec” was revised to include completion of both “Documentation of Medication History” and “Admission Reconciliation.” A second intervention standardized ATBs across all call teams. Feedback on standardized ATBs was obtained via post-intervention in-person interviews with each call team. Finally, all GIM residents were surveyed to identify individual perceptions on what constitutes a “complete med rec” and to identify barriers to completing the two components within the EMR.

Baseline med rec completion rates for day call teams were 71% (n=28 admissions) and 92% (n=13) after our initial intervention. After implementing the second intervention, completion rates were 81% for “Documentation of Medication History” and 83% (n=63) for “Admission Reconciliation.” After standardization of ATBs, completion rates were 80% (n=50) and 88% (n=50). Survey data pertaining to feedback on standardized ATBs and barriers to med rec was compiled and reviewed.

Our interventions decreased frequency of EMR pop-ups and increased med rec completion rates. Importantly, our study highlighted gaps in resident knowledge regarding the med rec process, including what constitutes adequate documentation of a medication history. Further analysis of the barriers to documenting both a medication history and admission reconciliation are necessary to ensure completion of these metrics, and to provide accurate discharge medication lists to patients and outpatient providers.

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SCHOOL OF NURSING

Effects of Teach-Back Method of Education on Knowledge of Heart Failure Self-Management and Post-Discharge Knowledge Retention

Heart Failure (HF) is a progressive and incurable disease affecting more than 5 million people in the United States (Benjamin et al., 2017; Centers for Disease Control and Prevention [CDC], 2016). Forty to eight percent of patient education content is immediately forgotten, and about 50 percent of retained information is inaccurate; Knowledge is fundamental in empowering self-care behavior, and essential in bridging the gap between patient teaching, comprehension and knowledge retention by using the teach-back method (Farris, 2015; Rouse et al., 2016; Stamp et al., 2014).

The purpose of this study was to compare teach-back education method versus usual education and care on knowledge of HF self-management at discharge and retention of knowledge at three to ten days post discharge.

A non-probability convenience sampling of 22 HF patients, 65 years and older, over a 6-month period was used. The intervention group received HF education using teach-back, plus usual care and HF handbook. The control group received usual care plus HF handbook. The study intervention was measured using the Dutch HF Knowledge Scale (DHFKS), the European HF Self-care and Behavior scale (EHFScB-9) and teach-back questionnaire, during hospital stay and follow up telephone calls, three to ten days post discharge.

The pre-discharge teach-back knowledge retention was statistically significant between groups ($t(20) = 2.28, p = 0.03$). Post teach-back intervention, EHFScB-9 scores and DHFKS demonstrated a moderate effect size and deemed clinically significant.

The findings from this study were encouraging to support the effect of teach-back technique on knowledge retention and self-care of HF. Further research study with a larger sample is needed to evaluate teach-back education on HF knowledge and patient outcomes.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Diabetes Flowsheet Quality Improvement Project

Outpatient management of diabetes involves targeted interventions and investigations aimed at improving diabetes-related complications. In the fast-paced environment of the modern primary care clinic, providers often fall short of meeting the numerous requirements of comprehensive diabetes care. To that end, we have developed a diabetes “flowsheet” for incorporation into the electronic medical record. This flowsheet is comprised of key clinical investigations (e.g., proteinuria) and outcomes (e.g., HbA1C) and may help primary care providers meet diabetes management goals and ultimately improve outcomes. Our goal was to introduce the flowsheet to medical residents and achieve a usership rate of 50% (i.e., 50% of residents would use the flowsheet in their diabetic patients’ progress notes). However, our first several PDSA cycles instead focused on addressing two major challenges: creating a flowsheet that balances usability with ease-of-use, and overcoming technical obstacles to incorporation of the flowsheet into a medical note. Moving forward, we will focus our efforts on promoting use of the flowsheet and ultimately evaluate its impact on quality measures and clinical outcomes.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Reducing Administrative Burden of Radiology-Guided Procedures: An Interdisciplinary Intervention

Background: Radiology guided procedures are an integral part of the diagnosis and management of many medical conditions. While hospitalists are able to perform many bedside procedures, certain scenarios necessitate ultrasound or CT guidance which can only be done in conjunction with the radiology department and ancillary staff. Participants included internal medicine residents, radiology residents, unit secretaries, and nursing staff.

Methods: Plan Do Study Act methodology was utilized for this project. Baseline data was obtained to measure the number of steps internal medicine residents needed to take in order to successfully schedule and complete a radiology procedure. Certain parts of the process, including transfer of labels and specimens between departments, order forms, faxing capabilities of the EMR were reviewed.

Intervention: Survey of medical residents was conducted to identify deficiencies in the process and to quantify the number of steps each resident needed to perform in order to successfully order and submit a specimen collected from a procedure performed by Radiology.

Results: Baseline data showed it took Internal Medicine residents 10 steps on average to complete the order process. The most time-consuming steps were completing the Radiology procedure order form, delivering the specimen to the lab, and transporting the patient to Radiology. Eight months after the implementation of new policies including nursing staff/unit secretaries placing order labels in patient charts and Radiology residents physically submitting specimens to labs, another survey was conducted that showed a decrease in the number of steps taken by Internal Medicine residents to complete order process for Radiology procedures.

Conclusions: Implementation of a multidisciplinary approach is required in reducing the burden on Internal Medicine residents in ordering and successfully submitting specimens collected from radiology procedures. There is further work to be done in order to streamline the process, specifically submitting order forms via faxing function of EMR, but there has been a reduction in the number of steps required by the residents with the help of nursing staff/unit secretaries and Radiology residents.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Reducing Unnecessary Inpatient Laboratory Testing

Excessive laboratory testing is one of many areas of waste that plague the healthcare system. Morning laboratory tests for hospitalized patients are often ordered out of routine more than due to clinical indications that may affect medical management. The aim of our project was to reduce unnecessary morning laboratory testing on a medicine inpatient service by 15% from baseline.

We identified six laboratory tests that are routinely drawn on hospitalized patients (CBC, differential, BMP, LFTs, magnesium level and phosphorus level). Tests were tracked via chart review on an internal medicine resident team at a large university urban hospital over a 4-week period. We gathered baseline data prior to any interventions. The first PDSA cycle involved discussing patient-centered harms of frequent blood draws and the financial cost of individual tests. We then posted an information sheet covering these points in the team workroom. The second PDSA cycle involved distributing a test checklist for the team to go through together for each patient during daily rounds.

The first PDSA cycle was well received by the residents and the information sheet remained posted in the workroom throughout the duration of the project. Average tests per patient per day decreased from 2.5 to 2.2 (decrease of 12%) following this intervention.

The second PDSA cycle coincided with the rotation of new interns onto the team. Copies of the test checklist template were distributed at different times to the team attending and the senior resident, however it was not put into practice due to miscommunication of its purpose and time constraints. Average tests per patient per day remained unchanged at 2.2 following this intervention.

Although the project did not meet the aim of a 15% reduction in routine morning laboratory testing, the teaching session and information sheet used in PDSA cycle #1 did prove effective in sustaining a reduction over several weeks. This is a promising intervention as it can be implemented across multiple teams at minimal cost of time and resources. The test checklist in PDSA cycle #2 was not successfully implemented on the team. It may still be an effective intervention in reducing unnecessary testing, but requires commitment from medical teams that are already limited on time. Better explaining the purpose of the checklist and promoting attending and resident interest at an earlier point may improve the value of this intervention. Reducing unnecessary laboratory testing remains an important area of quality improvement focus.

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Increasing HIV Screening in an Outpatient Academic Clinic – A Resident-Run Quality Improvement Project

The CDC recommends HIV screening for all patients ages 13-64 years residing in areas where HIV prevalence exceeds 0.1%, with annual screening for patients at high risk for infection. Washington DC had a prevalence of HIV of 1.9% in 2017. Given the high prevalence of HIV in DC, we propose that all persons age 13-64 should be offered annual HIV screening.

Our aim was to increase rates of HIV screening during health maintenance exams by 50% from 08/2019 to 06/2019. Eligible patients were adults ages 18-64 years without a diagnosis of HIV who were seen by a cohort of 15 Internal Medicine residents. Only patients seen during their annual health maintenance exam (HME) were included. A patient was considered to have been screened if on the exam day or in the preceding 365 days either 1) any HIV test was ordered, or 2) the ICD-10 code Z11.4 (“Encounter for screening for Human Immunodeficiency Virus”) was used. Baseline data was obtained by reviewing health maintenance exams occurring in the months of August, September, and October. A series of Plan-Do-Study-Act (PDSA) cycles were launched to improve screening. Secondary measures included pre-intervention assessment of resident knowledge, and post-intervention survey regarding perceived effectiveness of the intervention.

At baseline, only 14% of residents correctly identified the age groups that should be screened for HIV; 50% were correct about the screening frequency. During the pre-intervention period, residents ordered HIV screening during 35% of HMEs. In PDSA #1, we attempted to add a question on HIV screening to the patient intake form. This attempt was unsuccessful. In PDSA #2, stickers reading “Have you screened for HIV” were placed on exam room computers. After this, HIV screening tests seemed to decline to 27% of HMEs. Review of the individual months revealed HIV screening during 24%, 38%, and 18% of HME respectively. Only 14% of residents reported seeing the sticker, and only one person thought it was helpful.

There is opportunity for improvement in HIV screening in the GIM resident clinic as our annual screening rate averages only 30-35%. Our project demonstrated that passive reminders are not effective interventions in our clinical setting. Next steps include an educational intervention and introduction of a standard “dot phrase” during HME, which includes a line for HIV testing.

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Utility of Trio Rounds and Barriers to Their Implementation

“Trio” rounding between physicians, nurses, and patients, has been shown to improve communication among healthcare team members, improve patient safety, decrease costs, improve length of stay, and improve patient satisfaction. These factors combined have the potential for a dramatic improvement on the quality of patient care. In this study, the efficacy of trio rounding was measured and barriers to trio rounding were elicited.

Afternoon trio rounds—separate from morning rounds—were completed in seven sessions during three PDSA cycles between November 2018 and February 2019 on the medicine wards of George Washington University Hospital (GWUH). A “rounding checklist” was developed and distributed to facilitate trio rounding. This checklist highlighted several areas for potential interventions to improve patient care—including functional status, pain control, skin care, nutritional status, glycemic control, mental status, and respiratory status. The rounding provider was then asked to evaluate if there were any new or changed orders, or any near misses. Provider, nurse, and patient satisfaction with the rounding process was also measured. In each PDSA cycle, barriers to trio rounding were identified.

Afternoon trio rounds generated on average 2.43 new orders. In all instances, providers, nurses, and patients rated their satisfaction with trio rounds highly (>8/10) and all providers and nurses felt that these rounds improved physician-nurse communication. Several barriers to trio rounding were identified. These included competing nursing duties, patient location, lack of physician initiative, provider availability, nurse availability, and time constraints.

Our findings correlate with previous studies that have shown improvement in communication between healthcare team members from trio rounding as well as satisfaction among all participants in the trio rounding process. Despite the strong benefits associated with trio rounding, its adoption on the medicine wards of GWUH remains a challenge due to several factors. Further quality improvement projects could be aimed at reducing these barriers which could result in a significant improvement in patient care.

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The Role Social Capital Plays in the Psychological Capital of Registered Nurses Experiencing Second Victim Syndrome

This study used an ex-post facto survey for data collection and structural equation modeling for data analysis to explore the combined relationship of psychological capital and social capital on the severity of second victim syndrome experienced by registered nurses. Specifically, this study sought to answer the following research question “To what extent does the relationship between psychological capital and social capital combine to predict the severity of SVS experienced by registered nurses following a precipitating event?” A second research question, aimed at explicating the relationships between the subconstructs of the three constructs of interest was “What are the relationships between the subconstructs of psychological capital, social capital and second victim syndrome?”

The online survey consisted of three instruments: the Psychological Capital Questionnaire, the Social Capital Outcomes for Nurses, and the Second Victim Syndrome Experience and Support Tool. Following data cleaning, there were 1167 surveys with sufficient data for analysis via SPSS v25 and 999 cases with full data for SEM analysis via AMOS v25. First, correlational analyses were conducted. Based on these results, multiple structural equation models were created and tested.

The structural equation models demonstrated that psychological capital, on its own, had no effect on the severity of second victim syndrome. However, social capital, on its own, had a statistically significant effect on the severity of second victim syndrome. Moreover, the combined effect of social capital and psychological capital on second victim syndrome was statistically significant. Stated another way, the combined effect of psychological capital and social capital predict the severity of second victim syndrome experienced by registered nurses. Specifically, social capital impacts nurses’ psychological capital, and this combined effect inversely impacts the severity of second victim syndrome.

The results of this study have practical implications that include unit-based peer support programs and an increased focus on supportive workplace cultures. Programmatic efforts should also focus on social capital at the team level as well as the importance of building self-efficacy through increasing mastery experiences, modeling of behavior, social persuasion and monitoring one’s physiological responses..

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Improving Identification of Homeless Patients at GW University Hospital via ICD Diagnostic Coding

In January of 2018, DC's Point-in-Time (PIT) Count revealed 6,904 persons experiencing homelessness in the nation's capital. Many of these individuals receive care at GW University Hospital due to its downtown location and ease of access via Metro routes. As part of a quality improvement project, we sought to determine how often medical residents were properly identifying patients who were homeless via ICD diagnostic coding. We also briefed medical residents to ask patients about their housing situation. Lastly, we provided homelessness resources to our discharged homeless patients. Quantitatively, we reviewed all ED visits and medicine admissions to determine if our interventions improved ICD coding and if homeless patients were provided with resources on discharge. Our ultimate hope is to increase awareness of homelessness and encouraging medical providers to document homelessness via ICD coding. In the future, more accurate identification of homeless patients can be used to better analyze health care utilization and adopt targeted social or case management discharge interventions.

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Got C. Diff? Appropriateness of Special Contact Precautions in Patients with C. Diff Testing

Clostridium difficile is the most common cause of hospital-acquired infection in the US and is a significant cause of infectious death. Timing of implementation of contact precautions and type of testing for Clostridium difficile infection varies at different medical centers. When testing and precautions are not used appropriately, it can be costly. The AIM statement of our quality improvement project was reduce the number of inappropriate contact precautions for patients tested for C. diff infection at George Washington Hospital by 25% in 3 months. Testing for C. diff was performed either by GIPCR (if positive reflexed to C. diff antigen and toxin), C. diff PCR (if positive reflexed to C. diff antigen and toxin), or C. Diff toxin. Inappropriate contact precautions were defined as no electronic order to remove precautions within 12 hours of negative testing or complete lack of an isolation order. Three PDSA cycles were performed as part of the intervention. PDSA cycle 1 was an educational survey sent to internal medicine residents. In PDSA cycle 2, the survey was presented to nursing staff on one hospital floor. The survey was expanded to even more nursing staff during PDSA cycle 3.

A total of 128 patients were reviewed (65 pre-intervention and 58 post-intervention). Prior to the intervention, 9.2% of contact precaution orders were appropriately discontinued compared to 5.1% after the intervention ($p=0.45$). All appropriate removals in the intervention arm were after PDSA cycle 1. 58 patients lacked an isolation order entirely which defaulted to a result of not appropriately discontinued. Secondary analysis showed that 85% of the GIPCR tests in the control group were initially negative. In the intervention arm 36% of the GIPCR were initially negative. 100% of C. diff PCR testing resulted in a negative test. Our results indicate C. Diff testing and result reporting is a complex algorithm that incorporates multiple processes and healthcare professions. Although we did not achieve our AIM, our results are biased by the 47.5% of patients that had no electronic order. This made it impossible to determine if contact precautions were appropriately discontinued. Our intervention would benefit from a larger sample size. In addition, one possible future direction could be an automatic contact precaution order when C.diff testing is ordered. Patients tested with a C. Diff PCR were all negative, suggesting a high specificity. Therefore, in the future, C.diff PCR should likely be the initial test of choice.

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Utilization of Video Review Improves Resident Education and Patient Care in Cardiac Arrest

While simulated training with video is heavily studied, there is little data on the utilization of real case review of cardiac arrest resuscitation. This study investigates data collected from cardiac arrest resuscitations (n=47) to evaluate how a video review program may impact the quality of CPR provided. These cases were collected over a one-year period of video recording, chart review, and lecture curriculum. Videos were reviewed, and data collected including total resuscitation time, compression time, non-compression time (hands-off time). Educational sessions consisted of 1 hour lectures each month during dedicated education time for residents. During this time, a resuscitation was reviewed and teaching points were discussed as a group. Over the course of the one-year period, the percentage compression time increased significantly (Pearson's $\rho=0.4277$, p-value=0.003). Literature has identified compression time as a critical measure of the quality of CPR being provided, with a compression percentage >90% as ideal. This study shows that video review of real cases may improve the quality of care during cardiopulmonary resuscitation, although it remains to be seen if these improves are sustained after the study period.

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Perioperative Complications Associated with Diabetes Mellitus in Patients Undergoing Tonsillectomies with Adenoidectomies: Insulin-Dependence Makes a Difference

Over 1 million Adenotonsillectomies (AT) are performed each year in the United States, to treat sleep disordered breathing, obstructive sleep apnea, and chronic adenotonsillitis. Although T&A is a common and safely performed surgery, it is not without significant risk of complications (bleeding, acute pain, dehydration, and pulmonary edema). These adverse events tend to be more prevalent in adults with comorbidities in comparison to adults without them. Since patients with diabetes mellitus (DM) comprise a significant population that undergoes AT, determining the correlation between Diabetes Mellitus and post-operative complications could enable physicians to take preemptive cautionary measures, counsel patients on outcomes and expectations, or determine whether the patient is a better candidate for a non-invasive intervention, in order to decrease complications and health care costs.

The ACS-NSQIP database was queried for patients who had undergone tonsillectomies with adenoidectomies simultaneously from 2005 to 2016. These patients were then stratified into three cohorts based on their diabetes mellitus status for comparison in patient characteristics and to analyze the impact of DM on the risk for surgical complications: non-diabetics (Non-DM), non-insulin dependent DM, and insulin dependent DM. Multivariate and univariate analysis was performed to determine the risk of post-operative complications for DM patients.

On multivariate analyses, diabetic patients, as a whole, were at an increased risk for three complications. Diabetes mellitus was a significant independent risk factor for systemic sepsis, extended length of stay of at least five days, and unplanned readmission. However, IDDM patients had a far greater independent risk of complications after the procedure. Irrespective of the patient's demographics or other preoperative variables, it was found that IDDM independently increases the possibility of developing organ/space SSI, pneumonia, unplanned Intubation, deep venous thromboembolism (DVT), systemic sepsis, greater length of hospital stay, and readmission.

The increased risk of post-AT surgical complications in IDDM patients stems from poor glucose control, and post-operative complications can arise from both hyperglycemia and hypoglycemia. Surgical procedures, such as AT, can induce hyperglycemia, which has been a known risk factor for postoperative sepsis, endothelial dysfunction, cerebral ischemia, and impaired wound healing. This study urges preoperative counseling and glycemic index management for IDDM patients. Further research should investigate optimization of care before the surgical procedure, difference in management between IDDM and NIDDM patients to determine the specific cause of increased complication rate in IDDM patients, and the benefits of additional inpatient care.

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Screening For Vocal Cord Paralysis in High Risk Premature Infants After Patent Ductus Arteriosus (PDA) Ligation

Risk of vocal cord paralysis after Patent Ductus Arteriosus (PDA) is a well-known complication of the surgery, particularly in high-risk premature infants. This study aimed to determine clinical compliance with postoperative screening for vocal cord paralysis and associated comorbidities in high risk infants after Patent Ductus Arteriosus (PDA) ligation. Given that vocal cord paralysis is a known complication of PDA ligation, an understanding of the efficacy of current screening methodology is needed for improvement of care.

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Benefits of Debriefing after Acute Events for Medical Residents

Debriefing after critical events has been increasingly utilized across industries. The process is widely accepted to have benefits ranging from psychological protection to process improvement. As the medical community has an interest in continuous improvement in patient safety, enhanced learning for trainees, and for wellness benefits of a psychologically taxing profession, the profession may stand to benefit from routine debriefs. However, standardized debriefs have yet to be widely adopted.

This project sought to identify potential benefits to medical residents of debriefing after acute events as well as barriers to routinely adopting this practice.

Subjective data was collected first by a voluntary survey offered to all Internal Medicine residents. The survey asked respondents how frequently they had participated in debriefs, as well as the benefits and the barriers to performing a debrief. Subsequently, residents were encouraged to perform debriefs after acute events. For the purposes of this study, an acute event was a rapid response, Code Blue, or a death. Residents were asked following their debriefs to complete a brief survey to assess the benefits of the activity.

The initial survey had 40 responses including all three years (PGY1 33%, PGY2 42%, PGY3 25%). The majority of residents (62%) indicated they only participated in 1-2 debriefs during the current academic year. Notably, 12.5% had never participated in a debrief. A large percentage of residents (48%) responded that acute events contribute to their learning more than half of the time, though one third felt this was rarely the case. They cited multiple barriers to learning during acute events, most often that no one pointed out teaching points and that they didn't know their role (each 42%). The most common benefits of debriefing were understanding clinical reasoning and processing emotionally difficult situations. The most frequent reason for residents not engaging in a debrief was that no one senior to them initiated one (70%), with time constraints cited by only 38% of residents. After residents were encouraged to debrief, the responding residents noted benefits in both understanding clinical reasoning and processing emotionally difficult situations. Debriefs took approximately 5 minutes.

Results of these surveys suggest that medical residents could benefit from more frequent debriefs by improving clinical reasoning and contributing to resident wellness. Widespread awareness of these benefits may encourage residents at all levels, especially senior residents, to initiate debriefs with their team members.

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Implications of Using a Risk-Stratification Score on Chest Pain Admissions

Chest pain is a common cause for ED presentation, with over 8 million visits annually in the US. Patients undergo liberal testing in an effort to prevent a missed cardiac event. This workup results in overuse of resources costing \$10-13 billion annually. This quality improvement (QI) project focuses on patients who undergo no objective cardiac testing during their hospital stay, as a group, who may represent inappropriate admissions. It is hypothesized that these patients may be identified by the HEART score, as low-risk, and benefit from early ED discharge.

This project is a pre- and post-protocol intervention design set in a 371-bed urban academic hospital. A total of 3,225 charts were reviewed, 1,673 pre- and 1,552 post-intervention, between a 2-month intervention. The final analysis included 562 pre- and 631 post-intervention patients. The mean admission HEART score and length of ER stay were calculated between the two groups. Attending admission rates were compared to determine whether a statistical difference existed amongst providers evaluating chest pain. Differences were determined utilizing independent t-tests, with a p-value of 0.05.

There was a significant decrease in admissions after implementation of the HEART score. In the subset of patients who were admitted, there was no statistically significant change in the percentage of patients who underwent objective testing. And of the discharged patients, there was no significant difference in the number of readmissions within 30 days.

Using the HEART pathway and providing patient resources on care options correlated with a significant decrease in hospital admissions without increasing readmissions.

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Medical Student Patient Navigators: Connecting Hospitalized Homeless Patients to Outpatient Care

Washington, D.C., has extensive resources to serve the homeless population; however, connecting these patients with resources upon discharge from GW hospital remains a challenge. After key informant interviews with local physicians who care for the homeless community, we decided to explore the use of medical students to bridge the gap between patient discharge and follow-up with local resources.

This project aimed to identify community-wide resources to connect patients with comprehensive follow-up care, train internal medicine residents to identify and use specific ICD-10 codes for homelessness, measure the effectiveness of homeless patient identification upon admission, assess the feasibility of using medical students as resource navigators, and determine the use of resources by patients 30 days post discharge.

A literature review and resource mapping exercise were completed to identify the most accurate screening questions for homelessness in a busy clinical setting and to develop a community-wide resource guide for patients. Academic presentation was completed for GW internal medicine residents to introduce the topic, describe protocol, and answer any questions. Data collection comprised of daily patient interviews and retrospective chart analysis, including review of admission dates, clinician coding practices and screening of housing status, discharge dates, and resource guide usage.

Charts analyzed for a total of 8 weeks showed an increase in the proper documentation of homelessness but there is still room for improvement as housing status was often documented in other areas of the chart. It became apparent that identification would be one of the biggest barriers to seeing these patients. This project also provided insight into the barriers a medical student may face when trying to provide resources, including chart review time, presence of housing status documentation, knowledge of DC resources, etc. Furthermore, while many patients could be identified on chart review, it was difficult to speak with each patient to have the opportunity to provide resources.

While a medical student could be used as a resource navigator, there appear to be more efficient methods. GW Hospital needs to continue improving housing status documentation so resources can be automatically provided upon discharge. Also, while interviewing patients, it was apparent that simply handing out the resource guide was not sufficient. Discussing options and learning about each patient was the most valuable. There is significant potential for integrating medical students into the discharge process and I look forward to continuing work towards that goal.

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Resident Physician Response to New Research Measured by Utilization of Balanced Crystalloid vs. Normal Saline

Several studies published in March 2018 show that there may be a benefit to lactated ringers (LR) in terms of mortality and kidney failure for Emergency Department (ED) and Intensive Care Unit patients, however sodium chloride 0.9% (NS) is by far the most frequently used fluid in our emergency department. We seek to quantify how physicians in training change their practice based on available evidence.

On August 1, 2018, our first intervention was to distribute a survey assessing general knowledge pertaining to balanced crystalloids to 40 resident physicians training in emergency medicine. Participation in the survey was voluntary and anonymous. A second intervention included a Journal Club for many of the residents which occurred on September 19, 2018. After these interventions, we trended the number of LR and NS liters ordered in our emergency department starting in January 2018, before publication of the aforementioned article, and ending in November 2018. Outcomes include responses on the initial survey and change in percent of LR liters ordered in Jan 2018 compared with November 2018 using a simple t-test.

All residents present at morning conference were included in the study. Interestingly, only 17% of residents responded that they prefer using a resuscitation fluid other than LR. According to our data set, in July 2018, just prior to distribution of the survey, only 19% of the total fluids (LR plus NS) ordered in the ED were LR. The number of LR liters ordered in the ED increased from 1.4% of total fluid boluses ordered in January 2018 to 33.7% of the total in November 2018, a significant difference when comparing the number of liters both before and after the initial study intervention (survey) ($p < 0.05$).

There was a significantly higher number of LR compared with NS liters ordered after the advent of new research, survey participation, and after a journal club related to the research. This may help us understand and quantify what factors impact physician practices related to new research. Further, there appears to be a discrepancy between what residents state as their ordering preferences and the ordering practices of their emergency department.

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Reducing Unnecessary Phlebotomy Testing Using a Clinical Decision Support System

Overuse of phlebotomy testing offers little to improve patient outcomes but may subject patients to additional morbidity. Low-cost, high-frequency tests are ordered recurrently, unnecessarily, and contribute to the high cost of health care. Reducing unnecessary phlebotomy tests can cut costs without compromising quality. Type and screen tests are active for three days from the date the specimen is collected, yet our blood bank laboratory observed type and screen tests were often unnecessarily ordered in our organization. We set out to determine the effectiveness of a clinical decision support system (CDSS) on reducing unnecessary type and screen tests, estimate the cost saved by the CDSS implementation, and describe the unnecessary ordering practices by provider type. Adoption of CDSSs has been successful in reducing unnecessary radiologic imaging, overutilization of antibiotics, and *Clostridium difficile* testing. Our value improvement initiative was a separate-sample pretest posttest design at a mid-Atlantic academic health system. A CDSS was embedded in our computerized order entry (COPE) system to promote appropriate test ordering. The CDSS appears when a type and screen is ordered informing the provider of the date and time the current test expires. Our study demonstrated that CDSSs impacted a variety of provider types, reduced unnecessary phlebotomy tests, and achieved yearly cost savings. Unnecessary testing continues in health care and contributes to excessive health spending without adding value. Phlebotomy testing is one example of how providers can reduce waste and control healthcare costs for low-cost, high-frequency tests. To further improve test ordering practices of all provider types, we recommend additional interventions such as organizational support, education, audits, and feedback. In this era of precision medicine, ordering the right test, at the right time, for the right reason can reduce cost, reduce waste, and improve quality, outcomes, and satisfaction for patients. Until the establishment of national quality measures aimed to control the number of low-cost, high-frequency tests, health systems must find a way to reduce unnecessary health services. CPOE is widely used in a variety of health care settings and can incorporate CDSS to guide all provider types to make judicious decisions at the time of care.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Integration of a Vaccine Checklist to Promote Discussion between Patients and Providers and to Increase Rate of Vaccination

A vaccine checklist created by Center for Disease Control (CDC) was utilized as a tool to increase rate of vaccination in the George Washington Medical Faculty Associates medicine clinic from July 2018 to July 2019. This quality improvement project applied Plan-Do-Study-Act (PDSA) framework to iteratively integrate the checklist into clinical practice. A questionnaire, which used to assess resident's vaccination practice and knowledge, showed that patients rarely initiate discussion regarding vaccination and only few medical residents remember the complex vaccine schedule. Different ways of distributing the vaccine checklist were explored; ultimately, the checklists, along with the patient intake forms, were given to the patients by the medical assistants. The integration of the vaccine checklist went smoothly with minimal interruption to workflow and 75% of the checklists were filled out by the patients. The vaccine checklist was mostly well received by the patients; it was considered educational and not overwhelming. In the last PDSA cycle, 1 patient out of 8 initiated discussion regarding vaccination with their providers during a focus visit. Incorporating the vaccine checklist with the patient intake form during every visit may act as a catalyst in increasing number of times discussion occurs. Given the complex vaccine schedule, the checklist can also be used an additional resource to help remind providers the appropriate vaccines recommendations. Future projects can incorporate the vaccine checklist into patient intake form and measure number of vaccination administered after utilization of the checklist to assess change in rate of vaccination.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Improving the One Call Inter-Hospital Transfer System to Improve Patient Safety and Efficiency of Care: An Update

As a tertiary care center, George Washington University Hospital accepts transfers from regional hospitals for patients who require a higher level of care. These patients are often at increased risk of morbidity and mortality due to their clinical state. However, since these patients are admitted directly, they bypass the well-developed triaging systems that are in place in the emergency department, creating significant patient safety concerns surrounding this admission system. In the 2017-2018 academic year, a project was undertaken with the goal of expediting time-to-evaluation (as measured by time-to-admission order) by the medical admitting residents.

During the initial project, key stakeholders (including medical residents, nurses, charge nurses, nursing administration, and the Patient Logistics Center, or PLC) were engaged to develop a protocol for notifying admitting residents when patients arrived to the hospital, consisting of PLC staff sending a TigerText message to the admitting resident at the time of arrival. The result of this intervention was a statistically significant decrease in time-to-admission order by 50% with a protocol utilization rate of 57%. In order to continue improving the project, a first PDSA cycle was implemented to remeasure baseline data after 4 months of adopted protocol utilization. Further PDSA cycles included re-education regarding the protocol workflow and real-time weekly feedback on rates of protocol utilization.

The primary outcome measured was the rate of protocol adoption with an aim to increase it by 50% from baseline.

Baseline protocol utilization was 0% after 4 months of implementation of the protocol. This rate increased from 0% (for 31 patients) to 27.6% (24 TigerTexts for 87 patients). Time-to-admission order increased from 67.9 minutes to 112.9 minutes, an increase from the baseline for the second phase of the project as well as from initial data in April 2018.

While initial data suggested that the protocol could reduce time from admission to physician evaluation significantly, later PDSA cycles revealed that this protocol was ultimately unsustainable in terms of consistent utilization, raising concerns regarding its ability to consistently reduce time-to-evaluation in the long term. Future PDSA cycles may focus on implementing an alternate mechanism or protocol for notifying admitting physicians of a patient's arrival in order to a) reduce time-to-admission-order metrics and b) improve morbidity and mortality associated with this transition of care.

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REHABILITATION AND RECOVERY



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Use of The Adult Myopathy Assessment Tool (AMAT) as a Predictor of Functional Abilities in People with Multiple Sclerosis

People with multiple sclerosis (PwMS) are at greater risk for decreased muscle performance which may lead to decreased functional abilities. The Kurtzke Expanded Disability Status Scale (EDSS) is commonly used as a disability status rating scale in PwMS. Nevertheless, the EDSS is largely comprised of neurological tests and may not best reflect functional performance. A functional battery such as The Adult Myopathy Assessment Tool (AMAT) may better reflect functional performance. The AMAT was designed to assess both functional strength and endurance in clinical settings. However, the AMAT has not been validated for the assessment of PwMS.

The purpose of the study was to determine the comparative association of the AMAT and EDSS with measures of strength, fatigability, and functional performance.

Twenty-nine people (mean age 48.6 ± 11.2), with a history of MS (EDSS < 7.0) were recruited. Participants completed functional testing (5 times sit to stand and gait speed) and an assessment of disability and functional status using the EDSS and AMAT, respectively. Muscle performance was assessed via a 60 s maximal volitional isometric contraction (MVIC) of the knee extensors using an isokinetic dynamometer, and expressed as fatigability (exhaustion time to 60% of MVIC), peak torque, and peak torque scaled to body weight.

The participants exhibited moderate levels of disability (EDSS, 3.6 ± 1.4) and function (AMAT total score, 36.1 ± 7.6 ; AMAT function subscale, 18.2 ± 3.3). Peak force was $70.1 \text{ kg} \pm 22.0 \text{ kg}$, exhaustion time was $38.4 \text{ s} \pm 17.4 \text{ s}$, gait speed was $1.3 \text{ m/s} \pm 0.3 \text{ m/s}$, and five time sit to stand was $11.4 \text{ s} \pm 4.1 \text{ s}$. The AMAT function subscale was associated with scaled peak torque ($r=0.426$, $p=.021$), gait speed ($r=0.825$, $p=0.00$), and 5 time sit to stand ($r=-0.632$, $p<.001$). Whereas, the EDSS was associated with fatigability ($r=-0.524$, $p=.004$) and peak torque ($r=-0.423$, $p=.022$).

The AMAT was more strongly associated with scaled peak torque and functional measures in comparison to the EDSS. This may reflect the observation that relative strength is a better predictor of functional abilities than unadjusted strength measures. Whereas, the stronger association of the EDSS with fatigability may be explained by the pyramidal systems measures within the tool and the well-known association of MS-related fatigue with disability. Based on the results of the study, we suggest clinicians administer the AMAT in addition to the EDSS, to gain insight into functional impairments and assist with formulating a comprehensive plan of care.

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REHABILITATION AND RECOVERY



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Skin Cancer Referrals in New Zealand: Teledermatology Expediting Treatment

The rate of skin cancer in New Zealand is the highest in the world, but there is a severe shortage of dermatologists to meet the challenge. Only 2.1 full-time equivalent (FTE) public dermatologists are available to serve over 400,000 residents of the Waikato region of New Zealand. As a result, most patients rely upon general practitioners (GPs), who may have difficulty correctly diagnosing or crafting the most appropriate treatment plan for their lesions. In order to combat the access gap and prioritize skin cancer diagnosis and treatment, Waikato public dermatologists launched the Suspected Skin Cancer (SSC) service, a free store-and-forward teledermatology system for Waikato GPs to receive specialist advice within four days of referral. We conducted a retrospective chart review of the first six months of the SSC service to investigate the accuracy of both GP and dermatologist diagnoses, advice adherence, as well as time to response and action.

We determined the diagnoses, histopathology, dermatologist response time, advice given, and the subsequent action based on referral letters, clinical letters, primary care records, and histology reports. From this data, we evaluated the broad diagnostic concordance, which was based on the categorization of lesions as benign or cancerous, between physician specialties as well as the rate of advice adherence. A total of 8 referrals were excluded due to referrer error, and 2 were excluded due to pathway error.

GPs made 340 referrals for 402 lesions belonging to 310 patients between July to December 2017. Median specialist response time was 0.84 days (range 0.01 - 4.90 days). The researchers categorized the diagnoses as cancerous (GP $n = 235$, dermatologist $n = 130$) or benign ($n = 185$, 256). Histopathology of excised lesions revealed 56 cancers, including 19 melanomas, 26 basal cell carcinomas, and 11 squamous cell carcinomas. Of the 402 lesions, broad diagnostic non-concordance was 26% ($n = 103$, $\kappa = 0.58$) between GPs and dermatologists, 26% ($n = 18$, $\kappa = 0.61$) between GPs and pathologists, and 12% ($n = 8$, $\kappa = 0.81$) between dermatologists and pathologists. GPs followed the dermatologists' treatment advice in 74% ($n = 140$) of cases when action was recommended. The average time from GP referral to recommended action was 61.7 days.

Teledermatology is an effective and convenient method for connecting GPs with dermatologists for the rapid and accurate diagnoses and management advice for benign and malignant skin lesions.

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REHABILITATION AND RECOVERY



SCHOOL OF MEDICINE AND HEALTH SCIENCES

Developing a Cognition Scale Using Items from Three Federally Mandated Assessments in Post-Acute Care

The purpose of this work is to create a cognitive measure detecting change in cognitive deficits for post-acute stroke patients. Many individuals with stroke experience cognitive impairment contributing to ongoing disability. Identifying change in cognitive skills in response to treatment is important for demonstrating the value of rehabilitation services. Yet, the ability of federally mandated post-acute assessments to detect change has not been described.

A total of 147 stroke patients in post-acute care receiving rehabilitation services were assessed using 26 cognition items from the federally mandated assessments. Rasch analysis, using the partial credit model, was conducted to evaluate the construct validity of these items. The standardized effect size (ES), response mean (SRM), and minimal detectable change (MDC) were calculated using MedCalc.

Six items created a logical hierarchy for the cognition construct. Two items—long-term and short-term memory—represented the easiest and hardest items, respectively. The remaining items are problem-solving, memory, decision-making, and cognitive function. Evidence of good construct validity: Eigenvalue=2.13, unexplained variance in first contrast=7.5%, and person separation reliability of 0.87, person strata=3.8. Evidence of person-item alignment: adequate person fit, moderate ceiling effect, and person mean=1.53. Evidence of responsiveness: improvers (n=74) large ES 0.72, large SRM 1.19, 10% of patients made a change beyond the MDC.

The six identified cognitive items from the federally mandated post-acute care assessment tools represents a continuum of cognitive performance areas, from foundational arousal skill through higher level problem-solving. Advancing meaningful, precise cognitive assessment will help identify effective occupation-based cognitive skill training strategies for stroke survivors.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

A Program Evaluation of Homeless Prenatal Program's Healthy Feeding Initiative Breastfeeding Rates

Homeless Prenatal Program (HPP) is a 501(c)(3) non-profit organization which has worked with homeless and low-income families in San Francisco since 1989. HPP provided over 4,200 families with programs related to housing, prenatal and parenting life, family finances, health education, mental health, and breastfeeding. Breastfeeding has numerous beneficial properties for both the mother and infant. The CDC recommends that women breastfeed for at least 12 months for optimal health benefits; however, only 31% of women breastfeed for that period.

HPP wanted to evaluate the success of its breastfeeding program, Healthy Feeding Initiative, by exploring if its members participated in breastfeeding for 12 months after birth. This program evaluation compares the breastfeeding rates of HPP to national trends to assess the effectiveness and deficits of the program.

HPP randomly selected a sample group from women who had utilized the Healthy Feeding Initiative and asked whether they had breastfed for 12 months. These members were further categorized by race, Hispanic or Black. To analyze the national trend, NHANES unweighted 2009-2010 data was filtered for breastfed infants (DBRAF) via the Statistical Analysis System (SAS). This data was then further broken down by race (Non-white Hispanic and Black). A chi squared test compared the percentage of breastfeeding mothers by race from HPP and NHANES national data set.

Homeless Prenatal Program data showed that 69% of women randomly selected from its Healthy Feeding Initiative breastfed for 12 months. NHANES data reported that 11.84% of women breastfed. At HPP, 57.9% of Black women and 75% of Hispanic clients breastfed their children. In comparison, NHANES data found that 6% of black women and 17% of Hispanic women breastfed their children. HPP's breastfeeding rates were statistically significant to NHANES ($p = .007$, chi square = 7.21).

Homeless Prenatal Program's Healthy Feeding Initiative has excelled at encouraging mothers to breastfed compared to the national average. Their methods of providing supplies, lactation consults, private lactation rooms, and classes that reduce stigma have been effective. Further studies are needed to explore why 30% of HPP members were not breastfeeding the recommended time.

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Risk Factors for Adverse Outcomes and Prolonged Length of Stay in Obstetric Patients with Congenital Heart Disease

Advancements in reparative surgery have remarkably increased the proportion of adults living with repaired congenital heart disease (CHD), with current data demonstrating that 90% of infants born with CHD reach adulthood. After proficient repairs, women with CHD are capable of child bearing, however they are at increased risk for peri- and post-partum complications attributable to the variety of hormonal and hemodynamic changes over pregnancy. Previous studies have suggested that while mortality remains overall low, parous patients with CHD lesions are at increased risk of morbidity including pre-term delivery, caesarian sections, heart failure and arrhythmia. This project sought to evaluate risk factors associated with increased length of hospital stay and other adverse outcomes in parous CHD patients at a single institution, Winnie Palmer Hospital (WPH) for Women and Babies. The project is a retrospective chart review, using paper and electronic records. The study population includes parous patients with CHD who consulted with the anesthesiology department and were admitted to WPH for delivery or management between 1/2000 and 1/2017. CHD was defined as both cyanotic and acyanotic lesions, hypertrophic cardiomyopathy, congenital Long QT syndrome, pulmonary hypertension and genetic diagnoses with chromosomal abnormalities. At this stage of the project, 101 patients were identified for inclusion, with a cumulative 149 pregnancies. Within the included population, CHD diagnoses comprised structural anomalies, aortic valve dysfunction, genetic syndromes and congenital arrhythmias. For eligible patients, data on patient and lesion characteristics, along with cardiac, obstetric and significant neonatal complications was collected. Analysis of data is in progress to create a stratification of CHD lesions through evaluation of antepartum echocardiograms, allowing for a more accurate assessment of lesion specific risk. Univariate and multivariate analysis will be completed to evaluate variables associated with increased peri-partum length of stay and other adverse outcomes, comparing them to a control group of parous patients without CHD. The purpose of this research is to contribute to developing knowledge on recommendations for management of these patients, specifically in relation to obstetric and cardiac care.

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Predicting Venous Thromboembolism in Obese Pregnant Women in a National Study

Venous thromboembolism (VTE) in pregnancy and postpartum is a leading cause of maternal morbidity and mortality in developed countries, where obesity is a known risk for this complication. Current guidelines vary in which patients qualify for VTE prophylaxis, precluding a uniform approach for management. The purpose of this study was to derive a risk prediction model for VTE in obese pregnant women. We performed a retrospective cohort analysis using the Consortium on Safe Labor (CSL) database. The CSL includes detailed information from the electronic medical record for >200,000 deliveries from 19 hospitals across the United States from 2002 through 2008. Women ages 16-45 who were pregnant with singletons and had an obese body mass index (BMI>30kg/m²) were included in our study population. Maternal characteristics and preexisting conditions as well as pregnancy-related conditions and complications were analyzed to identify differences between those who had a VTE and those who did not. Multivariable logistic regression was used in order to identify predictors of VTE.

Of the 83,500 women who met inclusion criteria, on average women were 27.8 ± 6.0 years old, 38.6 ± 2.21 weeks gestation, with BMI of 35.8 ± 5.45 kg/m², and cesarean delivery (CD) incidence of 35.2%. The racial makeup of our cohort was 45.1% Caucasian, 27.2% African American and 20.2% Hispanic women. 109 women (0.13%) experienced a VTE event. Independent predictors of VTE in our final multivariable predictive model included: mode of delivery, BMI, pregestational diabetes, chronic heart disease, preeclampsia, blood transfusion (intrapartum or postpartum), prenatal history of thromboembolic disorder, and postpartum maternal length of stay. A receiver operating characteristic curve was developed to assess the model; area under the curve was 0.826. We developed a strong predictive model using a large, retrospective database to distinguish risk of VTE in obese pregnant women, which may provide the foundation for future protocol development of obstetrical thromboprophylaxis in obese women.

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Exploring Traditional Birthing Methods in Ecuador as a Model for U.S. Implementation

Ecuador, a country rooted in traditional healing practices, serves as a premier example of where biomedicine and traditional knowledge often intersect, and sometimes conflict, when addressing women's prenatal care. Many women seek *parteras*, or midwives, for their prenatal care while others choose to see an Obstetrician. Acknowledging the need for a more combined approach to women's health, Ecuador's Health Ministry implemented a program called "Attention for Culturally Appropriate Birth" that helps doctors learn more culturally appropriate birthing methods and allows *parteras* to have a more active role in hospital births. My objective was to explore how traditional and integrative methods are used in combination with western practices to address women's health needs in Ecuador and to better understand how the U.S. might be able to implement these practices. Methods used to explore these research questions included key informant interviews, site visits, literature review, and shadowing Ob-Gyn physicians and traditional Ecuadorian midwives (*parteras*) over 4 weeks. Student gained an in-depth understanding of how Ecuador has worked to integrate traditional birthing practices. Vertical birthing is a common method used in Ecuadorian indigenous communities allowing women to remain upright during childbirth so that the baby's head passes with more ease. This method is associated with fewer epistomies, C-sections, and fetal heart abnormalities, and less pain during labor. In our modern era, current prenatal health services often leave out traditional belief systems, which can inadvertently threaten a woman's access to prenatal care and this can lead to less safe delivery outcomes. Ecuador's initiatives can serve as a helpful model for the U.S. The use of midwives for prenatal care and birth is increasing rapidly in the U.S. and it is extremely important that we also learn how best to integrate traditional and biomedical aspects of health care.

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Characteristics and Outcomes of Mothers Receiving Tranexamic Acid during Delivery

In October 2017, the American College of Obstetricians and Gynecologists (ACOG) released a practice bulletin endorsing the use of tranexamic acid (TXA) to treat postpartum hemorrhage (PPH). The purpose of this study was to describe characteristics and outcomes of women receiving TXA in the peripartum period. Patients were included as a multicenter retrospective cohort study between January 2015 and June 2018. All delivery types were included. Patients under the age of 18 or above the age of 50 were excluded. Patients were grouped based on whether or not TXA was administered and their demographics and outcomes were compared. Data trends in terms of time periods and geography was also analyzed. Of the 103,617 patients included, TXA was used in 133 patients at the time of delivery. Among our cohort those who received TXA compared to those who did not were more likely to have history of postpartum hemorrhage (26% vs 2%, $p < 0.0001$), placenta previa (4.5% vs 0.3%, $p < 0.0001$), anemia with hematocrit less than 32% (30% vs 16%, $p < 0.0001$) and magnesium for neuroprotection (23% vs 5%, $p < 0.0001$). There was no significant difference in rate of deep venous thrombosis or pulmonary embolism. Perinatal outcomes are also presented. TXA use was also evaluated by date and geographic sector. TXA was used at highest rates in the last quarter of 2018, with the East sector reporting higher rates compared to all other regions. Women who received TXA at delivery were more likely to have cesarean delivery, $EBL > 1000$ cc, blood transfusion, and ICU admission, among other complications or comorbidities. Risk of venous thromboembolism was not increased with peripartum TXA use. More numbers are needed to assess if pre- and post-publication of the ACOG guidelines resulted in lower rates of hemorrhage complications.

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SCHOOL OF MEDICINE AND HEALTH SCIENCES

Patient Knowledge, Utilized Resources and Clinical Experiences regarding Prenatal Genetic Screening and Diagnostic Testing

Genetic screening and diagnostic testing during pregnancy has become increasingly common practice in preconception and prenatal visits. Prior research shows there is a lack of genetics knowledge, as well as understanding of screening and testing results by patients that may adversely impact their ability to make informed health decisions.

The purpose of this survey study was to assess patient knowledge, clinical resources and utilized resources on genetic screening and diagnostic testing.

Patients at a major urban OBGYN clinic were recruited for a voluntary survey. Descriptive statistics and chi square analysis of results are reported.

A total of 466 of 500 patient surveys were completed, and 441 analyzed (88.2% response rate). Patients were on average 32 years old, 27 weeks pregnant, and most often reported a graduate degree level of education (47.4%). 38.1% reported screening and diagnostic testing in a prior pregnancy, and 84.6% reported conversations with providers during their current pregnancy. 47.8% reported meeting with a genetic counselor, and 56.7% reported having all their questions answered by genetic counselors. Over 75% of patients reported accurate knowledge of basic genetic statements, like "a gene is part of a chromosome;" however, when asked more complex statements regarding aneuploidy patients were less knowledgeable. If a patient reported discussing screening and diagnostic testing with their provider, they were significantly more likely to properly define screening and diagnostic testing ($p < 0.001$). Patients most often reported receiving pamphlets/brochures (66.7%) with less than 10% reporting any other resource; however, independently, patients most often accessed web links/video links (40.1%) and pamphlets/brochures (37.1%). Patients perceived all but one proposed educational tool (group classes) at least useful 80% or more of the time. Only 47.6% perceived group education classes as useful.

Our findings suggest patients are having multiple discussions in office with providers, and this is having a significantly positive impact on patient knowledge and understanding. However, the discrepancy between educational resources distributed in clinic and what patients reported individually accessing, highlights an area of potential change to better provide resources to patients that are accurate in the media they desire. Patients also perceived all educational tools as useful, except for group classes, which may highlight the personalized needs and privacy associated with genetic screening and diagnostic testing. Future research should study whether implementing educational tools into the waiting room, and in clinic, would increase patient knowledge of genetic screening and diagnostic testing.

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Perinatal Outcomes After Implementing a Hemorrhage Risk Assessment at Admission

Our objective was to evaluate the impact of a novel assessment of hemorrhage risk at admission on subsequent perinatal outcomes.

This project was a retrospective cohort analysis of a multicenter database included women admitted to labor and delivery from January 2015 to June 2018. A novel nursing assessment developed by Association of Women's Health, Obstetric and Neonatal Nurses was used to categorize patients as low, medium or high risk for hemorrhage. This was implemented 6/1/2016 across the centers. Perinatal outcomes related to blood transfusion, estimated blood loss (EBL) \geq 1000cc, ICU admission, chorioamnionitis, general anesthesia, oxytocin use and cesarean delivery were evaluated before and after implementation.

There were a total of 109,719 women included, with 38,751 women included prior to implementation of the hemorrhage risk assessment and 70,968 women after implementation. Rates of any blood transfusion (0.5 to 0.4%, $p=0.02$) and EBL \geq 1000cc (6.3 to 6.0%, $p=0.02$) were significantly lower after implementation. Incidence of ICU admission, chorioamnionitis and general anesthesia did not change overall in the time period studied. There were higher rates of oxytocin use (83.4 to 85.2%, $p<0.0001$) and spontaneous vaginal delivery (58.8 to 59.9%, $p=0.01$). Details on perinatal outcomes are included.

In conclusion, after implementation of a hemorrhage risk assessment at admission, we found a 20% reduction in rates of blood transfusion and EBL \geq 1000cc. Significantly increased oxytocin use was also observed. Further analysis must be done to assess if any other changes could account for these trends.

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The Transferability of Virtual Reality Simulation-Based Robotic Suturing Skills to a Live Porcine Model in Novice Surgeons: A Single Blind Randomized Controlled Trial

The objective of this study was to assess whether a robotic simulation curriculum for novice surgeons can improve performance of a suturing task in a live porcine model. The design used was a randomized controlled trial taking place in an Academic medical center. 35 medical students without robotic surgical experience were enrolled in an online session of training modules followed by an in-person orientation. Baseline performance testing on the Mimic Technologies daVinci Surgical Simulator (dVSS) was also performed. Participants were then randomly assigned to the completion of 4 dVSS training tasks (Camara clutching 1, Suture sponge 1 and 2, and Tubes) versus no further training. The intervention group performed each dVSS task until proficiency or up to 10 times. A final suturing task was performed on a live porcine model, which was video recorded and blindly assessed by experienced surgeons. The primary outcomes were Global Evaluative Assessment of Robotic Skills (GEARS) scores and task time. The study had 90% power to detect a mean difference of 3 points on the GEARS scale, assuming a standard deviation (SD) of 2.65, and 80% power to detect a mean difference of 3 minutes, assuming a SD of 3 minutes. The study concluded that there were no differences in demographics and baseline skills between the two groups. No significant differences in task time in minutes or GEARS scores were seen for the final suturing task between the intervention and control groups respectively (9.2(2.65) versus 9.9(2.07) minutes; $p=0.406$ and 15.37(2.51) versus 15.25(3.38); $p=.603$). The 95% confidence interval for the difference in mean task times was -2.36 to 0.96 minutes, and mean GEARS scores was -1.91 to 2.15 points. Live suturing task performance was not improved with a proficiency-based virtual reality simulation suturing curriculum compared to standard orientation to the daVinci robotic console in a group of novice surgeons.

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The Effect of IUPC Use on Prolonged Second Stage of Labor

We performed a retrospective cohort study to evaluate whether the use of Intrauterine Pressure Catheters (IUPC) in prolonged second stage of labor in nulliparous women affects maternal and neonatal outcomes. The study included term, nulliparous women with singleton gestations, cephalic presentation, epidural anesthesia, in labor, who reached 10 centimeters of cervical dilation and had a prolonged second stage of labor. Prolonged second stage was defined as > 3 hours. Exclusion criteria were intrauterine fetal demise, planned cesarean delivery or suspected major fetal anomaly. The primary outcome was incidence of spontaneous vaginal delivery, and maternal and neonatal outcomes were compared as secondary outcomes.

In total, 208 women were evaluated. 27 women had IUPC's present and 181 women had no IUPC. Demographics differed between groups by ethnicity, hypertensive disorders and body mass index. In the IUPC group, 55.6% of women (15/27) had an SVD in comparison to 67.4% of women without an IUPC (122/181) (aOR 0.60, 95% CI 0.27-1.37). Women with an IUPC also delivered via operative vaginal delivery with an incidence of 14.8% (4/27) in comparison to 16.0% (29/181) of women without an IUPC (aOR 0.91, 95% CI 0.29-2.83). Women with an IUPC had a higher incidence of chorioamnionitis (29.6%, 8/27) (aOR 6.51, 95% CI 2.33-18.17) in comparison to women without an IUPC (6.1%, 11/181). Women with an IUPC also had a higher rate of postpartum hemorrhage (44.4%, 12/27) (aOR 4.03, 95% CI 1.71-9.46) in comparison to women without an IUPC (16.6%, 30/181). Neonatal complication rates were not different between groups. Of the women in the IUPC group, the IUPC was placed at an earlier cervical dilation in women who delivered via spontaneous vaginal delivery compared to women who had an operative delivery (5.7cm vs 7.6cm, $p = 0.03$). There was no difference in length of IUPC time, cervical dilation at placement, oxytocin dose or length of time on oxytocin between women who had a spontaneous vaginal delivery versus women who were delivered operatively.

In conclusion, in nulliparous term women with singleton gestations, prolonged second stage and epidural anesthesia, IUPC placement did not influence SVD rate. Nevertheless, earlier placement of an IUPC was associated with vaginal delivery. IUPC use was associated with a 551% increase in chorioamnionitis and a 303% increase in hemorrhage. Neonatal outcomes were not affected by IUPC use.

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Antihypertensive Treatment to Lower Cardiovascular Risk among Post-Menopausal Women on Estrogen Replacement Therapy

The project investigates the optimal antihypertensive therapy for elderly women on hormone replacement therapy. Hypertension is a major public health challenge in the United States. The Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack (ALLHAT) trial established that among available hypertensive therapies, hydrochlorothiazide (HCTZ) diuretics are superior to calcium-channel blockers and angiotensin-converting enzyme inhibitors in preventing 1 or more major forms of cardiovascular disease (CVD). Postmenopausal women on hormonal replacement therapy are generally at increased cardiovascular risks. There have been several studies that suggest lower tolerance of HCTZ compared to other hypertensive medications in this population. The goal of the study is to give healthcare providers with more liberty to select initial anti-hypertensive medication for postmenopausal women on estrogen replacement therapy, taking into account individual patient's side effect profile and other comorbidities.

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The Relationship Between Depression and Daytime Dysfunction from Lack of Sleep in Pregnant Women

Sleep quality and quantity are vital in pregnancy; sleep deficiency poses higher risks of preterm labor, inflammatory cytokines during pregnancy and labor, and postpartum depression. One additional day-to-day risk of sleep loss is daytime dysfunction, or lack of enthusiasm and trouble focusing during daily tasks. A common finding in pregnancy that may impact sleeping patterns and lead to daytime dysfunction is antenatal depression. Antenatal depressive symptoms may manifest as general depressed mood and/or anhedonia. The aim of this study is to examine the contribution of depressive symptoms in pregnant women to daytime dysfunction resulting from poor sleep. In an online survey, 303 pregnant women (gestation weeks $\mu=28.4$ wks, $SD=8.8$ wks) completed measures of sleep quantity and quality and mental health. Component 7 of the Pittsburgh Sleep Quality Index (ordinal scale, 0-6) assessed daytime dysfunction by measuring difficulty staying awake (0-3) and lack of enthusiasm (0-3) during daily tasks. The Patient Health Questionnaire-2 (PHQ2) measured anhedonia and depressed mood (ordinal scales, 0-3), comprising overall depressive symptoms (ordinal scale, 0-6). Statistical analyses were performed using SPSS. Of 303 pregnant women, 23.6% reported anhedonia and 21.2% reported depressed mood. There was a positive correlation between the two symptoms (Spearman coefficient=0.396, $p<0.01$). Three ordinal regressions were performed examining the relationship between PHQ2 measures and daytime dysfunction, controlling for gestational week, diagnosed sleep disorder, snoring, and sleep apnea. Women who reported increased anhedonic symptoms ($\chi^2=50.495$, $p<0.01$), depressed mood ($\chi^2=45.834$, $p<0.01$), and overall depressive symptoms ($\chi^2=66.239$, $p<0.01$) experienced significantly more daytime dysfunction. Depressive symptoms in pregnancy can manifest in various ways, including general depressed mood or anhedonia. Overall, anhedonia, depressed mood, and combined depressive symptoms are all indicators of daytime dysfunction in pregnant women. This study underscores an important negative consequence of depression: diminished daytime functionality and enthusiasm associated with deficient sleep. This information could help further address causes of lack of focus and energy women may face during pregnancy.

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How Well Does Assessing Hemorrhage Risk on Admission Correspond with Peripartum Morbidity?

To evaluate the extent to which a novel assessment of hemorrhage risk on admission corresponds with morbidity in the peripartum period.

This retrospective cohort analysis of a multicenter database included women admitted to labor and delivery from June 2016 to June 2018. A novel nursing assessment developed by Association of Women's Health, Obstetric and Neonatal Nurses was used to categorize patients as low, medium or high risk for hemorrhage. Outcomes related to blood transfusion, estimated blood loss (EBL) \geq 1000cc, ICU admission, general anesthesia and oxytocin use were evaluated based on hemorrhage risk score.

Data were available for 56,671 births. There were 14,861 low risk (26%), 26,080 (46%) moderate risk, and 15,730 (28%) high risk. There were a total of 275 women (0.5%) who had blood transfusion and 3,717 women (6.6%) with EBL \geq 1000cc. Tracking shell level (low/medium/high) designation is significantly associated with all the outcomes examined (Table). For women with high risk scores, the relative risk ratio compared with low risk women was 4.9 (95% CI 3.2-7.4) for blood transfusion and 5.2 (4.6-5.9) for EBL \geq 1000cc. Only 9% of women (26/275) who were categorized as low risk, 42% of women (115/275) originally categorized as medium risk, and 49% of women (134/275) originally categorized as high risk required a blood transfusion. For high versus low risk and the outcome of EBL \geq 1000cc, the sensitivity was 85%, specificity was 51%, positive predictive value 10%, negative predictive value 98%.

Women who scored high risk for hemorrhage on admission had five times higher risk for blood transfusion and EBL \geq 1000cc compared to low risk women. Given the low incidence of the outcomes explored, the hemorrhage risk assessment on admission works moderately well to identify peripartum morbidity.

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The Effect of Mental Health Disorders on Second Stage of Labor

The object of our study was to evaluate whether mental health disorders in nulliparous women affects second stage of labor and maternal/neonatal outcomes. We performed a retrospective cohort study of term, nulliparous women with singleton gestations, cephalic presentation, who dilated 10 centimeters. Women with mental health disorders, defined as depression, anxiety and bipolar disorder, were compared to women without these diagnoses. Exclusion criteria were intrauterine fetal demise, planned cesarean delivery or suspected major fetal anomaly. Primary outcome was incidence of spontaneous vaginal delivery (SVD). Results were adjusted for confounders. Maternal and neonatal outcomes were compared as secondary outcomes. IRB approval was obtained. In total, 661 women were evaluated. 35 women had mental health disorders and 626 women did not. Demographic data were similar between groups. Of the women with mental health disorders, 82.9% had an SVD compared to 84.7% of women without mental health disorders (OR 0.88, 95% CI 0.35-2.17). Women with mental health disorders had a slightly higher incidence of prolonged second stage compared to women without a mental health disorder (37.1% vs. 34.8%; OR 1.11, 95% CI 0.55-2.24). Maternal and neonatal complication rates were not different between groups. Of the women with mental health conditions and SVD, fetal position differed between groups. After controlling for fetal position, there was no difference in mental health disorder type, medication use, or pre/post pregnancy diagnosis for those who had a SVD versus an operative delivery. In nulliparous term women with singleton gestations, mental health disorders did not affect length of second stage or mode of delivery.

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