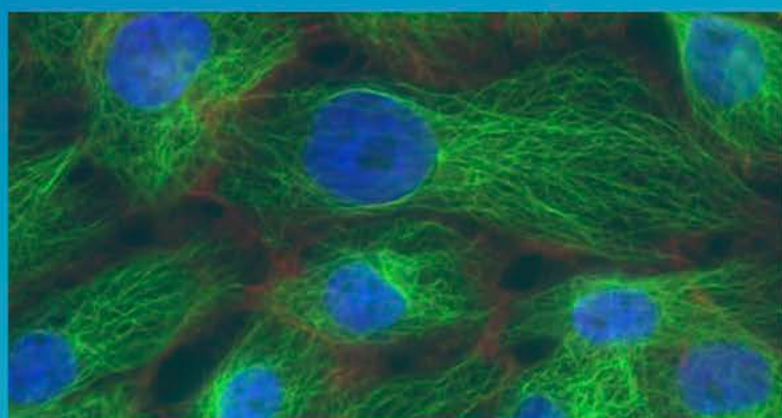


The University of Texas Southwestern Medical Center

59
FIFTY-NINTH

ANNUAL MEDICAL
STUDENT RESEARCH
FORUM



Guest Speaker

Professor Suzanne D. Conzen, MD

Professor of Internal Medicine

Division Chief of Hematology and Oncology

Andrea L. Simmons Distinguished Chair in Cancer Research

February 2nd, 2021 • 3-5pm

POSTER PRESENTATIONS 5-6PM

**THE UNIVERSITY OF TEXAS
SOUTHWESTERN MEDICAL CENTER
AT DALLAS**

**59th ANNUAL
MEDICAL STUDENT RESEARCH FORUM**

TUESDAY, FEBRUARY 2nd, 2021
Oral Presentations 3-5:00 pm
Poster Presentation 5-6:00 pm

PROGRAM DIRECTOR: Rene Galindo, MD, PhD

PROGRAM COORDINATOR: Amanda Arista, MAEd

EDUCATION ASSISTANT: Taylor MacLaskey, AA

GENEROUSLY SPONSORED
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THE SOUTHWESTERN MEDICAL FOUNDATION

59th ANNUAL MEDICAL STUDENT RESEARCH FORUM

LIST OF ORAL PRESENTATIONS

Graham Andre

“Ex vivo study of detergent based intraosseous bone wash and thermosensitive hydrogel delivery for treatment of osteonecrosis.”

Mentor: Harry Kim, MD, Department of Orthopedic Surgery

Alyssa Chen

“Predicting Thrombocytopenia Incidence as an Adverse Effect to Beta-Lactams.”

Mentor: Mujeeb Basit, MD, Department of Internal Medicine

Galen Gao

“KIRCLE: An Analysis of Variations in KIR Genes in The Cancer Genome Atlas and UK Biobank.”

Mentor: Bo Li, PhD, Department of Bioinformatics

Allante Milsap

“Thymectomy: Does Robotic Thymectomy Improve Outcomes for Non-Thymomatous Myasthenia Gravis Patients.”

Mentor: Kemp Kernstine, MD, PhD, Department of Cardiothoracic Surgery

PRESENTATION OF GUEST SPEAKER

Suzanne D. Conzen, MD

Professor of Internal Medicine

Andrea L. Simmons Distinguished Chair in Cancer Research

Division Chief of Hematology and Oncology

POSTER SESSION IMMEDIATELY FOLLOWING

59th Medical Student Research Forum

Table of Contents

Basic Research and Disease Models Abstracts	6
Clinical Research Abstracts	17
Quality Improvement, Global Health, and Medical Education Abstracts	104

TABLE OF CONTENTS

Basic Research and Disease Models

Graham Andre Ω	6
Galen Gao Ω	7
Khiem Hoang	8
Yash Kadakia	9
Benjamin Kroger *	10
Nimay Kulkarni	11
Priscilla Liem	12
Shyon Parsa*	13
Courtney Prestwood	14
Tommy Tan	15

KEY

Ω Oral Presenter - UT Southwestern Medical Student Research Forum

* Poster Presenter

Ex vivo study of detergent based intraosseous bone wash and thermosensitive hydrogel delivery for treatment of osteonecrosis

Graham Andre

Mentor: Harry Kim, MD, Department of Orthopedic Surgery

Collaborators: Chi Ma, PhD; Vishal Gokani, BS; Mo Singhal, BS; Min Sung Park, PhD; & Brad Niese, BS

Introduction: Osteonecrosis (ON) is the death of bone tissue due to a loss of blood supply. It is one of the most disabling diseases affecting pediatric and adult populations. It commonly affects the end of long bones such as the proximal femur and humerus. ON leads to an abundance of necrotic marrow cells (e.g. hematopoietic cells and adipocytes) left in bone marrow space, which forms a necrotic microenvironment hindering bone regeneration. A novel saline bone wash technique has been applied ex-vivo to remove the necrotic debris from the marrow space. It can effectively remove the soluble proteins and components but is chemically unable to remove non-soluble components (e.g. cell debris and fat). Saline has been used to deliver interosseous therapeutics but led to insignificant local dose and distribution of the biological agents. Poloxamer 407 (P407) is a synthetic polymer, is entirely removed by the kidney, requires no metabolism, and has no cellular toxicity. P407 <15%w/v aqueous solution is a detergent which can solubilize the interosseous non-soluble cellular debris and necrotic ingredients. P407 at >15%w/v also can form a thermosensitive hydrogel, which has an excellent flowability at low temperature, while it will be self-solidified at high temperature because of the sol-gel transition. The purpose of this study was to determine the effect of P407 on the removal of the non-soluble necrotic component and to determine the distribution of P407 hydrogel. Our hypothesis was that 10% P407 will extract more lipids, cellular debris, and increase washing efficiency in the trabecular space when compared to saline and that 20% p407 thermosensitive hydrogel would result in a higher volume of distribution than preformed hydrogel.

Methods: Harvested piglet humeral heads underwent three freeze-thaw cycles to mimic ON bone environment. Heads were washed with saline or P407 via two interosseous needles. Wash fractions lipids from the wash solution were measured Triglyceride Quant (Sigma-Aldrich). Cellular debris by weight was measured after lyophilization. Gross coronal section scans of the humeral heads were analyzed using OSTEOIMAGER (BIOQUANT Image Analysis, TN) to quantify washing efficiency using average pixel light intensity and percent washed. 2ml of thermosensitive hydrogel labeled with Barium Sulfate was injected into each sample in the experimental group, 2ml of labeled preformed was injected into the control group. Humeral heads were imaged using SKYSCAN MICRO-CT, and analyzed with CTan (Bruker, Billerica, MA). Volume of distribution (VOD) was measured as volume of the hydrogel divided by the total head volume for percent. Analysis included two-tailed unpaired t-test

Results: Total percent washed increased by 11% ($p=0.03$) and average pixel light intensity ($p=0.03$) increased 22% in the P407 (N=6) vs saline group, indicating increased clearance of debris. P407 washes yielded 53% higher lipids removed vs saline control group ($p=0.006$). Lyophilization showed an 700% increase in cellular debris removed ($p=0.02$) from P407 washes (N=4) vs saline controls. CT data showed increase in VOD ($p=0.01$) in the heads injected with the thermosensitive poloxamer hydrogel vs preformed hydrogel (N=3).

Discussion: P407 is a typical amphipathic polymer. Using P407 to perform the intraosseous bone wash, the non-soluble fat or cell debris can be encapsulated by the P407 molecules and extracted from bone marrow space. By removing these pro-inflammatory molecules and cell debris, the necrotic microenvironment may be reconditioned for bone regeneration. P407's ability to form a thermosensitive hydrogel allow effective interosseous delivery of therapeutics. Combining P407s non-toxicity, complete kidney clearance and FDA approval for temporary vessel occlusion, allows this minimally invasive washing method and therapeutic delivery system to be on a fast track for clinical applications for the treatment of ON.

KIRCLE: An Analysis of Variations in KIR Genes in The Cancer Genome Atlas and UK Biobank

Galen Gao

Mentor: Bo Li, PhD, Department of Bioinformatics

Collaborator: Xiaowei Zhan, PhD

Natural killer (NK) cells represent a critical component of the innate immune system's response against cancer and viral infections, among other diseases. To distinguish healthy host cells from infected or tumor cells, killer immunoglobulin receptors (KIR) on NK cells bind and recognize Human Leukocyte Antigen (HLA) complexes on their target cells. Just like the HLAs they bind, these KIRs exhibit high allelic diversity in the human population. In order to better understand these immunoreceptors, we have developed "KIR CaLling by Exomes" (KIRCLE), a novel method for genotyping individual KIR genes from whole exome sequencing data, and used it to analyze approximately 60,000 patient samples in The Cancer Genome Atlas and UK Biobank. We were able to assess population frequencies for different KIR alleles and demonstrate that, similar to HLA alleles, individuals' KIR alleles correlate strongly with their ethnicities. In addition, we observed associations between different KIR alleles and HLA alleles, including HLA-B*53 with KIR3DL2*013 (Fisher's Exact FDR = $7.64e-51$). Finally, we showcased statistically significant associations between KIR alleles and various clinical correlates, including peptic ulcer disease (Fisher's Exact FDR = 0.0429) and age of onset of atopy (Mann-Whitney-U FDR = 0.0751). Our work represents the first large-scale genetic analysis to elucidate pathologic and immunologic associations with human NK cells and provides an unprecedented resource and computational tool for future investigations into the functionality of different KIR alleles. Through these analyses, we demonstrate that KIR polymorphism and NK cells play a critical role in many diseases, often through their interactions with HLA complexes. Peptic ulcer disease and atopy are just two diseases in which NK cells may play a role beyond their "classical" realm of anti-tumor and anti-viral responses.

Arc Proteostasis in Neurodegenerative Diseases

Khiem Hoang

Mentor: Joseph Albanesi, PhD, Department of Pharmacology

Collaborator: George DeMartino, PhD

Activity-regulated cytoskeleton-associated protein (Arc) has been able to invoke much interest due to its association with a variety of cognitive disorders including Angelman's Syndrome, substance addiction, and neurodegenerative diseases. While its role in the pathogenesis of the aforementioned conditions has not been established, it is likely due to Arc's physiological function of promoting amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptors (AMPA) endocytosis. Overexpression of Arc leads to excessive clearance of postsynaptic AMPAR, resulting in deficits in learning and memory. Hitherto, most studies have focused on the activity-dependent control of Arc expression at the levels of transcription and translation. However, emerging evidence points to a critical role of degradation via the ubiquitin proteasome system in Arc proteostasis. In this review, we provide a synopsis of the mechanisms controlling Arc degradation, highlighting controversies in the field, the potential regulatory role of post-translational modifications, and the implications of dysfunctional Arc degradation in neurodegenerative disorders, including Alzheimer's diseases.

The Impact of Ischemia and Temperature on Arterial Graft Histology in Free Flap Reconstruction

Yash Kadakia

Mentors: Nicholas Haddock, MD & Sumeet Teotia, MD, Department of Plastic Surgery

Collaborators: Thomas Suszynski, MD, PhD & Bret Evers, MD

Background: Exciting advances in microsurgery have enabled the use of nontraditional donor sites with composite vessel grafting for complex reconstruction, particularly in breast reconstruction. However, while such “jump” grafts lengthen the vascular pedicle, these vessels may experience significant warm ischemia time (WIT) in the interval between harvest and reperfusion. To our knowledge, no previous study has histologically characterized time-dependent and temperature-dependent ischemic injury to the vessel endothelium in the setting of smaller caliber arteries with increased metabolic demand relative to blood flow (diameter <1.5mm). This study aims to describe cytoarchitectural damage to vessel endothelium in response to increasing WIT and increasing cold ischemia time (CIT).

Methods: This was an IRB approved study funded by the American Society for Reconstructive Microsurgery Medical Student Research Grant. 10 patients scheduled for deep inferior epigastric perforator (DIEP) flap breast reconstruction were enrolled and donated <2cm of resected deep inferior epigastric perforator artery. Collected samples were immediately sectioned into four segments, each assigned to the following ischemia groups: 120 mins of WIT, 600 mins of WIT, 120 mins of CIT, and 600 mins of CIT. Processed segments were stained for H&E and CD31 to study gross structure and endothelial sloughing, respectively. Slides were reviewed in a blinded manner by two board-certified pathologists. Segments from 2 patients were damaged during processing; these samples were not included in preliminary analysis.

Results: On H&E, all segments demonstrated intact adventitia, media, and internal elastic lamina. On CD31, the degree of endothelial sloughing appeared to increase with increased WIT (Figure 1). Furthermore, cold ischemia reduced the degree of endothelial sloughing at 120 minutes compared to warm ischemia in almost all patients. This difference was even more prominent at 600 minutes of ischemia, for which CIT reduced endothelial sloughing for all patients.

Conclusion: Our preliminary results show that the adoption of a cooling regimen may reduce endothelial sloughing that occurs secondary to ischemia. Reduced exposure of subendothelial collagen may subsequently lead to reduced risk of thrombosis, necrosis, and delayed wound healing. The implications of this finding extend to diverse areas of complex reconstruction, and cooling should thus be considered in designing protocol for intraoperative composite tissue preservation. Further study is needed to confirm our findings in a larger sample size and address the impact of reperfusion injury.

Single Cell Multi-Omic Analysis of Myelodysplastic Syndromes: Phenotypic Correlation to the Acquisition of Mutations in Hematopoietic Stem Cells

Benjamin Kroger

Mentor: Stephen Chung, MD, Internal Medicine- Hematology/Oncology

Collaborator: Yi Huang, PhD

The myelodysplastic syndromes (MDS) are a group of heterogeneous bone marrow failure syndromes occurring more frequently with increased age. Mutations that underlie the development of MDS originate in hematopoietic stem cells (HSCs), a population of self-renewing multipotent progenitor cells that give rise to myeloid and lymphocytic lineages. Mutant HSC populations underlie disease initiation and relapse, and curative therapies likely require their eradication. These mutant HSCs have been yet to be fully characterized and have proven difficult to isolate and study. We utilized a novel single cell DNA sequencing (DNA-seq) platform, which allows for simultaneous targeted DNA-seq and protein expression quantification at the single cell level to identify cell surface markers unique to mutated HSCs in a patient with MDS. We found that wild type vs. mutated CD34+CD38- HSCs had markedly differing cell surface phenotypes, with MDS HSCs characterized by downregulation of CD99, CD164, and CD44, as well as upregulation of CD90, CD109, and KCN3. Previous work has shown CD99 to be differentially expressed in diseased HSCs, however no additional markers have been conclusively shown to be selective for this population. This platform thus represents a powerful modality by which to identify unique markers with functional and therapeutic potential.

Power Decreases in the Anterior Hippocampus and Posterior Cingulate Cortex Identify Primacy Items During Both Encoding and Retrieval

Nimay Kulkarni

Mentor: Bradley Lega, MD, Department of Neurosurgery

Collaborator: Srinivas Kota, PhD

During a free recall memory task, the first item remembered is most frequently an item presented early in the list of words. Existing evidence suggests successful recall of early-list items causes a graded reduction in power of slow oscillations during encoding while items presented later in a list show the opposite trend. We propose recollection of early-list items (primacy) uses a unique regional network compared to late-list items (non-primacy). Intracranial electroencephalography (iEEG) recordings from 114 patients with drug-resistant epilepsy were collected while they studied and subsequently recalled a list of 15 nouns. iEEG data was transformed and normalized to acquire spectral power during encoding and retrieval of each item. A linear mixed effect model was used to compare band power from 1000ms recordings during both encoding and retrieval between primacy (pos. 1- 2) and non-primacy (pos. 3-15) items that were subsequently recalled first in each list. During encoding, primacy items demonstrated robust left hemispheric depression of theta (4-8hz) and beta (8-16hz) power in the anterior hippocampus ($p<0.001$), posterior hippocampus ($p<0.001$), angular gyrus ($p<0.001$) and posterior cingulate cortex ($p<0.001$). Amongst the same regions during retrieval, only the anterior hippocampus showed similar theta and beta band depression ($p<0.005$) and the posterior cingulate cortex showed a reduction in beta power ($p<0.005$). While all the studied regions are known to participate in both encoding and retrieval, our results suggest the anterior hippocampus and posterior cingulate cortex maybe involved the preferential retrieval of primacy items. This unique regional activation may suggest an underlying memory network that specifically aids in the recall of items presented early in a sequence while having a less significant role in recall items presented later in a sequence.

Sterol-O-Acyltransferase 1 (SOAT1) as a chemo-sensitizing Drug Target in Non-Small Cell Lung Cancer Cell Lines

Priscilla Liem

Mentors: Long Shan, MD, PhD & John Minna, MD,
Department of Internal Medicine- Hematology/Oncology

Collaborators: Kim Avila and Hyun-Sil Par

Traditional chemotherapy for Non-Small Cell Lung Cancer (NSCLC) seems to render ineffective upon acquisition of chemoresistance during treatment. One potential chemo-sensitizing target is Sterol-O-Acyltransferase 1 (SOAT1), an enzyme responsible for the conversion of cholesterol to cholesterol esters intracellularly. Studies have shown the importance of SOAT1 in cell survival, as the inability to produce cholesterol esters leads to impaired steroidogenesis and cell death. Other studies have also shown that various cancers such as glioblastoma multiforme exhibit an increase in lipogenesis and the employment of excess lipid droplets are crucial for cancer cell survival in harsh microenvironments. Single cell CRISPR-Cas9 knockout clones of SOAT1 were tested with various chemotherapeutic drugs to test for sensitization through in vitro colony formation assays. Compared to the H2009 parental cell line, colony formation assay results showed a slight statistically significant decrease in survival fraction of the SOAT1 knock out when treated with Cisplatin (S14- $P=5E-10$, S35- $P=0.92$) and Paclitaxel (S35- $P=0.02$, S26- $P=0.29$, S411- $P=0.028$, S15- $P=0.5$). Treatment with Etoposide (S14- $P=8E-8$, $P=2.39E-12$) and Gemcitabine ($P=0.00035$) portrays a statistically significant and dramatic decrease in survival fraction with the SOAT1 knock out, which is displayed in the figures below. Treatment with Docetaxel ($P=0.03$), Vinorelbine ($P=0.26$), Mitomycin C ($P=0.82$), Pemetrexed ($P=0.79$), shows no statistically significant decrease in survival fraction. The results of this investigation portray the potential efficacy of SOAT1 as a drug target to create combination chemotherapies in chemo-resistant NSCLC patients.

Non-Invasive Skin Rejuvenation Assessment by Virtual Biopsies Using Optical Coherence Tomography (OCT)

Shyon Parsa

Mentor: Yucel Akgul, MD, PhD, Department of Plastic Surgery

Collaborators: Jeffrey Kenkel, MD & Christine Wamsley

Purpose: Currently, the outcomes of non-invasive skin rejuvenation procedures and treatments are limited to highly subjective patient, physician, or observer-based rating surveys. Skin biopsies are invasive and not practical for continuous assessment of skin rejuvenation. Here we determine the applicability of optical coherence tomography as a virtual biopsy to provide an objective, non-invasive assessment of both epidermis and dermis following rejuvenation treatment.

Methods: Twenty patients received bipolar fractional radiofrequency treatment to the left and right suprapatellar skin. Optical coherence tomography (OCT) images were obtained at baseline, days 0-7, 3 weeks, 3 months, and 6 months. The images were processed on ImageJ and MatLab to create 3D renderings of the baseline and 3 months post-procedure dermal collagen and vasculature. Measures on the epidermal/dermal thickness, dermal epidermal junction (DEJ), attenuation coefficient, blood flow and surface roughness were analyzed.

Results: Increased DEJ projections at 3 week and 3 months, and attenuation coefficient at 3 months and 6 months in contrast to decrease in blood flow at 3 and 6 months following treatment were recorded. In addition, 3D rendering of the sub-epidermal skin displayed a marked difference in collagen composition before and after the procedure.

Conclusions: Non-invasive OCT imaging successfully provides objective measurements of the skin ultrastructure, DEJ properties, attenuation coefficient and blood flow as well reconstruction of a virtual biopsy allowing 3D model of the skin layers.

Localization of Upregulated Proteins in Hidradenitis Suppurativa

Courtney Prestwood

Mentor: Tamia Harris-Tyron, MD PhD, Department of Dermatology

Collaborators: Chenlu Zhang, PhD & Travis Vandergriff, MD

Background: Hidradenitis Suppurativa (HS) is a chronic debilitating inflammatory skin disease. Histologically, the inflammatory changes of HS are characterized by a perifollicular lymphocytic infiltrate due to follicular occlusion, keratinocyte hyperplasia, and subsequent rupture. These changes then lead to the loss of sebaceous glands and other adnexal structures. Recent transcriptomic studies comparing HS skin to healthy skin controls reveal multiple transcripts that are more abundant in HS skin including SPRR2B, SPRR2C, psoriasin (S100A7), koebnerisin (S100A7A or S100A15), calgranulin (S100A12), Peptidase Inhibitor 3 (PI3), OAS2, and OASL.

Methods: We employed immunohistochemical staining to determine the expression pattern of these proteins in HS skin samples compared to normal controls.

Results: All of the transcripts that were more abundant in HS skin by RNA analysis showed a noticeably darker staining pattern by immunohistochemistry compared to normal skin controls. SPRR1B, SPRR2A, OAS2, OASL, and PI3 were all pan positive in HS skin. In normal skin, psoriasin expression is restricted to the distal outer root sheath and uprabasal keratinocytes. However, in HS skin samples psoriasin is expressed in the basal epidermis and throughout the hair follicle. The nonhealing sinus tracts in HS skin show an increased expression of OAS2, psoriasin, koebnerisin, elafin, and OASL, which is a pattern also seen in chronic wounds.

Conclusion: Our findings reveal the antimicrobial and structural proteins that are more abundant in HS skin are expressed at different locations in HS skin compared to control skin. Additionally, the expression pattern of OAS2, psoriasin, koebnerisin, elafin, and OASL in non-healing sinus tracts in HS further highlights the link between chronic wounds and HS. Our findings add to the growing knowledge of the pathological changes associated with HS.

Cerebellar Cortical Control of Feeding

Tommy Tan

Mentor: Peter Tasi, MD, PhD, Department of Neuroscience/Psychiatry

Collaborator: Fantao Meng, PhD

The cerebellum is increasingly being recognized for its role in regulation of cognitive and emotional processes. In line with these functions, cerebellar dysfunction has been implicated in many neuropsychiatric disorders such as autism spectrum disorder and anxiety disorders. However, there are still many potential behavioral processes regulated by the cerebellum that are unknown or poorly understood. In this study, we demonstrate that chemogenetic inhibition of the cerebellum, particularly of Crus1 Purkinje cells (PC), is able to suppress feeding behavior in fasted mice and upregulate neuronal activity in the paraventricular nucleus of the hypothalamus (PVN), a nucleus with critical roles in feeding regulation. We then showed that the medial prefrontal cortex (mPFC) mediates cerebellar suppression of feeding behavior as well as PVN activity pointing towards the mPFC as a critical node in cerebellar mediated feeding control. Together these studies reveal the role of a cerebellar-cortical circuit important for control of feeding behavior.

TABLE OF CONTENTS

Clinical and Translational Research

Claire Abijay *	17	Jessica Lowe	61
Murtaza Ahmed *	18	Pratyusha Manthena *	62
Joshua Amaya	19-20	Amisha Mehta	63
Annapoorani (Anu) Asokan	21	Tabarak Mian	64
Rohit Badia	22	Gina Milano	65
Alyssa Chen Ω	23	Allante Milsap Ω	66
Sung Kyung (Stephanie) Cho *	24	Benjamin Montanez	67
Andrew Davis *	25	Santiago Olachea *	68-69
Paul D'Cunha *	26	Mackenzie Parker	70
Pallavi Dev *	27	Akshat Patel *	71
Cecilia Zhou			
Farzam Farahani *	28	Prem Patel	72-73
Amrit Gonugunta	29	Juliana Pineider	74
Malvika Govil *	30	Courtney Prestwood *	75
Charlotte Greif	31	Meredith Rae	76
Jane Gu	32	Jenny Raman	77-78
Paul Gudmundsson *	33	Amani Ramiz *	79
Samrez Haider	34-35	Revathi Ravella	80
Waqas Haque *	36-38	Swathi Rayasam *	81
Sharon Huang *	39	Meghana Reddy *	82
Won Jae Jeong	40	Joel Rodriguez *	83
Merin John	41	Sanchit Sachdeva *	84
Christopher Johns	42	Ambica Sethi *	85
Kaitlin Jones	43-44	Aaron Shi *	86
Yash Kadakia	45-46	Prachi Singh	87
Ami Kapadia	47	Madeline Sparks	88
Mehraban Kavoussi *	48	Casey Strauss *	90
Heejo (Clare) Keum	49	Lisa Thiele *	91
Jenny Kim	50	Dharani Rhoit Thota *	92
Elysha Kolitz	51	Abhinav Thummala *	93-94
Vineeth Kommidi	52	Karlyn Tunnell	95
Ashlyn Lafferty	53	Aaron Tverye *	96
Bonnie Leung	54	Angel Valencia *	97
Jorena Lim	55	Jesus Valencia	98
Jason Lin *	56	Benjamin Wang *	99
Charles Liu *	57	Angela Zhang *	100
Jim Liu	58	Lucian Zhao	101
Yida Liu *	59	Cecilia Zhou *	102
Samantha Lopez	60	Haoling (Holly) Zhu *	103

KEY

Ω Oral Presenter - UT Southwestern Medical Student Research Forum

* Poster Presenter

Demographic, Clinical, and Polysomnographic Parameters in Children with Down Syndrome and Obstructive Sleep Apnea

Claire Abijay

Mentor: Ron Mitchell, MD, Department of Otolaryngology
Collaborators: Anna Tomkies, MD & Romaine Johnson, MD

Background: Children with Down Syndrome (DS) have a higher prevalence of obstructive sleep apnea (OSA) in comparison to the general pediatric population. Studies are needed to assess outcomes after surgical intervention.

Objective: To determine the efficacy of tonsillectomy and adenoidectomy (T&A) in children with DS. To identify demographic and clinical predictors for persistent OSA.

Methods: This is a retrospective chart review of children with DS ages 1 to 18 from Children's Medical Center / UT Southwestern between January 2009 and January 2020. Children were included if they had pre and postoperative polysomnography (PSG) studies within 12 months of T&A. Demographic and clinical characteristics were compared among the following postoperative OSA categories: no OSA (apnea-hypopnea, $AHI < 1$), mild ($AHI 1-4.9$), moderate ($AHI 5-9.9$), and severe ($AHI \geq 10$) OSA. Simple and multivariable regression models were used to determine the predictors for persistent moderate-to-severe OSA ($AHI \geq 5$).

Results: A total of 81 children with DS were included, with a mean age of 6.6 years, 37 (47%) females, 53 (65%) Hispanic, 14 (17%) Caucasian, and 10 (12%) African American. Preoperatively, 60 (74%) children had severe OSA. After T&A, PSG parameter improvements were seen with AHI (27.9 to 14.0, $P < 0.001$), arousal index (25.2 to 18.8, $P = 0.004$), percent time spent with oxygen saturations less than 90% (8.8% to 3.4%, $P = 0.003$), and oxygen nadir (81.4% to 85%, $P < 0.001$). Overall, 47 children (58%) had persistent moderate-to-severe OSA, and 49 (60%) had a 50% reduction in AHI after T&A regardless of initial severity. Fifteen (18.5%) children had increased AHI post-T&A with 2 worsening from mild to moderate and 4 from mild/moderate to severe OSA. Increasing severity of OSA post-T&A was associated with higher rates of obesity (25% for no OSA to 64% for severe, $P = 0.03$). Persistent OSA predictors were asthma (odds ratio = 4.77, 95% CI: 1.61-14.09, $P = 0.005$) and increasing age (OR = 1.25, 95% CI: 1.09-1.43, $P = 0.001$).

Conclusion: Most children with DS after T&A are at high risk for persistent OSA despite improvements in respiratory parameters. Asthma and increasing age are predictors for persistent OSA. Children with DS should be closely monitored post-T&A for persistent OSA especially if they are older asthmatics.

Association between body mass index, dosing strategy, inflammatory markers, and efficacy of immune checkpoint inhibitors

Murtaza Ahmed

Mentor: David Gerber, MD, Department of Internal Medicine-Hematology/Oncology

Collaborators: Mitchell Itzstein, MD; Thomas Sheffield, PhD; Shaheen Khan, PhD; Farjana Fattah PhD; Jason Y. Park, MD, PhD; Vinita Popat, MD; Jessica M. Saltarsk; Yvonne Gloria-McCutchen; David Hsiehchen, MD; Jared Ostmeyer, PhD; Saad A. Khan; Nazima Sultana MS; Yang Xie, MD, PhD; Quan-Zhen Li, MD, PhD; & Edward K. Wakeland PhD

Introduction: Increased body mass index (BMI) has been associated with improved response to immune checkpoint inhibitors (ICI) in multiple cancer types. We evaluated associations between BMI, ICI dosing strategy, inflammatory biomarkers, and clinical outcomes in a cohort of cancer patients treated with ICI.

Methods: Patients with cancer scheduled to initiate ICI were enrolled in a biomarker collection protocol. Blood samples were collected at pre-treatment baseline and approximately six weeks after ICI initiation, and were evaluated for cytokines and autoantibodies using multiplex platforms. We compared clinical outcomes between low- and high-BMI populations using Kaplan-Meier curves, cox regressions, and Pearson product-moment correlation coefficients.

Results: A total of 299 patients were enrolled, of whom 41% were women and 60% were overweight (BMI ≥ 25). Of these, 209 (70%) received fixed and 90 (30%) received weight-based ICI dosing. In the overall cohort, overweight BMI was associated with improved progression-free survival (PFS) (HR 0.69; 95% CI, 0.50-0.94; $P=0.02$) and had a trend toward improved overall survival (OS) (HR 0.76; 95% CI, 0.56-1.05; $P=0.09$). For both endpoints, improved outcomes in the overweight population was limited to patients who received weight-based ICI dosing (PFS HR 0.56; $P=0.05$; vs HR 0.76; $P=0.15$ for fixed dosing) (OS HR 0.53; $P=0.02$; vs HR 0.90; $P=0.58$ for fixed dosing). In exploratory analyses, baseline levels and post-treatment increases in multiple pro-inflammatory cytokines and autoantibodies were greater in overweight patients.

Conclusions: Overweight BMI is associated with an inflammatory state and improved clinical outcomes from immunotherapy. This apparent benefit may be limited to patients who receive weight-based dosing of these agents.

Completion of Nipple Reconstruction in Triple-Negative Breast Cancer Patients Compared to Triple-Positive Breast Cancer Patients: A Single Institutional Analysis

Joshua Amaya

Mentors: Nicholas Haddock, MD & Sumeet Teotia, MD, Department of Plastic Surgery
Collaborators: Yash Kadakia, BA; Kaitlin Jones, BA; & Pope Rodnoi, BA

Background: Triple-negative (TN) breast cancer is considered to be more aggressive than other subtypes of breast cancer and has a poorer prognosis. It is defined as breast cancer tumors that lack estrogen receptor (ER), progesterone receptor (PR), and HER2 expression and affects 17-20% of women with breast cancer. However, reconstructive outcomes remain to be elucidated when compared to other invasive breast cancer subtypes. The aim of this study is to determine if there is a disparity in completing nipple areolar reconstruction in breast cancer patients with a triple-negative subtype compared to patients with a triple-positive (TP) subtype.

Methods: 107 patients who underwent bilateral non-nipple sparing mastectomies from 2013 to 2017 diagnosed with a TN (n = 54) and TP (n = 53) invasive breast cancer subtype were identified. All 107 patients were seen by two attending surgeons at a single institution. Completion of nipple reconstruction and areolar tattoos, number of days from mastectomy to nipple reconstruction, and areolar tattoos were analyzed. Demographic/clinical variables, including race, age, BMI, smoking, comorbidities, neoadjuvant/adjuvant chemotherapy, hormonal therapy, radiation therapy, and choice of implants or flaps were also analyzed.

Results: There was no significant difference in the proportion of patients who underwent radiation therapy in the TN group than in the TP group (55.56% vs 37.74%, $p = 0.0819$). Among these two groups, there was no significant difference in the percentage of patients completing nipple reconstruction (TN = 44.44%, TP = 49.06%, $p = 0.7001$) and acquiring an areolar tattoo (TN = 33.33%, TP = 39.62%, $p = 0.5503$). The differences in the average duration in days from mastectomy to nipple reconstruction (TN = 505.7, TP = 456.4, $p = 0.5259$) and areolar tattoos (TN = 665.6, TP = 638.5, $p = 0.7653$) among these two patient populations were also insignificant.

Conclusion: TN subtype does not make a significant impact on completing nipple reconstruction when compared to TP patients, another extreme. These results should be considered when counseling TN patients on their reconstructive journey.

Influence of Triple-Negative Versus Luminal A Breast Cancer Patients on Choice of Implant Versus Autologous Breast Reconstruction at a Single Institution

Joshua Amaya

Mentors: Nicholas Haddock, MD & Sumeet Teotia, MD, Department of Plastic Surgery

Collaborators: Ryan Dickey, MD; Yash Kadakia, BA; Kaitlin Jones, BA;
Pope Rodnoi, BA

Background: Triple-negative (TN) and luminal A (Hormone-receptor positive, HER2 negative, low grade) are two extremes in terms of breast cancer diagnosis, with TN being the most aggressive and luminal A being the least aggressive. Our study aims to compare the reconstructive journey of these two groups from the time they receive a tissue expander to the time they complete implant- or autologous-based breast reconstruction.

Methods: 255 patients who underwent tissue expander placement from 2013 to 2017 diagnosed with a TN (n = 73) and luminal A (n = 182) invasive breast cancer subtype seen by two attending surgeons at a single institution were identified. Preference in implant- and autologous-based reconstruction with and without a history of radiation was analyzed. Tissue expander (TE) complications, race, age, BMI, smoking, and comorbidities were also studied.

Results: There was a significant difference in the choice of implant- or autologous-based reconstruction among these two groups ($p < 0.05$). A greater proportion of luminal A patients underwent implant-based reconstruction (63.47%) and a greater proportion of TN patients underwent autologous-based reconstruction (53.13%). In comparing the duration from TE placement to placement of implants among these two groups, there was no significant difference (TN = 240.2 days, luminal A = 206.7 days, $p = 0.2096$). There was also no significant difference in the duration from TE placement to autologous-based reconstruction (TN = 411.1 days, luminal A = 254.1 days, $p = 0.0607$). Additionally, there was no significant difference in the proportion of TN and luminal patients going through surgical complications related to TE placement ($p = 0.5796$). Significantly more TN patients underwent radiation therapy ($p < 0.01$) and neoadjuvant chemotherapy ($p < 0.0001$) than luminal A patients. Autologous-based reconstruction was more prevalent in patients from both groups who underwent radiation therapy (Luminal A: $p < 0.001$; TN: $p < 0.005$).

Conclusion: TN breast cancer patients mostly chose autologous-based reconstruction, while luminal A patients chose implant-based reconstruction. Radiation therapy may play a big role in the type of delayed-immediate reconstruction these patient populations choose. Both patient groups carried their tissue expanders for similar duration of time depending on their choice of reconstruction.

Physician attitudes, knowledge gaps, and system-level factors are barriers to prescribing metformin for diabetes prevention among people with severe mental illness.

Annapoorani (Anu) Asokan

Mentor: Esti Iturralde, PhD, Kaiser Permanente Northern California

Collaborators: Natalie Slama, MPH & Julie A. Schmittiel, PhD

People with severe mental illness (SMI) face high risk for diabetes and cardiovascular disease, which is exacerbated by antipsychotic medications associated with metabolic side effects (e.g., rapid weight gain, dysglycemia). Previous clinical trial studies have found that metformin reduces antipsychotic-induced weight gain and lowers diabetes risk, but metformin is not commonly prescribed for these purposes despite high patient tolerability. This qualitative study examines barriers to metformin prescription for patients taking antipsychotic medications. We conducted semi-structured interviews with 13 physicians (7 psychiatrists and 6 primary care providers [PCPs]) in Kaiser Permanente Northern California, a large integrated health care delivery system. Interviews assessed physicians' metformin prescribing practices, approaches to managing weight gain or preventing diabetes, and health system factors. Interviews were assessed by two researchers using a rapid analysis approach designed for implementation research. Physicians reported: (1) knowledge gaps related to prescribing metformin specifically for antipsychotic-induced weight gain; (2) common perceptions (among physicians and, according to them, among patients) that lifestyle change was preferable to metformin; and (3) lack of role clarity and care coordination between psychiatrists and PCPs related to managing metabolic side effects. Results of this study suggest: (1) a need for physician training regarding metformin for antipsychotic-induced weight gain; (2) clinician guidelines on metformin that balance evidence on efficacy with patient preferences and circumstances; and (3) more formalized support and consultation for psychiatrists to address metabolic effects given their more frequent interactions with the SMI population and their role in prescribing antipsychotic medications. Overcoming barriers to metformin prescription for patients taking antipsychotic medications may improve diabetes and cardiovascular risk profiles for people with SMI.

Real-World Application of Pre-Orchiectomy miR-371a-3p Test in Testicular Germ Cell Tumor Management

Rohit Badia

Mentor: Adita Bagrodia, MD, Department of Urology

Introduction: Testicular cancer is the most common neoplasmin young men 20-40years of age. Current serum tumor markers (STMs) for detecting testicular germ cell tumor (GCT) are limited by low sensitivity. Growing evidence supports the use of circulating miR-371a-3p as a superior marker for malignant (viable) GCT management. We evaluatedthe real-world application of serum miR-371a-3p levels in detecting viable GCT among patients undergoing partial or radical orchiectomy.

Materials and Methods: Serum samples were collected from 69 consecutive patients with suspected testicular cancer before orchiectomy. Performance characteristics of serum miR-371a-3p were comparedwith conventional STMs (AFP/ β -hCG/LDH) between viable GCT patients and those without viable GCT on orchiectomy pathology. Relative miR-371a-3p levels were correlated with clinical course. Kruskal-Wallis test and linear and ordinal regression models were used for analysis.

Results: For detecting viable GCT, combined conventional STMs had a specificity of 100%, sensitivity of 58%, and area under the curve (AUC) of 0.79. Them iR-371a-3p test showed a specificity of 100%, sensitivity of 93%, and AUC of 0.978. Median relative expression of miR-371a-3p in viable GCT patients was >6,800-fold higher than in patients lacking viable GCT. MiR-371a-3p levels correlated with composite stage(CS) ($p=0.006$), and, among CS I patients, independently associated with embryonal carcinoma percentage ($p=0.0012$) and tumor diameter ($p<0.0001$). Six patients received orchiectomy after chemotherapy and were correctly predicted to have presence or absence of viable GCT by the miR-371a-3p test.

Conclusions: If validated, the miR-371a-3p test can be used in conjunction with conventional STMs to aid clinical decision-making. A positive miR-371a-3p test inpatients after preoperative chemotherapy or with solitary testes could potentially guide subsequent orchiectomy or observation.

Predicting Thrombocytopenia Incidence as an Adverse Effect to Beta-Lactams

Alyssa Chen

Mentor: Mujeeb Basit, MD, Department of Internal Medicine- Cardiology

Collaborator: Marguerite Monogue, PharmD

Objective: Beta-lactam induced thrombocytopenia (TCP) is a rare but potentially fatal disorder characterized by low platelet levels, which can result in clinically significant bleeding in patients if not diagnosed or resolved in a timely manner. There is a need to understand the factors that may increase the risk of TCP prior to beta-lactam administration with hopes of reducing the incidence of potentially fatal complications.

Methods: This study is a retrospective review of all adult inpatient encounters at UT Southwestern Medical Center from 01/2012 to 07/2020. Encounters with >1 beta-lactam administration, a normal baseline platelet value, and a recorded platelet value ≤ 30 days following administration were included. Study outcome was incidence of TCP (defined as platelet $<150,000/\mu\text{L}$ or $>50\%$ decrease from baseline) at most 30 days after administration. A total of 62 features, including lab values, demographic data, comorbidities (including other etiologies of TCP), as well as beta-lactam dosage and administration values, were analyzed. Logistic regression was used to fit and model the data. Forward, backward, recursive, and manual feature selection methods were used to optimize the set of features in the final model.

Results: A total of 22,004 encounters from 13,732 patients met the study criteria. Of these, 1218 (5.5%) developed TCP in the 30 days following beta-lactam administration. 16 features were included in the final logistic regression model, which achieved 80% accuracy, 79% sensitivity, and 81% specificity, and AUROC of 87%. Presence of CHF (OR, 0.65; 95% CI, 0.45-0.94), higher baseline platelet values (OR, 0.97; 95% CI 0.97-0.98), higher PTT values (OR, 0.98; 95% CI 0.96-1.00), and body surface area (OR, 0.56; 95% CI, 0.34-0.91) were protective against TCP. In contrast, a diagnosis with other etiologies of TCP (OR, 2.79; 95% CI 1.44-5.37) were shown to be positively associated with TCP.

Conclusion: We performed a large-scale retrospective study to understand the incidence of thrombocytopenia following beta-lactam administration, identified 5 statistically significant risk and protective factors, and developed a predictive model with excellent discrimination (AUROC of 87%). For future work, we hope to first prospectively validate model performance in predicting thrombocytopenia in at-risk patients and develop an intervention to reduce future incidence of thrombocytopenia.

Retrospective Cohort Study of Non-Adherence to Surgical Treatment in Patients with Non-Melanoma Skin Cancer

Sung Kyung (Stephanie) Cho

Mentor: Benjamin Chong, MD, MSCS, Department of Dermatology

Importance: Many studies have shown efficacy of various treatment options for non-melanoma skin cancer (NMSCs). However, studies on the completion of recommended surgical treatment options and reasons behind non-adherence are lacking.

Objective: The objective is to compare rates of non-adherence of surgical treatment options, determine clinical and demographic factors associated with non-adherence, and identify barriers for non-adherence.

Methods: This is a retrospective cohort study conducted at Parkland dermatology clinic. All adult patients with NMSC (age>18 years) seen between January 1, 2015 and December 31, 2017 that were recommended surgical treatment (surgical excision & electrodesiccation & curettage (ED&C) or Mohs surgery) were eligible. Non-adherence was defined as not completing recommended treatment. Patients were excluded if they had multiple NMSCs diagnosed at once with different treatment recommendations or were lost to follow up. Reasons for non-adherence were categorized into five categories: barriers to communication, social reasons, medical reasons, financial reasons, and other reasons not specified.

Results: There were 427 patients that met inclusion criteria during our study period. Patients recommended surgical excision and ED&C had a lower non-adherence rate of 3.40% compared to those recommended Mohs surgery (11.43%) ($p=0.006$). Factors associated with non-adherence were self-pay (19.07% adherent vs. 43.24% non-adherent) ($p=0.004$) and male sex (59.49% adherent vs. 75.68% non-adherent) ($p=0.054$). Multivariate logistic regression analysis confirmed the findings that Mohs surgery patients were more likely to be non-adherent (odds ratio (OR)=3.839, 95% confidence interval (CI) (1.435-10.270), $p=0.007$) compared to surgical excision and ED&C. Males were more likely to be non-adherent (OR= 2.474 (1.105-5.542), $p=0.028$) to females, and self-pay patients were more likely to be non-adherent than those with other payers (OR=3.050, 95% CI(1.437-6.475), $p=0.004$). Of the 37 patients who were non-adherent, the most common reasons were loss to follow-up (32.81%%), social reasons (26.56%), medical reasons (25.00%), and financial reasons (12.50%).

Conclusion: There was a significant difference in non-adherence rates between surgical treatments for NMSCs in our cohort of patients. Our study suggests the need for future interventional studies that implement strategies such as patient reminders and supplement patient education to decrease non-adherence rates.

OCTA Optic Disc Measurements Corrected Using Axial Length

Andrew Davis

Mentor: Karanjit Kooner, MD, Department of Ophthalmology

Purpose/Relevance: Optical Coherence Tomography – Angiography (OCTA) is a technique used to image the vascular networks of the retina, optic nerve, and choroid. OCTA imaging utilizes a standard axial length (AL) when calculating structural measurements; however, these measurements are subject to distortion when a patient's AL deviates from the machine's standard AL. In this study we use Littman and Bennett formulas to correct for OCTA disc area values according to patient AL.

Methods: With IRB approval, we retrospectively analyzed AL measurement adjusted OCTA data from 134 healthy control eyes. To accomplish this task, we employed a method put forth by Bennett et al in conjunction with the Littman Formula to determine the relationship between image size and magnification factor of the eye based on AL in a telecentric lens system such that used in OCTA. The generalized formula is: $t_2 = (1/(0.01306*(AL_{machine}-1.82)))^2 * 0.013062*(Patient\ AL-1.82)^2$ $t_2 = true\ area$ $s_2 = measured\ area$.

Results: Across the measurements of 134 eyes, the combined Littman-Bennett formula methodology indicates unadjusted OCTA measurement under-prediction when patient AL values exceed, and over-prediction when AL values fall short of the standard AL utilized by the OCTA machine of 23.82 mm. Adjusted OCTA values range from 24.2% less than to 44.5% greater than the associated unadjusted OCTA values. In an analysis of the regression coefficients for unadjusted and adjusted values for the OCTA dataset, a statistically significant difference was found ($p = <.001$ 95% confidence interval).

Discussion: Current OCTA machines face the same image distortion issues as OCT telecentric lens systems. Values produced by OCTA are not reflective of true measurements when a patient's AL differs from the machine's defined AL. The use of a combined Littman-Bennett formula for the correction of distortion is necessary when evaluating non-standard AL patients using OCTA technology.

Conclusion: Our study has demonstrated that diagnostic accuracy and context for optic disc area measurements could be improved with an adjustment for patient AL. Utilizing this solution, further research can be performed on the interplay between AL, myopia, glaucoma, and other eye pathologies.

External Validation and Optimization of Contouring Atlases for Elective Radiation of Para-aortic Lymph Nodes in Cervical Cancer

Paul D'Cunha

Mentor: Kevin Albuquerque, MD, Department of Radiation Oncology

Purpose: Previous studies have proposed two different contouring guidelines for the prophylactic radiation of para-aortic lymph nodes (PANs) for locally advanced cervical cancer. Because PAN mapping atlases in current literature are limited to small patient samples and nodal populations, we updated the PAN atlas with a large dataset of PET-positive PANs on PET/CT from patients with cervical cancer.

Methods: We identified 176 PET-positive PANs on pretreatment PET/CT of 47 patients with diagnosed FIGO stage IB-IVA cervical cancer. PANs were classified as left-lateral para-aortic (LPA), aortocaval (AC), or right paracaval (RPC). CTV-T and CTV-K were drawn for all patients based on previously published contour guidelines from Takiar et al. (2013) and Keenan et al. (2018), respectively, and nodal volumetric coverage was assessed.

Results: We identified 94 LPA nodes (54%), 71 AC nodes (40%) and 11 (6%) RPC nodes. CTV-T had improved nodal center coverage of 97.6% compared to 85.0% for CTV-K ($p < 0.001$). Nodal center coverage for CTV-K and CTV-T (with corresponding PAN) were respectively 79 (84.0%) and 93 (99.0%) LPA nodes ($p = 0.001$), 64 (90.1%) and 68 (95.8%) AC nodes ($p = 0.221$) and 5 (45.5%) and 9 (81.8%) RPC nodes ($p = 0.134$). Additionally, our updated PAN atlas identified nodal centers anterior to aorta and IVC.

Conclusions: We have updated the PAN anatomical map with our database of 176 PET-positive nodes from 47 patients and demonstrated that CTV-T has significantly better PAN coverage over CTV-K for posterior lateral LPA and retrocaval regions for our dataset. Additionally, we suggest an update to the PAN atlas that includes a blend of CTV-T and CTV-K to provide optimal coverage for the mapped nodes anterior to the great vessels in our data.

Efficacy of Prothrombin Complex Concentrate in the Management of Direct Oral Anticoagulants-Associated Bleed

Pallavi Dev & Cecilia Zhou

Mentor: Ravi Sarode, MD, Department of Pathology

Collaborator: Carol Abousaab, MD

Background: Direct oral anticoagulants (DOACs) are used for stroke prevention in atrial fibrillation as well as the prevention and treatment of venous thromboembolism. However, they are associated with bleeding risk. Existing literature suggests that administration of prothrombin complex concentrate (PCC), a general hemostasis agent, may be useful in controlling bleeding due to factor Xa inhibitors.

Objective: The objective of this study was to determine the efficacy of PCC for the reversal of major bleeding in the setting of DOAC usage.

Methods: This study was a retrospective chart review of patients who presented to Clements University Hospital or Parkland Memorial Hospital from January 2014 to December 2019.

Results: Of the 50 patients included in this study, 28 (56%) were found to achieve effective hemostasis after administration of PCC using ISTH criteria and 42 (84%) achieved effective hemostasis by ANNEXA-4 criteria. Of the 20 patients with intracranial bleeding, 70% had a clinically defined good outcome based on neurologic status. When comparing rivaroxaban and apixaban, there was no significant difference in effective hemostasis using either criteria, time to hemostasis, thromboembolic events, or patient mortality. Five (10%) patients had thromboembolic events within 7 days of PCC administration and overall 30-day mortality rate for the study population was 7 patients (14%).

Conclusions: Compared to the ANNEXA-4 trial for use of andexanet alfa in DOAC-associated bleeding, this study demonstrates that efficacy, thromboembolic events, and mortality associated with PCC are similar to andexanet alfa, suggesting that PCC may be a viable alternative.

Low BMI (<10th Percentile) Increases Complications and Readmissions After Posterior Spinal Fusion in Adolescent Idiopathic Scoliosis

Farzam Farahani

Mentor: Brandon Ramo, MD, Department of Orthopedic Surgery

Collaborator: Anthony I. Riccio, MD

Purpose: While obesity has been shown to predict negative outcomes following PSF in AIS patients, less is known about the effects of low BMI. We sought to elucidate the impact of low BMI on 30-day outcomes in this population.

Methods: AIS patients undergoing PSF were identified using the 2015-17 ACS-NSQIP-Pediatric database. Patients were placed in underweight (UW, <10th percentile) and normal weight (NW, 10th-90th percentile) cohorts based off CDC BMI-to-age growth charts. Demographics, comorbidities, intra-, and postoperative factors were compared via univariate analysis with Benjamini-Hochberg adjustment. Multivariable logistic regression models were generated to assess UW status as a predictor of complications.

Results: 2,799 AIS patients undergoing PSF (NW=2,517, UW=282) were identified. UW patients were older (15.6 vs. 14.7 years), less female dominant (62.4% vs. 79.5%), and had more pulmonary (2.5% vs. 0.4%) and minor cardiac comorbidities (6% vs. 1.7%) compared to NW patients ($p<0.001$). UW patients had a greater percentage blood loss (6.7% vs. 5.3% of total blood volume, $p<0.001$) and higher complication (3.9% vs. 1.4%, $p=0.008$), pneumonia (1.4% vs. 0.1%, $p=0.006$), and readmission (3.5% vs. 1.2%, $p=0.001$) rates compared to NW patients. UW status was a predictor of $\geq 15\%$ blood volume loss (adjusted OR=2.65; 95% CI=1.76-3.97; $p<0.001$), pneumonia (aOR= 6.57; 95% CI=1.80-24.00; $p=0.004$), and hospital readmission (aOR=2.47; 95% CI=1.02-6.01; $p=0.046$).

Conclusion: There is a higher occurrence of complications in UW AIS patients undergoing PSF. Low BMI is an independent predictor of $\geq 15\%$ blood loss, pneumonia, and readmissions. Like their overweight counterparts, underweight AIS patients have an increased postoperative risk for negative complications.

Immune Checkpoint Inhibitor Outcomes Associated with Antibiotic Exposure

Amrit Gonugunta

Mentor: David Gerber, MD, Department of Internal Medicine-Hematology/Oncology

Collaborator: Mitchell Von Itzstein, MD

Introduction: Exposure to antibiotics is associated with worse outcomes in patients receiving immune checkpoint inhibitors (ICI). We evaluated associations between timing of antibiotic therapy, number of unique antibiotics, and clinical outcomes.

Methods: A retrospective chart review was performed to abstract clinical data from patients enrolled in a non-therapeutic immune checkpoint inhibitor cohort study. We compared progression free survival (PFS) and overall survival (OS) outcomes between patients according to antibiotic use, timing of antibiotic use (between 12 weeks prior to ICI and up to 6 weeks post ICI), and number of antibiotics using Pearson product-moment correlation coefficients, cox regressions, and Kaplan-Meier Curves.

Results: A total of 261 patients were included in the analysis, of whom 60% were male, and 55% had non-small cell lung cancer (NSCLC). Of these, 24 (8.4%) received antibiotics between 0-6 weeks before ICI, 40 (14%) received antibiotics 0-6 weeks after ICI, 74 (25.9%) received antibiotics within both time frames, and 118 (41.3%) did not receive antibiotics within the specified time period. Antibiotic exposure 0-6 weeks after ICI initiation was associated with a worse PFS (321 days (95% CI 242 to 471 days) vs 121 days (70–193); HR: 2.00; $p < 0.01$) and OS (No Antibiotics Med: 742 (511–1033) vs Any Antibiotics Med: 187 (134–396); HR: 2.31; $p < 0.01$). Furthermore, exposure to increased number of unique antibiotics was associated with worse PFS (0 Antibiotics Med: 321 (242–471) vs. 1 Antibiotic Med: 173 (71–NA) HR: 1.37 vs. 2 Antibiotics Med: 184 (66–NA) HR: 1.91 vs. 3+ Antibiotics Med: 64 (39–160) HR: 3.07, $p < 0.01$) and OS (0 Antibiotics Med: 742 (511–1033) vs. 1 Antibiotic Med: 239 (148–NA) HR: 1.84 vs. 2 Antibiotics Med: 430 (184–NA) HR: 1.69 vs. 3+ Antibiotics Med: 130 (84–245) HR: 3.57, $p < 0.01$).

Conclusions: Antibiotic exposure in the six-week time period after ICI initiation is associated with substantially worse clinical outcomes, and antibiotic exposure in the six-week time period prior to ICI initiation is associated with modestly worse outcomes. Furthermore, increased number of distinct antibiotics used is associated with worse clinical outcomes. It is unclear whether antibiotic exposure is a surrogate marker for increased medical illness and subsequent increased morbidity and mortality, or if it directly affects ICI therapy. Further studies to understand the clinical impact and mechanisms underlying these associations should be pursued.

Hyperprogressive Disease with Immune Checkpoint Inhibitor Use in Metastatic Renal Cell Carcinoma

Malvika Govil

Mentor: Roy Elias, MD, Department of Internal Medicine

Collaborator: Jason Lu, BS

Introduction: Immune checkpoint inhibitors (ICI) have revolutionized therapy for multiple tumor types. While this has improved outcomes, occasionally patients experience a rapid acceleration of tumor growth, termed hyper-progressive disease (HPD), after starting ICI. HPD is generally defined clinically, and risk factors which can predict HPD are lacking. We sought to evaluate the incidence and associated risk factors of HPD across all patients with metastatic renal cell carcinoma (mRCC) treated at UTSW. HPD has been defined by either accelerated tumor growth rate (TGR) or marked tumor growth (based on RECIST 1.1 criteria) upon starting ICI therapy. We applied these definitions to our cohort of patients with metastatic renal cell carcinoma (mRCC) treated with ICI therapy to compare patients captured as HPD.

Methods: All patients with mRCC who received ICI therapy between January 2014 to January 2019 were identified. Responses to therapy were determined using RECIST v1.1 criteria. Among patients with progressive disease (PD) as a best response, we applied two previously described criteria of HPD; (i) Matos et al. criteria, which defined HPD as a 40% increase in tumor burden or 20% increase with ≥ 2 new unique metastatic lesions, and (ii) Champiat et al. method which defined HPD as a doubling of the tumor growth rate ratio (TGR) post-ICI relative to pre-ICI. Chi squared tests were used to compare baseline characteristics of HPD vs non-HPD patients, and Kaplan Meier analysis was used to compare HPD with standard PD (SPD).

Results: Out of 146 patients with evaluable lesions and imaging, 75 had PD as best response and were further evaluated to determine HPD. The Champiat et al. definition could not be applied to 20 of these patients due to inadequate imaging or negative TGR in the pre-ICI period. Overall, 22 (15%) of patients had HPD, with a breakdown of 20 (16%) by Matos et al., 4 (3%) by Champiat et al, 2 overlapping patients. There were no significant differences in baseline characteristics of HPD vs non-HPD patients and no survival difference between HPD vs SPD.

Conclusions: These two methods identified distinct populations of HPD. The Matos et al. definition does not account for pre-ICI tumor growth, which may bias its HPD results in favor of more aggressive tumors, and the TGR definition is agnostic of new metastatic disease. Further, there were patients who did not meet either criteria due to minimal target lesion growth, but developed multiple new metastases or a large pleural effusion soon after ICI initiation, which may represent clinically significant hyper-progressive disease. Thus, there is a need for a robust method which better captures this clinical phenomenon.

A Retrospective Cohort Study of Dermatofibrosarcoma Protuberans at a Large Metropolitan Academic Center

Charlotte Greif

Mentor: Rajiv Nijhawan, MD, Department of Dermatology

Dermatofibrosarcoma protuberans (DFSP) is a rare, low-grade dermal mesenchymal malignancy that tends to recur locally but rarely metastasizes. Research on this malignancy is limited, perhaps due to its rarity. The aim of this study was to collect and analyze a robust number of clinicopathologic variables to better characterize this disease. We identified all cases of DFSP diagnosed at UT Southwestern Medical Center (UTSW) as of January 2020 and calculated descriptive statistics for this sample of sixty-two patients.

Sixty-nine percent of our sample was female with an average age of diagnosis of 42.5 years, suggesting the disease affects females more and has a young age of onset. Most patients had a low chronic disease burden with obesity, congestive heart failure, and diabetes being uncommon. The most common comorbidity was hypertension, occurring in 32% of patients. A family history of DFSP, radiation, chemotherapy, immunosuppression, and skin cancer were rare.

Most patients (94%) presented with primary DFSP rather than recurrent, and most lesions were located on the trunk (50%) or extremities (37%). The lesion on average persisted 5 years prior to diagnosis and was 3.5 x 2.0 cm. Most lesions were slow growing, with only 18% of patients experiencing rapid growth. Most lesions were asymptomatic (66%), while 21% were painful and 10% pruritic.

Most cases at UTSW were treated with Mohs Micrographic Surgery (MMS) (89%), while the rest were treated with wide local excision (WLE). Of the five patients treated with WLE, two experienced recurrence yielding a 40% recurrence rate. Of the forty-seven patients treated with Mohs Micrographic Surgery, only one experienced recurrence, yielding a 2% recurrence rate. No patients in our sample had died upon follow up.

Our study differs from findings in the literature in several ways. The two pregnant women in our sample experienced no rapid lesion growth, despite increased risk of rapid growth in pregnant women in the literature (Brooks and Ramsey, 2019). The literature finds no gender predilection, but we find a female predominance (Brooks and Ramsey, 2019). We find Caucasians to be the most represented race, while the literature finds African Americans (Brooks and Ramsey, 2019). In the future, we plan to expand our sample size to better characterize this disease.

Finding a Common Link Between Primary Open-Angle Glaucoma, Hypertension, and Diabetes

Jane Gu

Mentor: Karanjit Kooner, MD, Department of Ophthalmology

Collaborators: Betty Tong; Jeffrey Wooliscroft; & Aaron Hurd

Purpose: To compare the disease features and processes of primary open-angle glaucoma (POAG), hypertension (HTN), and diabetes (DM) in search for a common underlying link between all three conditions.

Methods: In this IRB-approved retrospective study, 767 eligible patients at a University eye clinic were categorized into 4 groups: (1) HTN alone, (2) DM alone, (3) combined HTN and DM, and (4) neither HTN nor DM. These patients were selected for chart review and a survey conducted via phone call. Demographic variables collected were age, gender, race, BMI, IOP, HgbA1c, and BP. One-way ANOVA and Chi-squared tests were used to determine any significant differences. A literature search of 21 articles was then conducted to explain correlations found among the patient data.

Results: The literature analysis identified common features in POAG, HTN, and DM. The pathophysiology of all three conditions involve a decrease in nitric oxide bioavailability and increased oxidative stress from uncoupled endothelial nitric oxide synthase (eNOS) activity. This results in sympathetic overactivity, diminished retinal blood flow, and dysfunction of blood flow autoregulation. Other similarities include chronic hypoxia, an increase in hypoxia-inducible factor-1 alpha, and up-regulation of vascular endothelial growth factor (VEGF). In genotypic analysis, genes affecting the eNOS region has been linked to POAG, HTN, and DM.

Conclusion: Our study has determined a common pathophysiological link involving decrease in nitric oxide bioavailability and increased oxidative stress from uncoupled eNOS activity. This information may be useful in the management of patients with POAG, HTN, and DM.

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Functional improvement in hip pathology improves anxiety, depression, and pain catastrophizing: an intricate link between physical and mental well-being

Paul Gudmundsson

Mentor: Joel Wells, MD, Department of Orthopedic Surgery

Background: Pain catastrophizing, anxiety, and depression are risk factors for poor functional outcomes and worse post-treatment pain that can be treated alongside physical care given to orthopedic patients. While these factors have been shown to be common in patients with hip pathology, there is limited literature that follows these conditions throughout treatment. The purpose of this study was to track psychological factors in patients with various hip pathology to determine if they improved alongside functional measures following treatment.

Methods: Patients presenting to a specialist hip clinic were prospectively evaluated for outcomes of pain catastrophizing, anxiety, depression, and hip function. Pre- and post-treatment assessments were undertaken: Pain Catastrophizing Scale, the Hospital Anxiety Depression Scale, the Hip Outcome Survey, and Hip Disability and Osteoarthritis Outcome Score (HOOS). Patient characteristics were recorded. A correlation analysis, using the Spearman partial correlation coefficient (r_s), was conducted to evaluate the relationship between change in psychological factors with change in functional outcomes.

Results: A total of 201 patients (78 male, 123 female) with a mean age of 53.75 ± 18.97 years were included, with diagnoses of hip dysplasia ($n = 35$), femoroacetabular impingement ($n = 35$), lateral trochanteric pain syndrome ($n = 9$), osteoarthritis ($n = 109$), and avascular necrosis of the hip ($n = 13$). Statistical analysis revealed a significant negative relationship between change in function level (as measured by HOOS ADL) and change in pain catastrophizing ($r_s = -0.373$, $p < 0.0001$), depression ($r_s = -0.363$, $p < 0.0001$), and anxiety ($r_s = -0.264$, $p = 0.0002$). Pain catastrophizing, depression, and anxiety improved with function. Spearman correlation coefficients also revealed that pain catastrophizing, HADS anxiety, and HADS depression improved with improvement in other patient-reported functional outcomes.

Conclusions: Patients with hip pathology often exhibit pain catastrophizing, anxiety, and depression, but improvements in hip functionality are associated with decreased severity of these psychological comorbidities. Exploring this connection demonstrates the correlation between musculoskeletal impairment and psychosocial outcomes and mental health. Perioperative multidisciplinary assessment may be a beneficial part of comprehensive orthopaedic hip care.

Revision Total Knee Arthroplasty with Metaphyseal Sleeve and Mobile Varus-Valgus Constraint Bearing

Shamrez Haider

Mentor: Michael Huo, MD, Department of Orthopedic Surgery

Collaborators: Garen Collet, MD & Tim Brown, MD

Introduction: Revision total knee arthroplasty (TKA) is increasing in volume and complexity. Varus-valgus constrained (VVC) articulation is commonly used in revision TKAs. The purpose of this study is to evaluate the outcomes of a consecutive series of revision TKAs done using a mobile bearing VVC articulation and adjunct metaphyseal fixation using a sleeve.

Materials: This is an IRB-approved retrospective review of the experience at a single institution over 10 years using the same implant system. Minimum 2-year follow-up data were available in 112 consecutive patients. All patients received adjunct tibial metaphyseal fixation, and 30% also received adjunct femoral metaphyseal fixation. The mean age was 61 years. 63% were women. The mean BMI was 34.6 kg/m².

Results: The mean follow-up was 56 months (24 to 144). The reasons for the revision included: aseptic loosening 70%, infection 18%, instability/stiffness/malposition 9%, and others 3%. The mean Knee Society Score was 56 (preop) and 85 (final). The mean functional score was 65 (preop) and 83 (final). The mean knee flexion was 96° at final follow-up. Radiographic evidence of spot-welds were seen around the sleeves in 24%, and reactive lines in 17%. The 5-year survival was 90% for any reoperations. The reasons for the reoperations included: infection (50%), stiffness/instability (45%), and wound dehiscence (5%).

Discussion: There were no complications specific to the implant design, and to the mobile bearing or the metaphyseal sleeve. The functional outcomes were similar to revision TKAs using other implant systems. There was no revision for aseptic fixation loosening at the mid-term. Longer term follow-up is needed to determine the efficacy and the durability of adjunct metaphyseal fixation.

Kypho-scoliosis in Neurofibromatosis Type I on Whole Body MRI: Frequency and Association with Intraspinal and paraspinal lesions and tumors

Shamrez Haider

Mentor: Avneesh Chhabra, MD, Department of Radiology

Collaborators: Lu Le, MD; Gina Cho, MD; & Yin Xi, PhD

Introduction: Scoliosis is a common orthopedic problem in patients with Neurofibromatosis 1 (NF1). Spinal deformities have been reported to be found in 77% of all NF1 cases and 2% of all pediatric scoliosis cases have been attributed to NF1. A proposed etiology of scoliosis in NF1 patients states that paraspinal or intraspinal neurofibromas disrupt the normal orderly development of the spine. This study aimed to use whole-body MR imaging (WBMRI) to screen patients with NF1 for scoliosis and determine association with locoregional spinal tumors.

Methods: This is an IRB-approved retrospective review of WBMRIs ordered at a single institution over a six-year period. 122 patients with WBMRI were isolated from the electronic medical records. 97 of these cases were identified as patients with NF1. All patients underwent uniform imaging on 3-Tesla Scanners with automatic software fusion of all sets of images in the coronal plane. A senior radiologist and student on scholarly track re-looked at all scans to identify those with scoliosis and spinal tumors. Patients with acute angulated scoliosis were also identified and Cobb angles were measured by two radiologists. Correlation analysis was performed.

Results: 97 patients with NF1 were evaluated. Two had prior spinal surgery and were excluded. 95 patients were included the final study population, 33 (35%) males and 62 (65%) females with a mean BMI of 25.82 (4.96). 43/95 (45.3%) patients were found to have scoliosis, 13/43 (30.2%) of which were acutely angled. 25/95 patients (26.3%) had locoregional tumor presence, 18 of which were paraspinal, 5 intraspinal, and 2 patients with both types combined. ICC measured 0.99 (CI 0.98,1.0). Fisher's exact testing determined that no association existed between scoliosis and presence of either paraspinal or intraspinal tumors ($p = 0.485$). There was also no association between tumor presence and acute angled scoliosis ($p = 1$).

Conclusion: This study contradicts the proposed hypothesis in literature of an association between the presence of locoregional spinal tumors and scoliosis in NF1 patients. The work adds to the body of knowledge in the domain of NF1 patients that presence of scoliosis shouldn't mandate search for intra- or paraspinal tumors.

Factors Associated with Disease Severity and Mortality Among Patients with Coronavirus Disease 2019: A Meta-Analysis

Waqas Haque

Mentor: Panagis Galiatsatos, MD, MHS, Department of Internal Medicine
Collaborators: Vignesh Chidambaram, MD, MPH; Muzzammil Ahmadzada; & Eman Haque

Introduction: With variable access to critical care resources across countries, recent guidelines for the COVID-19 pandemic have called for allocating life sustaining treatments based on a patient's risk of mortality. Health systems preparedness requires a deeper understanding of how to effectively triage patients with COVID-19, in order to maximize the benefit of scarce intensive care unit resources while minimizing the potential harm of outpatient management of ill patients.

Purpose: The purpose of this systematic review and meta-analysis was to better understand the clinical, laboratory and radiological parameters associated with mortality and disease severity among patients with COVID-19. We performed a systematic review to determine the demographic, clinical, laboratory and radiological factors associated with severity and mortality in COVID-19.

Methods: We searched PubMed, Embase and WHO database for English language articles from inception until May 8, 2020. We included Observational studies with direct comparison of clinical characteristics between a) patients who died and those who survived or b) patients with severe disease and those without severe disease.

Results: Among 15680 articles from the literature search, 109 articles were included in the analysis. The risk of mortality was higher in patients with increasing age, male gender (RR 1.45; 95%CI 1.23,1.71), dyspnea (RR 2.55; 95%CI 1.88,2.46), diabetes (RR 1.59; 95%CI 1.41,1.78), hypertension (RR 1.90; 95%CI 1.69,2.15). Congestive heart failure (OR 4.76; 95%CI 1.34,16.97), hilar lymphadenopathy (OR 8.34; 95%CI 2.57,27.08), bilateral lung involvement (OR 4.86; 95%CI 3.19,7.39) and reticular pattern (OR 5.54; 95%CI 1.24,24.67) were associated with severe disease. Clinically relevant cut-offs for leukocytosis(>10.0 x10⁹/L), lymphopenia(< 1.1 x10⁹/L), elevated C-reactive protein(>100mg/L), LDH(>250U/L) and D-dimer(>1mg/L) had higher odds of severe disease and greater risk of mortality.

Conclusion: Knowledge of the factors associated of disease severity and mortality identified in our study may assist in clinical decision-making and critical-care resource allocation for patients with COVID-19.

Skin Biopsy Utilization as a Potential Cause of Melanoma Overdiagnosis: County-Based Ecological Analysis

Waqas Haque

Mentor: Ade Adamson, MD, MPP, Department of Internal Medicine

Collaborators: Muzzammil Ahmadzada, & Shahaan Mansuri, MS

Introduction: From 1975 to 2010, melanoma incidence in the United States has increased by a margin of 200%, despite the corresponding mortality rate increasing only 24% over the same time period. Proposed explanations for incidence outpacing mortality include an increase in skin cancer screening and awareness, detection bias, and overdiagnosis. Overdiagnosis is defined as an increase in diagnostic scrutiny yielding more diagnoses, while true occurrence of the disease does not increase.

Purpose: While this phenomenon has been examined at the state level, the purpose of this study is to analyze the association between biopsy utilization and melanoma incidence at the county level.

Methods: Using Medicare Part B Provider Utilization data and SEER-21 data, both freely available online, we performed a cross-sectional analysis of the relationship between skin biopsy utilization and melanoma incidence at the county level across the United States for the years 2012 to 2016. The Medicare dataset provides data on biopsy utilization for individual providers, which we mapped onto counties using the zip code. Within SEER-21, we captured county-level incidence of melanoma for the age group 65+ years (corresponding with the Medicare population) in 18 participating areas for which biopsy data was also available. Our independent variable was number of skin biopsies per 100,000 senior citizens on Medicare. Our dependent variables were in-situ and total annual melanoma incidence per 100,000 senior citizens. Statistical analysis was performed in STATA (College Station, Tex).

Results: 309 counties from 18 SEER registries during years 2012-2016 were included for a total of 1433 available county-years available. The skin biopsy rate increased nearly 1.72% between 2012 and 2016, with 10,297 biopsies per 100,000 individuals in 2012 to 10,473 biopsies per individual in 2016. However, melanoma incidence increased 12.08% from 170.82 to 191.46 cases per 100,000 individuals. The annual correlations ranged from 0.069-0.143 for in-situ diagnoses and 0.078-0.163 for overall incidence.

Conclusions: Our data suggest that while overdiagnosis may appear as a partial explanation for melanoma incidence at the state/registry level, this may not be the case at the more granular county level. It is possible that only analyzing the relationship at a state level masks the high level of intra-state variance. Our findings call for a more nuanced study of melanoma overdiagnosis at the county level specifically.

Coronary Artery Calcium to Improve the Efficiency of Randomized Controlled Trials in Primary Cardiovascular Prevention

Waqas Haque

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Collaborators: Khurram Nasir, MD; Marcio Bittencourt, MD; Deepak Bhatt, MD, MPH; Roger Blumenthal, MD; Ron Blankstein, MD; Michael Blaha, MD; & Miguel Cainzos-Achirica, MD, MPH

Background: There is significant interest in extending the use of evidence-based novel add-on therapies (NATs) into primary atherosclerotic cardiovascular disease (CVD) prevention among high risk individuals. However, primary prevention populations may be on average too low risk to demonstrate benefit, and the feasibility of randomized controlled trials (RCT) may be limited by sample size and cost. To inform the design of potential future RCTs in this important area, we assessed coronary artery calcium (CAC) as a tool for identifying individuals with high and low event rates, its implications for the 5-year number needed to treat (NNT) with NATs on top of statin therapy, and for sample size and cost of a hypothetical RCT.

Methods: We evaluated 5,777 statin-naïve participants from the Multi-Ethnic Study of Atherosclerosis (MESA), mean age 61.5 years, 53% women. We first calculated CVD event rates assuming a 30% relative risk reduction (RRR) with background statin use, and then calculated event rates and 5-year NNT to prevent one CVD event with addition of NAT, assuming variable additive RRRs of 15%, 20% and 25%, respectively. NNTs were calculated for groups defined by increasing estimated CVD risk and increasing CAC burden ($=0$, >0 , >100 , >400). Sample size calculations of a hypothetical RCT of NAT on top of statins compared to statins alone and exploratory cost calculations were also conducted. The same analyses were also performed for several guideline-endorsed risk enhancing features.

Results: Regardless of the estimated CVD risk threshold used to define the study population, $CAC > 400$ consistently identified the subgroups in which the 5-year NNT was lowest and $CAC = 0$ the subgroups in which the NNT was largest. $CAC > 400$ outperformed other guideline-endorsed tests and risk enhancing factors in terms of NNT and consistently yielded the smallest estimated sample size for a hypothetical RCT. $CAC > 400$ also yielded the lowest estimated RCT cost in most scenarios, followed by high sensitivity C-reactive protein > 3.0 mg/L.

Conclusions: CAC may be a highly valuable tool for enrichment of future RCTs evaluating the efficacy of NATs in primary prevention patients treated with statins. Use of $CAC > 400$ as part of the entry criteria may result in more feasible, efficient trials in this setting.

Effect of Age and Preoperative Body Mass Index (BMI) on BMI Percentile Changes After Pediatric Orthopaedic Surgeries

Sharon Huang

Mentor: Henry Ellis, MD, Department of Orthopedic Surgery

Collaborators: Hannah Worrall, MPH; Brandon A. Ramo, MD; & Philip L. Wilson, MD

Purpose: Following pediatric orthopaedic surgery, reduced activity and physiologic recovery may cause weight changes. The purpose of this study was to identify changes in BMI percentile in pediatric patients following primary elective orthopedic surgeries over a 2.5-year postoperative period.

Methods: Retrospective chart review of patients (< 21 years old) who underwent orthopedic surgery at a single institution between October 2016 and December 2018 was performed. Demographic characteristics, height, weight, and BMI at every postoperative visit within 30 months of surgery were collected. For patients who underwent spine surgery for scoliosis, postoperative height within 6 weeks was used in lieu of preoperative height in BMI calculation to account for the fact that these patients are “shorter” due to their spinal deformities. To account for natural changes in height and weight with physical maturation, BMI percentiles were calculated. Statistical analysis of BMI percentile at 3-7, 9-18, and 24-30 months after surgery, along with analysis by surgical procedure category, initial BMI category, and age < 14 or ≥ 14 at time of surgery, was conducted.

Results: A total of 2001 patients (53.3% female; mean age 12.71 years, range 5-20) were included. At 3-7 months postoperatively, patients demonstrated an average increase of 1.50 BMI percentile points ($p = 0.039$) from preoperative percentile. At 9-18 months, the average increase was 2.55 points ($p < 0.001$) from baseline, and at 24-30 months, percentile had increased by 5.47 points ($p < 0.001$). Among sports patients ($N = 682$), those who had upper extremity surgery demonstrated an average increase in BMI percentile of 13.3 points at 24-30 months, while those with lower extremity surgery demonstrated a decrease of -0.42 points ($p = 0.015$). At 9-18 months and 24-30 months, overweight and obese sports patients had decreased BMI percentile, while underweight or normal-weight patients had increased percentile ($p = 0.046$ and $p = 0.009$, respectively). After spine surgeries, BMI percentile increased for underweight patients and younger patients, increased for older, normal-weight patients, and remained stable for overweight and obese patients.

Conclusion: Following orthopedic surgery in children and adolescents, upper extremity sports patients may be at risk for increasing BMI percentile. However, both spine and lower extremity sports patients who are underweight demonstrate improvements and normalization of BMI percentile, while obese sports patients undergoing lower extremity procedures decrease their BMI percentile postoperatively.

Evaluation of Kinesiophobia in Survivors of Major Burn Injury

Won Jae Jeong

Mentor: Radha Holavanahalli, PhD, Department of Physical Medicine & Rehabilitation

Collaborator: Karen Kowalske, MD

Objectives: Significant metabolic stress with loss of aerobic capacity and muscle mass is a frequent finding in patients with a major burn injury. Patients are reluctant to engage in unsupervised exercise because of concerns of pain, physical incapacity, and intolerance to extreme temperatures. The objective of this study was to investigate kinesiophobia among burn injury patients.

Design: This is a single site, cross-sectional study (n=36) conducted in a regional burn center. Data were collected from burn injury survivors who were 18 years of age or older, and at least 3 months post injury. The level of kinesiophobia was measure using the Tampa Scale of Kinesiophobia (TSK), a 17-item self-report survey. The total score ranges between 17 and 68, and a score of 37 or greater was used as a cut-off value. The statistical significance of the mean TSK scores differences based on demographics and injury characteristics were evaluated by independent sample t-test ($p<.05$).

Results: Sixty-six percent of subjects reported high levels of kinesiophobia (score 37 or above). The mean TSK scores among different sex, race, ethnicity, age, total body surface area (TBSA) burn, and time post-burn were compared. Except for time post-burn injury, none of the mean differences were statistically significant. Interestingly, participants who were injured more than 12 months ago showed higher levels of kinesiophobia than those who were injured within 12 months with a mean difference of 7.35 ($p=.01$).

Conclusions: Our finding indicates that a majority of burn survivors report kinesiophobia. The association of kinesiophobia and post injury time is a significant finding that may help in designing appropriate exercise intervention programs to overcome such fear. The findings underscore the importance of continued, long-term follow up that allows practitioners to reiterate the importance of physical exercise and activities among survivors of major burn injury.

Prognostic Performance of Serum Neuron Specific Enolase (NSE) in Comatose Cardiac Arrest Survivors: A Multiple Thresholds Meta-analysis

Merin John

Mentor: Kartavya Sharma, MD, Department of Neurology
Collaborators: Song Zhang, PhD & Gary Gronseth, MD, FAAN

Objective: To determine optimal threshold of serum NSE for prediction of poor outcome after cardiac arrest using a multiple thresholds meta-analysis model.

Background: Despite several systematic reviews, meta-analysis of studies on NSE after cardiac arrest has been challenging due to, a) variable cutoffs reported in each study and b) multiple cut-offs within the same study for each time point.

Design/Methods: Data from a 2014 systematic review (ERC 2014) were updated with literature searches from Pubmed, Cochrane and Scopus until May 2020. Cohort studies on comatose (GCS < 8) survivors aged > 16 y, which defined poor outcome as CPC 3-5 (or equivalent) were included. After grading study quality based on the AAN guideline process manual, contingency tables were extracted and combined with the ERC 2014 data. Using the multiple thresholds meta-analysis model, summary receiver-operating curves (SROC) were generated for NSE levels at time points <24, 48 and 72 h post resuscitation. Area-under-curves (AUCs) [95% CI] were calculated as well as cut-off values [95% CI] associated with false positive rate (FPR) < 5%.

Results: Evidence from a total of 52 studies was reviewed; 11 studies (n = 2153) at 24 h, 22 studies (n = 3012) at 48 h, and 13 studies (n = 2605) at 72 h. Quality of evidence was low or very low for most studies due to the risk of incorporation bias. AUCs for prediction of poor outcomes were 0.64 [0.52-0.74]; 0.82 [0.76-0.87] and 0.83 [0.77-0.88] respectively. For prediction of poor outcome with FPR < 5%, NSE cut-offs (µg/L) were 50.1 [30.5-70.4] at 48 h, and 47.1 [35.8-58.6] at 72 h.

Conclusions: NSE had the best prognostic performance at 48-72 h. Levels above 70.4 µg/L at 48 h and 58.6 µg/L at 72 h are highly predictive of poor outcome with FPR < 5%.

Safety and Accuracy of Active Breathing Coordinator Assisted Deep Inspiration Breathhold Technique in Delivery of Radiation Therapy for Locally Advanced Breast Cancer

Christopher Johns

Mentor: Nathan Kim, MD, PhD, Department of Radiation Oncology

Collaborator: Christian Maxwell, MD

Purpose/Objectives: Active breathing coordinator assisted deep inspiration breath hold (ABC/DIBH) is an important technique utilized during radiation therapy (RT) as an organ sparing strategy particularly for left sided breast cancer patients. Patients with locally advanced breast cancer undergoing chest wall and regional nodal irradiation often require a field matching technique. In free breathing patients, the matching field technique is a clinically accepted method of radiation delivery. However, studies demonstrating safety of field matching while employing ABC/DIBH have not been reported.

Materials/Methods: From January 2013 to May 2018, patients undergoing ABC/DIBH based breast RT were reviewed. For each treatment fraction, the amount of overlap or gap between the supraclavicular field and the tangential field were measured and recorded prospectively. Acute and delayed skin toxicities were collected and analyzed. Optically stimulated luminescent dosimeter (OSLD) readings were taken on at least 3 different fractions from 10 patients (measurements were taken at 1 cm above, below, and at the junction).

Results: 202 patients underwent ABC/DIBH RT for breast cancer during this period. A total of 4973 fractions had gap/overlap measurements available for analysis. The average gap/overlap measured at junction was 0.28 mm $\pm$ 0.99 mm (standard deviation). 72% of fractions had a perfect match (0 mm), while 5.6% had an overlap and 22.7% had a measurable gap. There was no significant trend for worsening or improvement of gap or overlap measurements with increasing fraction number per patient. OSLD dose measurements were compared to the planned dose. The median dose at 1 cm above the junction was 106% $\pm$ 7% of planned dose (range 94% to 116%). At 1 cm below the junction, the median dose was 114% $\pm$ 11% of planned dose (range 95% to 131%). At the junction, the median dose was 106% $\pm$ 16.3% of planned dose (range 86% to 131%). Taking into account calibration error of OSLD, as well as OSLD set up error, the range of values appeared to be within reasonably acceptable limits. Acute skin toxicity was similar to historically reported values, with 5.4% experiencing grade 3 and 0% experiencing grade 4 toxicity.

Conclusion: ABC assisted DIBH appears to be a safe method of delivering RT in the setting of complex matching field technique for breast and regional nodal treatments. There was a low frequency of clinically significant overlap or gap, with reasonable OSLD measurements, and patients did not demonstrate unexpected acute or delayed skin toxicity at the junction.

Impact of Neoadjuvant versus Adjuvant Chemotherapy on type of Breast Reconstruction and Completion of Nipple Reconstruction: An Institutional Analysis

Kaitlin Jones

Mentors: Nicholas Haddock, MD & Sumeet Teotia, MD, Department of Plastic Surgery
Collaborators: Yash Kadakia BA; Joshua Amaya BS; & Pope Rodnoi, BS

Background: Based on breast cancer presentation, institutional pathways for treatment can include neoadjuvant and adjuvant chemotherapy in the presence of mastectomy followed by completion of cancer treatment with or without radiation. We hypothesized that an extended duration of cancer treatment (chemotherapy and radiation) and breast reconstructive surgery may preclude some patients to forgo nipple reconstruction.

Methods: A retrospective chart review was conducted on patients that underwent either neoadjuvant chemotherapy or adjuvant chemotherapy and had breast cancer reconstruction after mastectomy by two surgeons at a single academic institution. A comparison between both groups was made in terms of surgical nipple reconstruction, followed by sub-group analysis of history of radiation therapy and type of breast reconstruction.

Results: Between January 2014 and July 2017, 118 patients received neoadjuvant chemotherapy and 103 patients received adjuvant chemotherapy. Overall, there was no significant difference in completion of nipple reconstruction between neoadjuvant and adjuvant chemotherapy. In addition, there was no significant difference in the history of radiation treatment between neoadjuvant and adjuvant patients. In patients that had a history of radiation therapy, both neoadjuvant and adjuvant patients were more likely to choose autologous reconstruction over implants ($P < 0.001$). In patients that did not receive radiation, neoadjuvant patients showed no difference in type of reconstruction whereas adjuvant patients were more likely to undergo implant-based reconstruction than autologous ($P < 0.005$). In patients that had a history of radiation, there was no significant difference in completion of nipple reconstruction between neoadjuvant and adjuvant patients. In patients that did not have a history of radiation treatment, patients that received neoadjuvant chemotherapy were less likely to have nipple reconstruction after autologous reconstruction than adjuvant patients ($P < .05$), with no difference among those that received implants. Between implant-based breast reconstruction vs. autologous breast reconstruction, patients that received neoadjuvant chemotherapy were less likely to choose implant-based reconstruction than those with adjuvant chemotherapy ($P < .03$). However, there was no significant difference in the selection of autologous breast reconstruction between those with neoadjuvant chemotherapy and those with adjuvant chemotherapy.

Conclusion: Institutional patient cancer care pathways may impact the completion of nipple reconstruction after breast reconstruction. History of radiation therapy, timing of chemotherapy, and implant-based vs autologous reconstruction all influence the decision and ability to complete nipple reconstruction.

Reconstructive Burnout After Mastectomy

Kaitlin Jones

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Collaborators: Sameer H. Halani, MD, MSc; Yulun Liu, PhD; Pope Rodnoi, BS;
Yash Kadakia, BA; & Joshua Amaya, BS

Background: The reconstructive journey is a long road with many hurdles to achieve an ideal aesthetic result. Cancer therapy, operative complications, and comorbidities impact patients, both physically and emotionally. Our study aims to evaluate which clinical factors are predictors of reconstructive burnout and contribute to patients prematurely stopping breast reconstruction.

Methods: We performed a retrospective review of patients undergoing breast reconstruction from 2014-2017 with two senior surgeons at a single institution. Completion of reconstruction was defined as formation of breast mound with completion of major revisions with or without nipple reconstruction (Figure 1).

Results: We identified 530 patients for this study with 76.6% completing reconstruction. Diabetics and smokers were more likely to burnout ($p < 0.05$); radiation and chemotherapy were not associated with reconstructive burnout. In patients undergoing delayed-immediate reconstruction with tissue expanders, breast wounds ($p = 0.004$), infections ($p = 0.037$), or a complication requiring return to OR ($p < 0.001$) were less likely to complete reconstruction; explantation of expanders were the strongest predictor of reconstructive burnout ($p < 0.001$). Autologous reconstruction was independently associated with burnout ($p = 0.04$), with burnt out patients having a higher number of complications than those who completed reconstruction (1.2 vs 0.8, $p = 0.01$). Implant-based and autologous reconstruction had comparable burnout rates (17.1% vs 19.0%).

Conclusion: Reconstructive burnout in breast reconstruction is associated with operative complications and patient comorbidities. Although autologous reconstruction was a predictor of reconstructive burnout, overall rates of completion of reconstruction were comparable to implant-based reconstruction. It is critical to tailor each patient's reconstructive journey to meet both their emotional and physical needs to avoid reconstructive burnout.

A Propensity Matched Comparison of the Safety and Efficacy of Two Infection Prophylaxis Regimens in Immediate Tissue Expander Based Breast Reconstruction: Is Standard Triple Antibiotic Solution Enough?

Yash Kadakia

Mentors: Nicholas Haddock, MD & Sumeet Teotia, MD, Department of Plastic Surgery

Collaborators: Joshua Amaya, BS, Kaitlin Jones, BS, Pope Rodnoi, BS, & Yulun Liu, PhD

Background: There is currently no consensus regarding the optimal infection prophylaxis for immediate tissue expander placement following mastectomy. The goal of this study was to determine whether irrigation with 1L of standard triple-antibiotic solution (TAS) can achieve similar infection and perioperative complication rates compared to a regimen of 180ml of TAS with povidone-iodine solution (Betadine®) painted on the field immediately prior to placement of the expander.

Methods: The two regimens were compared via retrospective propensity matching of all patients of the two senior authors who underwent bilateral tissue expander placement immediately following mastectomy with one of three mastectomy surgeons from January 2013 to December 2019 (n=281). Groups were determined by the reconstructive surgeon placing the tissue expander—one of the senior authors uses Betadine® solution in his practice, the other does not. Apart from this difference, the partner reconstructive surgeons share an identical approach to infection prophylaxis in expander placement and also share the same resident and mastectomy teams. Groups were controlled for mastectomy surgeon, mastectomy type, mastectomy weight, age, race, BMI, diabetes, hypertension, smoking, prepectoral/subpectoral placement, use of acellular dermal matrix (ADM), operating room time, and duration of post-operative antibiotics.

Results: Compared to the TAS + Betadine® cohort (n=65), the TAS cohort (n=65) experienced a similar rate of infections (13.8% vs. 12.3%, p=1.00), including major infections requiring IV antibiotic treatment (10.8% vs. 9.2%, p=1.00) after propensity matching. Infections in the TAS cohort did not grow different bacteria on culture, require different antibiotic coverage, or result in prolonged duration of average antibiotic therapy (9.9 days vs. 9.7 days, p=0.86). Rates of subsequent expander washout and exchange were also similar between groups, although patients who did not receive Betadine® may be at greater risk of involuntary explant (10.8% vs. 4.6%, p=0.32). The rate of overall complications that required return to the OR was nearly identical in both groups (21% in TAS cohort vs. 20% in Betadine® cohort, p=1.00).

Conclusion: It is possible to achieve adequate infection prophylaxis with TAS alone compared to TAS used in conjunction with Betadine® with no significant difference in perioperative complications. A prospective, randomized trial that controls for reconstructive surgeon will generalize these results across all surgeons. Our data establish the need for further cost-benefit analysis of povidone-iodine infection prophylaxis.

Does Wise Pattern Closure Increase the Risk for Mastectomy Skin Necrosis Following Prepectoral Tissue Expander Placement? A Propensity Matched Comparison

Yash Kadakia

Mentors: Nicholas Haddock, MD & Sumeet Teotia, MD, Department of Plastic Surgery

Collaborators: Katy Jones, BS; Joshua Amaya, BS; Pope Rodnoi, BS; & Yulun Liu, PhD

Introduction: In patients with large or ptotic breasts, Wise pattern closure following immediate expander placement may improve projection/contour. However, this practice may result in T-junction mastectomy skin necrosis. We sought to evaluate the safety of Wise pattern closure in prepectoral reconstruction via propensity matching for factors including BMI and mastectomy weight.

Methods: This was a retrospective propensity matched analysis of all patients who underwent bilateral delayed-immediate tissue expander based reconstruction following a skin-sparing mastectomy recorded from January 2017 to July 2019 with one of two senior surgeons at a single institution. Among patients who underwent Wise pattern closure, a lower mastectomy dermal advancement flap was fashioned to protect the T-point junction. Patients were matched by the following covariates: breast surgeon, reconstructive surgeon, age, race, BMI, HTN, diabetes, mastectomy type, mastectomy weight, and smoking history. The primary endpoint was the proportion of patients with mastectomy skin necrosis, including percent overall and percent requiring return to OR.

Results: Following propensity scoring, 24 patients from the Wise pattern group were matched to 24 patients from the non-Wise pattern group. Wise pattern closure was not associated with significantly increased risk of overall wound healing complications (25% vs. 21%, $p=1.00$) or wound healing complications that required return to OR (8% vs. 21%, $p=0.416$) (Figure 1). Specifically, 8% of Wise pattern patients returned to the OR for necrosis and 0% for dehiscence, compared to 12% of non-Wise pattern patients who returned to the OR for necrosis and 8% for necrosis ($p=1.00$, $p=0.49$, respectively). The inclusion of seromas, hematomas, and infections did not create any significant difference in overall or major complications between groups. Finally, there was no difference in loss of reconstruction between groups (4% rate of explant in each).

Conclusion: Wise pattern closure was not associated with increased risk for wound complications, overall complications, or loss of reconstruction. In carefully selected patients, despite high BMI or mastectomy weight, adoption of Wise pattern closure with a buried flap may permit superior aesthetic outcome with no increased perioperative morbidity.

Re-fractures of the Radius and Ulna in Adolescents: Tumbling and Contact Sports maybe at Risk in the First Year

Ami Kapadia

Mentor: Henry Ellis, MD, Department of Orthopedic Surgery

Collaborators: Charles W. Wyatt, MS, CPNP; Gerard K. Montgomery, MSN, FNP-C;
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Purpose: The forearm is the most common site of fracture, and perhaps re-fracture, in the pediatric population. Although both bone forearm (BBFA) fractures represent approximately 30% of pediatric upper extremity fractures, little is known about BBFA re-fractures, particularly among adolescents. The purpose of this study is to evaluate characteristics of BBFA re-fracture and recurrent fractures in the adolescent age group.

Methods: An IRB-approved retrospective chart review based on CPT and ICD-9/10 codes of forearm fractures (ages 10-18 years) treated by a single academic pediatric orthopedic group from June 2009 to May 2020 was conducted. All diaphyseal BBFA, radial, or ulnar fractures with ipsilateral same-site, or non-identical ipsilateral or contralateral forearm recurrent fractures were included. Metaphyseal fractures of the radius and/or ulna and surgically treated fractures were excluded. Demographics, injury characteristics, length of immobilization, timing of return to activity, and radiographic data were recorded. An analysis was performed to evaluate associations of ipsilateral same-site re-fracture (RE-FRACTURE) versus other secondary forearm injuries (ipsilateral different site or contralateral or OTHER).

Results: Thirty-six of 717 BBFA and isolated radius or ulna fractures were identified to have recurrent fracture (5.02%; mean age 11.4 years, M:F 6.2:1). 47% percent of recurrent fractures were RE-FRACTURE, while 53% occurred in OTHER. Recurrent fractures occurred 547.6 days (range 77-2209 days) after original fracture. The most common mechanisms of recurrent fracture were contact sports (41.7%), falls (36.1%), and tumbling (13.9%). 82.4% of RE-FRACTURES occurred within one year of original fracture (mean=182.6 days). Compared to OTHER, RE-FRACTURES were significantly associated with sports being played at time of original injury (soccer, cheerleading/gymnastics vs. no sports) ($p=0.03$) and mid-shaft position of fracture on the radius (79.21mm vs. 40.80mm, $p=0.001$) and ulna (70.50mm vs. 34.25mm, $p=0.04$). Increased radius to ulna fracture distance, degree of angulation, fracture-line visibility, and length of immobilization were not significantly associated with re-fracture.

Conclusion: Ipsilateral same-site re-fractures tend to occur within the first year of treatment following mid-shaft BBFA fractures incurred during contact sports and tumbling, with an overall low rate of re-fractures in the age group and fracture pattern. Further research may be warranted to evaluate biologic, bone health, or personality traits that may lead to recurrent and re-fractures in pediatric forearm fractures.

Explanation of High Submuscular Reservoirs: Safety and Practical Considerations

Mehraban Kavoussi

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Introduction: Prior research supports high submuscular (HSM) placement of inflatable penile prosthesis (IPP) reservoirs as an alternative to space of retzius (SOR) reservoir placement. However, there are no data comparing the feasibility and complications of reservoir removal between HSM and SOR locations. Herein, we present our large single surgeon experience of HSM and SOR reservoir removal.

Methods: Data was retrospectively collected on patients who underwent IPP reservoir removal between January 2011 and June 2020. Cases were separated into two cohorts based on reservoir location. Time from IPP insertion to explant, operative time, intraoperative and postoperative complications, and the need for a counter-incision were compared between HSM and SOR groups. Rate of explant in cases where the reservoir was left in situ was compared between HSM and SOR location. Statistical analysis was performed using Fisher's Exact and Chi-squared tests for categorical variables and Student's T-test for continuous variables. Timing from IPP insertion to explant were compared between HSM and SOR groups using the Mann-Whitney U test. Significance was set at $p < 0.05$.

Results: Between January 2011 and June 2020, 106 (73 HSM, 33 SOR) patients underwent IPP removal by a single surgeon at our institution. Average time from IPP insertion to removal was 43.6 months (24.2 HSM, 52.7 SOR, $p = 0.07$). Reservoir removal at the time of device explant was noted in 70 cases. A significantly greater portion of HSM reservoirs were explanted at the time of IPP removal compared to the SOR cohort (54 (74%) HSM vs. 16 (48%) SOR, $p = 0.01$). Similar rates of complications were noted between the HSM and SOR groups (1.9% vs 6.2%, $p = 0.35$); one patient (1.9%) in the HSM group had a postoperative bleed upon resumption of anticoagulation that required exploratory laparotomy for vascular control (Clavien Grade IVa). One patient (6.2%) in the SOR group required laparoscopy at the time of explant because the reservoir was found to be intraperitoneal. There was no significant difference in need for counter-incision between the two groups (24 (44%) HSM vs. 4 (25%) SOR, $p = 0.16$), nor in average operative times (76.5 + 38.3 minutes HSM vs. 70 + 34.3 minutes SOR, $p = 0.53$).

Conclusions: HSM reservoir removal is associated with comparable perioperative complication rates and operative times when compared to SOR reservoir removal. Our experience with explanting HSM reservoirs supports the safety and ease of their removal.

Family History in Patients with Cutaneous Lupus Erythematosus

Heejo (Clare) Keum

Mentor: Benjamin Chong, MD, MSCS, Department of Dermatology

Various genetic polymorphisms have been associated with an increased risk of cutaneous lupus erythematosus (CLE). However, it is not known how often positive family histories occur in patients with CLE. Investigating rates of a positive family history of CLE would potentially indicate how important a role these genetic polymorphisms could play in CLE pathogenesis [1].

The aim of this study is to determine the rate of a positive family history among a cohort of CLE patients and identify risk factors associated with patients with positive family histories.

A retrospective cohort study was conducted among patients with CLE who were registered in the UTSW Cutaneous Lupus Registry. The primary outcome was the presence of self-reported CLE in first-degree relatives of a patient. Other secondary outcome measures included a positive family history of CLE in any relatives. From medical records and patient questionnaires, the following data were collected: sex, racial groups, CLE subtypes, age at diagnosis, presence of systemic lupus erythematosus, smoking status, history of positive antibody test results, education, and income. Univariate analyses were performed to identify risk factors associated with a positive family history in patients with CLE. We used Mann-Whitney U test for continuous variables and Fisher's exact tests for categorical variables. Two-sided P values < 0.05 were considered significant. All statistical analyses were performed using Python SciPy version 1.5.1.

Among 342 patients with CLE, 14 (4%) patients had a first-degree relative with CLE. In total, 20 patients (6%) reported a positive family history of CLE. African American CLE patients were more likely to have first-degree relatives with CLE (12/14 [86%] vs 159/322 [49%]; $P=0.011$) or any relative with CLE (15/20 [75%] vs 159/322 [49%], $P=0.017$) than those who did not.

Approximately 4% of CLE patients had a first-degree relative affected by CLE, and African Americans were more likely to have a positive family history of CLE. Providers can use this information to counsel CLE patients on the risk of other family members having CLE. Limitations of this study include cross-sectional design. We plan to investigate the follow-up visits to find relatives that have newly developed CLE to address this limitation.

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Impact of Maternal Obesity on the Relationship between Resting Muscle Sympathetic Nerve Activity and Ambulatory Blood Pressure During Early Pregnancy in Humans

Jenny Kim

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Collaborators: Sarah L. Hissen, PhD; Jeung-Ki Yoo, PhD; Ryosuke Takeda, PhD; & Amanda M. Clark, MS

Obese women are at greater risk for gestational hypertensive disorders (GHD). The underlying mechanisms are multifactorial, but impaired neurogenic regulation of blood pressure (BP) regulation maybe involved. We hypothesized that maternal obesity would cause higher BP, which may be attributed to greater sympathetic activation early in pregnancy compared to normal-weight controls. Resting muscle sympathetic nerve activity (MSNA) and 24-hour ambulatory BP were measured i n 15 obese (mean±SD; 30±5 years; 36±5 kg/m²) and 16 normal-weight (31±7 years; 22±2 kg/m²) women during the first 10 weeks of pregnancy. While MSNA was not different between groups(31±18 vs. 24±8 bursts/min, P=0.157), ambulatory BP was greater in obese than normal-weight women(24-hour systolic/diastolic; 126±13/71±9 vs. 108±5/62±4 mmHg, both P<0.05). Awake, but not asleep, BPs and mean arterial pressure were positively related with MSNA in the obese group (r=0.612-0.813, all P<0.05). Conversely, the normal-weight group trended towards a negative relationship between MSNA and awake BP. These results suggest that obese and normal-weight women have different sympathetic neural control of BP in pregnancy, which may contribute in part, to the obesity-related risk of GHD.

A Retrospective Review of Transferred Patients to a Tertiary Referral Care Center due to Concern for Stevens-Johnson Syndrome/toxic Epidermal Necrolysis

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Collaborators: Nishika Karbhari, MD & Tiffany Son, BA

Introduction: Stevens-Johnson syndrome and toxic epidermal necrolysis (SJS/TEN) are severe cutaneous drug reactions resulting in desquamation of the skin as well as mucosal membranes. Clinically diagnosing SJS/TEN has been a challenge due to the tendency of several other dermatologic conditions to mimic its presentation. Proper diagnosis is key to obtaining adequate care efficiently and early—in turn decreasing mortality. Misdiagnosis of a more benign condition as SJS/TEN can lead to unnecessary transfers and exorbitant costs. The objective of this review is to evaluate patients transferred to Parkland Health and Hospital System (PHHS) for rule out SJS/TEN, characterize differences between SJS/TEN and non-SJS/TEN patients, and to assess the need for a more efficient triage system.

Methods: A retrospective chart review of patients transferred to PHHS for suspected SJS/TEN was performed from 2012 to 2018. Two groups of patients were identified, those with a final diagnosis of SJS/TEN and those diagnosed with another condition. All patients were consulted by the dermatology inpatient team who determined the final diagnosis. Data collected included demographic information and clinical characteristics. Continuous data were analyzed using an unpaired 2-tailed Student's t-test and categorical data were analyzed using Fisher's exact test. All comparisons were two-tailed, and the alpha error was set at 5%.

Results: Of 193 patients, 68 were found to have SJS/TEN, while 125 had a different condition. The most common conditions found included fixed drug eruptions, AGEP, morbilliform eruption, and bullous pemphigoid. Significantly associated with SJS/TEN included mucosal involvement ($p < 0.0001$), site of mucosal involvement either genital, ocular, or oral (all with $p < 0.0001$), need for amniotic membrane transfer ($p < 0.0001$), nikolsky positive ($p < 0.0001$), presence of atypical targets ($p < 0.0001$), white blood cell count ($p = 0.0002$), skin pain ($p < 0.0001$), presence of vesicles/bullae ($p = 0.0091$), fever ($p < 0.0001$), and $>10\%$ body surface area denuded ($p = 0.0016$). The SJS/TEN group had an average transfer distance of 56.74 miles while the non-SJS/TEN group had an average transfer of 76.62 miles, which was significantly different ($p < 0.0001$).

Conclusion: Our experience at PHHS demonstrated significant clinical differences and substantial transfer of patients with only 35% diagnosed with SJS/TEN. We provide evidence for the necessity of dermatologic evaluation of suspected SJS/TEN patients and the need for a more efficient triage and transfer system.

Reduced-Port Magnetic Assisted Robot Assisted Laparoscopic Radical Prostatectomy Decreases Perioperative Opioid Use

Vineeth Kommid

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Collaborator: Jeffrey Cadeddu, MD

Background and Purpose: While robot-assisted laparoscopic radical prostatectomy (RALRP) is a safe procedure, post operative opioid use is still required. We have adopted the Levita™ Magnetic Surgical System (San Mateo CA, USA) in combination with reduced port surgery to help address this issue. We sought to compare opioid use and outcomes between traditional RALRP and magnetic assisted RALRP (MA-RALRP) procedures.

Methods: We performed a retrospective cohort study examining all patients who underwent RALRP from January 1, 2016 to May 1, 2020 by a single surgeon. On June 1, 2018, MA-RALRP started being performed for all subsequent RALRPs. Patient demographics, perioperative outcomes and peri- and post-operative opioid use converted to morphine equivalents (MEs) were calculated. Primary outcome was total amount of ME used and robotic technique (MA-RALRP vs. RALRP) was our comparator group. Multivariable analyses were performed comparing ME use between MA-RALRP and RALRP.

Results: Data from 93 patients who underwent RALRP and 106 patients who underwent MA-RALRP were analyzed. Those who underwent MA-RALRP experienced significant reductions in estimated blood loss ($p < 0.0001$), length of stay at hospital ($p < 0.0001$), postoperative inpatient opioid use ($p = 0.023$), total opioid use during hospital stay ($p = 0.021$), and daily opioid use during hospital stay ($p < 0.0001$) compared to RALRP.

Conclusions: MA-RALRP combined with reduced port surgery results in significantly lower rates of opioid use compared to traditional RALRP. Further studies examining other urological procedures and our initial results are warranted.

Severe Maternal Morbidity: Peripartum Hysterectomy Indications, Outcomes, and Complications

Ashlyn Lafferty

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Collaborators: Casey S. Yule, MD; Elaine T. Fleming, MD; Sarah K. Happe, MD; & Donald D. McIntire, PhD

Objective: Severe maternal morbidity is a major obstetric quality indicator and includes peripartum hysterectomy. With the dramatic rise in cesarean rates over the last decades resulting in rising rates of placenta accreta spectrum, the objective is to characterize indications and outcomes of peripartum hysterectomy, as compared to those performed a decade ago.

Study Design: Peripartum hysterectomies between January 1, 1990 and December 31, 2019 were studied. Women were identified through an obstetric database and medical records were reviewed for maternal demographics, pregnancy complications, indication for hysterectomy, pathology reports, and hysterectomy complications. IRB was approved from UT Southwestern with Parkland site approval. Statistical analysis included chi-square and ANOVA with $p < 0.05$ considered statistically significant.

Results: 750 women met inclusion criteria: 455 in first and 295 in second epoch. Maternal age (29.5 ± 6.3 vs 32.3 ± 5.7), multiparity (81% vs 94%) and prior cesarean (52% vs 77%) were significantly different in the two epochs respectively (all $P < 0.0001$). Maternal demographics (race and BMI) were not different. Overall, peripartum hysterectomy increased from 0.15% to 0.25%, $P < 0.001$. The primary hysterectomy indication changed from uterine atony to placental invasion ($P < 0.001$, Figure).

Conclusion: The incidence of peripartum hysterectomy is increasing, and the indication has changed with the majority related to placenta accreta spectrum.

Comorbidities in patients with CCCA, A Retrospective Chart Review of 76 Patients

Bonnie Leung

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Collaborators: Linsey Lindley, MD, PhD

Central centrifugal cicatricial alopecia (CCCA) is a scarring hair loss condition that affects the vertex of the scalp spreading peripherally and almost exclusively found in women of African ancestry (African, African- American, Afro-Caribbean). The purpose of this retrospective study was to determine if there were associated medical comorbidities in patients with CCCA. In this study, with IRB approval, we reviewed records of patients seen in the Department of Dermatology at The University of Texas Southwestern Medical Center between 2015 and 2020, and identified 76 patients with CCCA. The most prevalent comorbidity identified was diabetes mellitus type II (T2DM). To determine if this was significant, a population control group, the Dallas Heart Study (DHS) was used. The DHS is a multi-ethnic, population-based study based in Dallas County designed to examine the social and the biological variables contributing to differences in cardiovascular health. 790 women in the DHS study were matched to the demographics of our CCCA patient population. In our CCCA population, 25% of patients had the diagnosis of T2DM, compared to 12% in the control group ($p = 0.019$). Our study suggests that CCCA is associated with T2DM. This should encourage clinicians to screen for T2DM in patients newly diagnosed with CCCA. For women with CCCA who do not have T2DM, clinicians should educate patients on the possible associated risk and educate patients on lifestyles changes, such as diet, weight loss, and regular exercise in hope of disease prevention.

Respiratory Complications After Tonsillectomy

Jorena Lim

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Collaborators: Priya Garigipati, BA; Katie A. Liu, MD; Romaine F. Johnson, MD, MPH;
& Ron B. Mitchell, MD

Objectives: To explore the etiologies for postoperative respiratory complications after tonsillectomy in patients with severe OSA.

Material and Methods: We conducted a retrospective analysis of children < 18 years of age with polysomnography confirmed severe obstructive sleep apnea (apnea-hypopnea index > 10) for postoperative respiratory complications after tonsillectomy. Demographic, clinical, and polysomnographic data were collected. Patients were analyzed for respiratory complications and risk factors for respiratory complications were identified. We determined the odds ratio for respiratory events using logistic regression.

Results: From January 2018 to December 2019, 887 children with severe obstructive sleep apnea underwent tonsillectomy, of whom 125 (16.5%) were white, 195 (25.8%) were Black, 383 (50.7%) Hispanic, and 28 (3.7%) Other. The median age was 6.6 years (standard deviation 4.2 years); 542 (61.1%) were male. One hundred and thirty-one children (14.8%) had a respiratory complication post-tonsillectomy. Black children had more respiratory events than other children (23.2% vs. 14.8%, OR = 2.34 [95% CI = 1.53 to 3.58]). The most important predictor of respiratory events was desaturation time (% time SpO₂ < 90%) on polysomnography (OR = 1.10 [95% CI = 1.06 to 1.13]).

Conclusions: Children with severe obstructive sleep apnea are at higher risk of post-tonsillectomy respiratory complications. In this study, black children as well as children with prolonged or frequent desaturations on polysomnography were at higher risk for respiratory complications after surgery. The identification of risk factors will be instrumental in deciding which patients require close observation after tonsillectomy.

Osteonecrosis of the femur in diabetics and its association with risk of complications following THA

Jason Lin

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Collaborators: Mauricio Valdez, BS & I- Chun Lin, BA

Introduction: As diabetes grows increasingly prevalent, the rate of total hip arthroplasty (THA) in diabetics has soared. Diabetes is a key risk factor in evaluating patient eligibility for total hip arthroplasty with many surgeons and institutions setting an upper HbA1c limit at 8-9%. Current literature on comparisons in total hip arthroplasty postoperative complication rates in patients with femoral diabetic avascular necrosis versus femoral osteonecrosis is limited. Hence, the goal of the present study is to evaluate the current trend in diabetic avascular necrosis patients undergoing total hip arthroplasty and compare complication rates between THA patients with femoral diabetic avascular necrosis, femoral nondiabetic avascular necrosis, and osteoarthritis (OA).

Methods: The PearlDiver patient records database (www.pearldiver.com, Colorado Springs, CO) was used. Three groups of patients were established: patients with diabetes AND avascular necrosis of the femur AND THA (n=16,039), patients with nondiabetic avascular necrosis of the femur AND THA (n=13,716), and a control group of patients with total hip arthroplasty for osteoarthritis (n=191,574) that did not include anyone in the first two groups. Group THA AND Diabetes AND AVN was compared with Groups THA AND AVN and THA AND OA through two different linear regressions based on the following complications: DVT, transfusion, infection, dislocation, periprosthetic fracture, mechanical loosening, broken prosthesis, readmission, and other complications. All patients were matched based on age, gender, and common comorbidities.

Results: Between THA patients with diabetic avascular necrosis and avascular necrosis, both were significant correlated with subsequent transfusion ($p < 2e^{-16}$, $p < 2e^{-16}$ respectively), infection ($p < 3.25e^{-11}$, $p < 2.57e^{-9}$), and dislocation ($p < 2e^{-16}$, $p < 2e^{-16}$). THA patients with diabetic avascular necrosis also demonstrated significant progression to "Other Complications" ($p < .000451$) in comparison to THA patients with osteoarthritis.

Conclusions: Our data demonstrates that patients with total hip arthroplasty for diabetic avascular necrosis do not exhibit greater complication rates than patients with total hip arthroplasty for osteonecrosis. However, THA patients with diabetic avascular necrosis seemed to have higher complication rates than THA OA patients.

Favorable Waiting List BMI Changes in Underweight and Obese Patients Associated with Improved Lung Transplant Survival

Charles Liu

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Collaborators: Christopher Heid, MD; Kevin Li, MD; Jessica Pruszynski, PhD; John Murala, MD; Matthias Peltz, MD; & Michael Wait, MD

Background: Lung transplantation (LT) is the definitive treatment for end-stage lung disease. LT candidates have their body mass index (BMI) evaluated in order to be listed since obesity and underweight are relative contraindications. However, BMI changes may occur during the wait list (WL) period, resulting in altered BMI at the time of transplant that does not reflect BMI at the time of listing. Little data exists on the long-term impacts of WL BMI changes. This study assesses the impact of WL BMI changes in obese and underweight patients on LT survival.

Methods: We conducted retrospective chart review for single and bilateral LTs between February 2004 and December 2018. Patients were classified as underweight (< 20 kg/m²), obese (> 30 kg/m²), or control (20-30 kg/m²), then further stratified based on whether they lost (-) or gained (+) weight while on the WL. The primary endpoint was overall mortality. Secondary outcomes were initial intensive care unit (ICU) hours, initial mechanical ventilator (MV) hours, initial hospital length of stay (LOS), and a composite of in-hospital complications. Kaplan-Meier curves and log rank test were used to compare overall mortality between the BMI groups. Kruskal-Wallis, chi square, and Fisher exact test were used to compare the distribution of secondary variables.

Results: 640 LTs were included in this study. The groups and their sizes are as follows: underweight and lost weight (BMI < 20 , -), 46/640 (7%); underweight and gained weight (BMI < 20 , +), 59/640 (9%); obese and lost weight (BMI > 30 , -), 80/640 (12%); and obese and gained weight (BMI > 30 , +), 32/640 (5%). 423/640 (66%) patients were in the control group (BMI 20-30). The log rank test indicated there was an association between overall survival and change in BMI from listing to LT ($p = 0.010$). There was also a significant difference in the initial MV hours between the BMI cohorts ($p = 0.014$).

Conclusion: Obese and underweight LT patients whose BMI trended toward control while on the WL experienced better overall survival than obese and underweight patients who trended away. The WL period presents an opportunity for obese and underweight patients to improve their preoperative health status and long-term outcomes. We advocate for appropriate exercise and nutritional therapies to assist waitlisted obese and underweight patients with continued BMI optimization.

Univariate Analysis of the Factors Influencing Time to Next Treatment in Patients with Metastatic Renal Cell Carcinoma on VEGF Inhibitors

Jim Liu

Mentor: James Brugarolas, MD, PhD, Department of Internal Medicine

Collaborators: Roy Elias, MD; Joseph Formella; & Joseph Vento, MD

Background: studies have investigated the prognostic significance of various clinical biomarkers, including hemoglobin and blood pressure changes. Further research and analysis are needed to understand the effects of other patient characteristics and clinical biomarkers on survival outcomes, specifically time to next treatment (TTNT).

Methods: Data from 185 patients were pulled from UTSW's Kidney Cancer Explorer database. Up to fifty variables for each patient were analyzed via Kaplan-Meier survival estimates, log-rank tests, and Cox proportional hazards models.

Results: Using Kaplan-Meier survival estimates and log-rank tests, it was found that seven categorical variables showed statistically significant differences in TTNT. Using univariate Cox proportional hazards model regressions, it was found that six categorical variables and eighteen continuous variables showed statistically significant differences in TTNT.

Conclusions: Survival analysis of previously investigated variables validate existing literature in most cases, with several novel variables also showing statistical significance. Future directions include constructing a machine learning tool to better predict survival outcomes and using feature selection to identify variables that are most contributive in predicting TTNT within our model.

Estradiol's Influence on Muscle and Tendon Injury Incidence

Yida Liu

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Collaborators: Luis Rodriguez & Subaryani Soedirdjo, PhD

Introduction: In athletics, women tend to exhibit higher rates of sports injuries compared to their male counterparts. The anterior cruciate ligament (ACL) injury is a well-studied example that shows a higher prevalence in female athletes.^{1,2} Interestingly, increased ACL injury frequency in women has been shown to correspond with the follicular phase of the menstrual cycle.³ This phase correlates to a fluctuation from low to high estradiol (E2) levels, suggesting a hormonal influence.³ While studies have focused on the effect of E2 on passive structures such as ligaments, there is emerging evidence that suggests E2 may affect the neuromuscular system. E2 has been shown to modulate neuron excitability in the spine and muscles via calcium and contraction regulation^{6,7} and is critical for improving muscle mass and strength.^{4,5} Oral contraceptive (OCP) use leads to stabilization of E2 levels at a low concentration. Since this patient population has a consistently low E2 concentration, they can be used as a control group against eumenorrheic women to assess the contribution of E2 on the prevalence of muscle and tendon injury. We hypothesized that women would have a higher incidence of muscular strain injury compared to men of the same age.

Methods: We analyzed rates of lower extremity muscle strains in premenopausal females, females using oral contraceptives, and males. We extracted information from the PearlDiver database and analyzed patients diagnosed with a single record of lower extremity strain. Our population groups were filtered by sex inside the age range of 18-39 with an initial population of 118,576 patients. We further segmented our population based on common oral contraceptive use (as detailed in DeFroda et. al) and upper vs lower leg injuries.⁸ Statistical significance was determined with a Chi-square test ($\alpha=0.05$) between male vs. female, non-OCP user vs. OCP users, and upper and lower leg injuries.

Results: Preliminary results show that women incur a significantly higher rate of injury at 60.08% compared to men at 39.92% ($p<0.05$). Non-OCP users exhibited a higher rate of injury at 72.05% compared to OCP counterparts at 27.95% ($p<0.05$). Overall, upper leg injuries occurred more frequently than lower leg injuries, 69.31% and 30.69% respectively ($p<0.05$).

Conclusion: Women suffer from a higher frequency of muscle and tendon injury compared to men. In women, oral contraception use may reduce the frequency of muscle and tendon strain injury, suggesting a hormonal component in sex-specific muscle injury.

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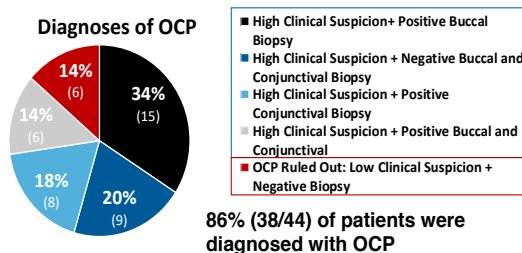
Clinical Utility and Reliability of Buccal Mucosal Biopsies for the Diagnosis of Ocular Cicatricial Pemphigoid in Patients with Isolated Ocular Disease

Samantha Lopez

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Collaborator: Jennifer Cao, MD

Ocular Cicatricial Pemphigoid (OCP) is a subset of the disease Mucous Membrane Pemphigoid, specifically with involvement of the ocular mucosa. OCP is characterized by chronic conjunctivitis, progressive subepithelial fibrosis, ocular keratinization, and if left untreated, blindness. The current diagnostic gold standard is conjunctival biopsy with direct immunofluorescence demonstrating linear deposition of one or more immunoreactants (IgA, IgG, or C3) at the epithelial basement membrane. However, sensitivity of conjunctival biopsy is variable and reported in the range of 50-80%. Buccal mucosal biopsy has been shown to be positive in patients with OCP, however its use has not been studied in patients with isolated ocular disease. This study aims to identify the utility and reliability of buccal mucosal biopsy for OCP diagnosis in a cohort of 38 patients presenting with cicatrizing conjunctivitis where OCP with isolated ocular involvement is suspected. We observed 37% (14/38) positivity on the first buccal biopsy, with an increase to 53% (20/38) when >2 biopsies were performed, notably at different time points (mean difference = 298 days). Additionally, 50% (6/12) of patients with a negative first buccal biopsy had a positive second biopsy. For patients with persistently negative (>2) buccal biopsies, conjunctival biopsies were positive in 75% (3/4). Serologic studies were largely negative, with less than 5 patients demonstrating autoantibodies via indirect immunofluorescence or ELISA. Therefore, multiple buccal mucosal biopsies done at separate points in time may be an effective alternative to conjunctival biopsy, offering a safer route for diagnosis of OCP in patients with isolated ocular involvement.



Effects of Geriatric Integrated Care on High-Risk Patients Undergoing Lower Limb Arthroplasty

Jessica Lowe

Mentors: Megan Sorich, DO & Joel Wells, MD, Department of Orthopedic Surgery

Collaborator: Sarah Wingfield, MD

Introduction: Total hip arthroplasty and total knee arthroplasty are effective treatment for end stage arthrosis. Yet, as the global median age increases over time, lower extremity arthroplasty is being done on more elderly patients. Older patients may have an increased risk of perioperative complications compared to their younger counterparts. The Perioperative Optimization of Senior Health (POSH) program was initiated at our institution to allow for more comprehensive perioperative care and to aid in prevention of complications. In this program, surgeons can refer patients who may be more susceptible to poorer perioperative results to geriatricians, who then assess and manage patients' comorbidities, nutrition, frailty and delirium. We sought to determine the outcomes and perioperative complications in patients that were eligible for POSH optimization and compare with those that did not undergo POSH evaluation. We hypothesize that an integrated and comprehensive perioperative care program improves outcomes and decreases perioperative complications

Methods: This was a retrospective study of 315 patients, all of whom were 70 years old or older and undergoing elective lower limb total joint replacement or conversion at a major academic medical center. Cohorts were divided depending on each patient's enrollment in the POSH program. Patients were excluded if they had severe pre- or co-existing pathology that would interfere with fair evaluation of postoperative outcomes. Pre-operatively, patients' general comorbidity was appraised using the age-adjusted Charlson Comorbidity Index (CCI). The modified frailty index (mFI) was utilized to evaluate for risk-stratifying joint arthroplasty patients preoperatively. Infection and mortality rates were collected from patient records.

Results: The POSH cohort had a higher average age of patients compared to the non-POSH cohort (80.67 years vs. 76.19 years). Preliminary data suggests a higher CCI in the POSH cohort (6.21 vs. 5.70) yet lower mFI (0.19 vs. 0.22) and lower rates of postoperative infection (0.00% vs. 3.66%). Mortality rates were roughly equal between cohorts.

Conclusion: Even in older patients with greater comorbidities, geriatric integrated care reduces postoperative complications, such as frailty and infections, in lower limb arthroplasty patients.

Effects of Parenteral Prostacyclin Therapy on Echocardiographic Variables

Pratyusha Manthena

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Collaborators: Sudeshna Ghosh, MBBS & Trushil Shah, MD

Objectives/Purpose: To evaluate the effects of treating patients with pulmonary arterial hypertension (PAH) with parenteral prostacyclin (IV/SC PGI₂) therapy on echocardiographic parameters.

Methods: We retrospectively assessed echocardiograms of patients diagnosed with PAH by right heart catheterization between 2007 and 2020. Patient were included if they had group 1 PAH with a baseline echocardiogram performed 0 – 12 months prior to starting PGI₂ therapy and follow up echocardiogram performed 3 – 18 months post therapy. Comparison between the two studies was done using paired Student t-tests or Wilcoxon signed rank tests, and categorical variables were reported as percentages. Results Out of 166 patients with PAH, 122 underwent echocardiogram within both time frames. Mean age was 47 ± 13 , most were female (79%), and IPAH/HPAH (52%) and CTD-PAH (32%) were the most common diagnoses. At baseline, severe right heart abnormalities were seen. Mean RVSP was 83 ± 21 , and most patients had a moderately (33%) or severely (43%) dilated RA and a moderately (32%) or severely (40%) dilated RV. Baseline echocardiogram was performed a mean 65 ± 85 days before initiation of parenteral PGI₂ therapy was initiated, while follow up echocardiogram was performed a mean 202 ± 105 days after therapy initiation. Significant improvement in most echocardiographic parameters was seen. This included improvements in RVSP, RV size, RV function and tricuspid regurgitation severity. Of note, individuals with severely diminished RV function went down from 40% to 23% ($p < 0.001$), and patients with a severely dilate RV decreased from 55% to 23% ($p < 0.001$). Notably, however, there was no significant change in RA size, and while only 34% patients had a pericardial effusion at baseline, this increased to 44% ($p = 0.047$) at follow-up. In addition to the RV changes, LA size ($p = 0.024$) and LV diastolic diameter ($p < 0.001$) both increased.

Conclusion: Given the significant changes in key echocardiographic variables after prostacyclin therapy and the non-invasive nature of these studies, echocardiograms may be useful in monitoring patient responses to prostacyclin therapies.

Changes in Pelvic Floor Dysfunction After Hip Surgery

Amisha Mehta

Mentor: Joel Wells, MD, MPH, Department of Orthopedic Surgery

Collaborator: Paul Nakonezny, PhD

Introduction: Pelvic floor dysfunction (PFD) is the inability to relax and coordinate contraction of layers of muscles that function to support pelvic organs and to constrict the urethra, vagina, and anal canal. Investigations into this subject have found a relationship between pelvic floor and hip joint function, but the comprehensive effects of hip surgery on PFD symptoms are not well understood. The primary purpose of this study is to observe changes in hip function after a variety of surgical hip procedures and their impact on the severity of pelvic floor dysfunction symptoms in women.

Methods: The study depended on a prospective database of demographic and outcome data for all female patients that presented to a sports medicine clinic between 2016 and 2020 with a complaint of hip pain. The Pelvic Floor Distress Inventory (PFDI-20) and Internal Consultation on Incontinence Questionnaire-Urinary Incontinence short form (ICIQ-UI) were used to assess pre- and post-operative PFD symptoms, and the Hip Outcome Score (HOS) and International Hip Outcome Tool Short Form (iHOT 12) were used to assess pre- and post-operative hip function.

Results: A total of 193 patients were identified, with 37 patients having pre-op data, 117 with post-op data, and 39 with both pre and post-op data. The PFDI mean score in baseline or pre-operative surveys (n=37) was 33.2, while the ICIQ-UI was 3.1. The average pre-op HOS score was 38, and post-op was 58.9. The average pre-op iHOT12 score was 32.3 and post-op was 52. The PFDI mean score in follow-up or post-operative surveys (n=117) was 40.7, while the ICIQ-UI was 3.8. The average pre-op HOS score was 42.5 and post-op was 57.8. The average pre-op iHOT12 score was 26.2 and post-op was 45.8. The final cohort's (n=39) PFDI mean score in baseline or pre-operative surveys was 34.2, while the follow-up PFDI scores averaged 30.5. The mean ICIQ-UI pre-operatively was 2.85 and post-operatively was 2.71. The average pre-op HOS score was 52.1 and post-op was 57.1. The average pre-op iHOT12 score was 37.1 and post-op was 48.6.

Conclusion/Discussion: Our study increases the scope of knowledge on PFD by including a wider range of PFD symptoms, a variety of hip pathologies, and by studying the effects of more types of surgical hip interventions. Pelvic floor dysfunction improved after surgery, with a 7 point increase in the PFDI scores. This increase was similar to the increase in ICIQ-UI scores from pre- to post-op. These results demonstrate the need for more research on the subject, especially in hip preservation surgeries. Pelvic floor dysfunction could be related to hip function, but more research on the subject is needed to confirm hip surgery as a reliable tool for significant improvement in pelvic floor symptoms.

Effect of Corticosteroid Use on Stereotactic Biopsy Yield in Primary Central Nervous System Lymphoma

Tabarak Mian

Mentor: Kalil Abdullah, MD, Department of Neurosurgery

Collaborators: Andrew Azzam, MD, University of Pennsylvania; & Jeffrey Traylor, MD, UT Southwestern

Background/Aims: Primary central nervous system lymphoma (PCNSL) is an aggressive, non-Hodgkin's lymphoma that requires stereotactic brain biopsy (STB) for definitive diagnosis [1-3]. However, patients are commonly prescribed corticosteroids when suspected to have an intracranial lesion in order to reduce edema and symptoms of mass effect [4]. This phenomenon is thought to obscure histological findings and delay diagnosis and treatment [5, 6]. This study aims to conduct a review of literature pertaining to corticosteroid treatment before STB, evaluate its influence on diagnostic yield, and develop a diagnostic approach for PCNSL based on recommendations from existing studies.

Methods: A qualitative review of literature was conducted through the PubMed database to analyze articles that addressed STB yield following corticosteroid administration in PCNSL patients and alternative diagnostic modalities for PCNSL management.

Results: Seventeen studies were selected for analysis, with ten studies supporting the notion that corticosteroids should be withheld prior to STB while seven studies did not. The studies concluding that steroids did not need to be withheld were of relatively stronger evidence levels but did present several experimental limitations. There were no appreciable differences in immune status, preoperative treatment duration, dosage, or type of corticosteroid used. Several articles suggested that protocols and procedures have improved significantly over time, allowing for better histological yield despite pre-biopsy steroid use. Immunohistochemistry (IHC) and lumbar punctures (LP) for CSF analysis emerged as promising diagnostic tools to be utilized as supplements for the diagnosis of PCNSL.

Conclusion: Evidence in literature is mixed regarding whether corticosteroids need to be withheld for a definitive neurosurgical diagnosis of PCNSL. Corticosteroid treatment does obscure histological findings in most cases of PCNSL, and should be withheld when PCNSL is suspected in order to avoid diagnostic delay or misdiagnosis. However, patient-specific considerations such as severity of symptoms may warrant the use of preoperative steroids and tapering protocols must be implemented to improve diagnostic yield in those cases. Additionally, obtaining larger tissue samples and utilizing IHC and LP can increase the likelihood of diagnosis in PCNSL patients who had to be treated with corticosteroids prior to STB.

An External Validation of the Extracorporeal Membrane Oxygenation Outcome Prediction Scores for Neonatal and Pediatric Respiratory Patients

Gina Milano

Mentor: Lakshmi Raman, MD, Department of Pediatrics

Collaborators: Michelle Martin, RN & Aziz Farhat, MD

Background: Extracorporeal Membrane Oxygenation (ECMO) is a bridge therapy that helps support the heart and lungs. In the last decade ECMO outcome prediction scores have been developed to help clinicians estimate the likelihood of survival of patients receiving life support. The Pittsburgh index for pre-ECMO risk mortality (PIPER) score analyzes pre-ECMO variables and on-ECMO variables to predict the likelihood of mortality for neonatal respiratory patients. For congenital diaphragmatic (CDH) patients, a different prediction scoring system has been created that looks at both Pre- and On-ECMO variables. The Pediatric Pulmonary Rescue with ECMO (P-PREP) score investigates pre-ECMO data to predict the likelihood of mortality for pediatric patients.

Methods: We used our single center retrospective chart review from 2015-2019 of VA and VV ECMO patients from 0-18 years in the PICU. We input variables from patient charts in the appropriate calculators to predict scores. We look at several different variables. For PIPER and PIPER+ we analyze mean airway pressure (MAP), pO₂, inhaled nitric oxide (iNO), pH, Apgar at 5 minutes, birth weight, age, CDH status, hours on ECMO, neurologic, pulmonary, renal, hemorrhagic, or metabolic complications. For the CDH specific calculator, we look at: Pre-ECMO weight, Apgar at 5 min, side of hernia, prenatal diagnosis, hand-bagging, CDH repair pre-ECMO, cardiac arrest, pH, pre-ECMO ventilator mode, MAP, critical congenital heart disease, perinatal infection, pump type, multiple congenital anomalies, airleak syndrome, hemorrhage, severe neurological complications, dialysis, elevated Creatinine, tamponade, CPR, sepsis/infectious complications. For PPREP we look at hypoxia, primary pulmonary diagnosis, and co-morbid conditions (cancer, pre-ECMO cardiac arrest, renal failure, liver necrosis). The purpose of this study is to validate the accuracy of the PIPER, CDH Pre- and On-ECMO, and P-PREP score mortality predictors at Children's Medical center of Dallas.

Results: We found that PIPER and PIPER+, were more predictive for non-CDH patients. When deciding which calculator to use for CDH patients, the scoring system which included side of hernia, CDH repair pre-ECMO, multiple congenital anomalies, and infectious complications was more predictive than both PIPER and PIPER+. When using PPREP, we observed it is important to consider quality of pre-ECMO cardiac arrest and acute renal failure.

Conclusions: Overall, PIPER, CDH, and P-PREP are fair predictors of mortality with an average match rate of 87.4%.

Thymectomy: Does Robotic Thymectomy Improve Outcomes for Non-Thymomatous Myasthenia Gravis Patients

Allante Milsap

Mentor: Kemp Kernstine, MD, PhD, Department of Cardiothoracic Surgery
Collaborators: Hellen Chiou, BS; Rachel Hurst, BS; Steven Vernino MD, PhD, & Shaida Khan, DO

Purpose: Myasthenia Gravis (MG) is an autoimmune disorder that largely results from autoantibodies produced in the Thymus. Thymectomy is a therapy for MG and has 4 basic means: transsternal, transcervical, video-assisted, and robotic. Our objective is to determine if robotic thymectomy is equivalent or superior to the transsternal approach.

Methods: Thymectomy cases from January 1, 2006, to June 21, 2017, were retrospectively analyzed from a prospectively maintained clinical database. Patients were labeled by their primary disease category, including MG, Non-Thymomatous Myasthenia Gravis (NTMG), and other categories that warranted thymectomy. Inpatient costs, intraoperative data, inpatient narcotic levels, and average ICU stay were recorded for all patients. Long term change in MG medication dosages, MG-related hospital readmissions, and MGFA classifications were identified for NTMG patients only. Differences in perioperative and postoperative outcomes were compared between the minimally invasive approaches (Robotic and VATS) and the open approaches.

Results: 67 robotic, 11 VATS, 20 transcervical, 77 transsternal, 4 thoracotomy, and 3 multi-approach thymectomy cases were identified, for a total of 182 patients. No patients were lost to follow up. Median robotic inpatient costs was \$15,943 vs. \$33,539 for open approaches ($p = 0.0008$). Robotics had reduced ICU admission rates compared to VATS (18/67 patients, 26.9%, vs. 7/9 patients, 74.7%, $p < 0.0001$). Robotics demonstrated lower inpatient narcotic requirements ($p < 0.0001$). In the NTMG group, we identified 31 robotic, 7 VATS (38 minimally invasive), and 21 transsternal patients. No significant difference was found in hospital readmission rates or in the improvement of MG symptoms at two- and three-year intervals between the minimally invasive and transsternal groups. No significant difference was found in dosages of pyridostigmine, prednisone, or mycophenolate at 36 months post-thymectomy between the minimally invasive and transsternal groups.

Conclusions: Compared to more invasive approaches, robotic thymectomy offers reduced inpatient costs, ICU admission rates, and inpatient narcotic requirements. In NTMG, robotic thymectomies demonstrate similar medication requirements to control MG symptoms. We conclude that robotic thymectomies offer improved perioperative outcomes without compromising long-term management.

Soft Tissue CAM Impingement in Adolescents: MRI reveals impingement Lesions Underappreciated on X-Ray.

Benjamin Montanez

Mentor: Henry Ellis, MD, Department of Orthopedic Surgery

Collaborators: Benjamin L. Johnson, PA-C; Hamza Alizai, MD; John Wagner III, BS; & Tyler Youngman, MD

Background: The existence of a non-ossified CAM lesion in adolescent femoracetabular impingement (FAI) is not well described. The purpose of this study is to evaluate the presence of a non-ossified or soft CAM lesion in adolescent patients with FAI. We believe that presence of a soft CAM will show increased alpha angle, previously unidentified on radiograph, on MRI.

Methods: A review of a prospective cohort of patients with symptomatic FAI in an institutional registry was performed. Subjects were included if they had an MRI and lateral x-ray of the hip (45° Dunn, Cross Table, or frog) at a baseline visit. On MRI, evaluation of the anterolateral femoral head was evaluated using radial, coronal, sagittal, or axial oblique sequences. When a soft CAM lesion was identified (all found between 2-5 o'clock), an alpha angle was performed on MRI and plain radiograph. The cohort of soft CAM lesions was reviewed and differences between radiographic and MRI alpha angles were assessed using a paired T-Test.

Results: Thirty-one (9.3%) of 332 hips (mean age 16.4 yrs, range 13.66-19.59 yrs; 83.9% F) were identified with a soft impinging lesion at the femoral head-neck junction on MRI. The most common primary sport was track & field (4), the average duration of symptoms was 92.4 weeks and a majority with insidious onset (77.4%). The average alpha angle on MRI was greater than on x-ray [$63.53 \pm 7.94^\circ$ vs $51.25 \pm 7.92^\circ$; $p < 0.05$]. All subjects with soft CAM lesions demonstrated soft tissue consistent with extension of the pysis ($n=1$), thickening of the peri-chondral ring ($n=22$), or thickening of the periosteum ($n=8$). Twenty-two of these patients (71%) with soft impingement underwent hip preservation surgery ($n=13$ labral repairs) with improvements in clinical outcome.

Conclusion: In adolescent patients with symptomatic hip impingement, MRI may be useful to identify soft CAM lesions (non-ossified) that are under-represented on x-ray. Further research is needed to determine if earlier intervention in the skeletally immature population with soft Cam lesion present is warranted to prevent further damage to the hip joint.

An Association Between PET 18F-FDG Uptake and the Development of Cachexia and Survival in a cohort of gastroesophageal cancer patients

Santiago Olaechea

Mentor: Rodney Infante, MD, PhD, Department of Clinical Nutrition
Collaborators: Bhavani Gannavarapu, MD; L. Anne Gilmore, PhD, RD; & Puneeth Iyengar, MD, PhD;

Background: The development of cachexia in cancer patients involves an alteration in inflammatory and metabolic signaling, leading to a loss in muscle, adipose, and body weight. Positron Emission Tomography (PET) ^{18}F -FDG uptake can signal metabolic changes in glycolytic pathways of tumors, which may be associated with cachexia development. We tested the hypothesis that primary gastroesophageal cancer tumor FDG uptake correlates with cachexia development and altered survival in patients.

Methods: One hundred thirty six gastroesophageal cancer patients diagnosed between 2006-2014 with pre-treatment PET scans compose the study cohort. Using the international validated consensus for defining cachexia, cancer associated weight loss was assessed for these patients. Maximum primary tumor standardized uptake values from these scans were obtained and dichotomized based off the calculated cutpoint SUV_{Max} of 8.5. Associations between survival, cachexia development and primary tumor FDG uptake were evaluated using chi square and log-rank testing analyses.

Results: Cancer associated weight loss and primary tumor SUV_{Max} at or above the determined cutpoint of 8.5 were present in 54% and 57% of gastroesophageal cancer patients, respectively. Primary tumor SUV_{Max} above the determined cutpoint was significantly associated with the presence of pre-treatment cancer-associated weight loss in both univariate and multivariate analysis. In the presence of cancer-associated weight loss, there was no significant difference in survival time based on the dichotomized SUV_{Max} (Log-Rank $P=0.6743$). With SUV_{Max} above the cutpoint, there was no significant survival difference on the basis of cancer-associated weight loss (Log-Rank $P=0.7096$). With SUV_{Max} below the cutpoint, overall survival was improved for patients without cancer-associated weight loss (Log-Rank $P=0.0006$). In the absence of cancer-associated weight loss, overall survival was improved in patients with SUV_{Max} below the cutpoint (Log-Rank $P<0.0001$).

Conclusion: A positive association was present between cancer-associated weight loss and SUV_{Max} of the primary tumor, indicating greater glycolytic metabolism in gastroesophageal tumors that induce cachexia. Both cancer-associated weight loss and high SUV_{Max} values independently predicted poorer survival, without a synergistic or additive effect when combined. The presence of significant weight loss at diagnosis was more relevant to predicting a worsened survival in patients with low SUV_{Max} tumors. Likewise, in the absence of significant weight loss, higher SUV_{Max} values predicted worse survival prognoses. Ultimately, higher gastroesophageal primary tumor SUV_{Max} correlated with increased incidence of cachexia, with both higher SUV_{Max} and cachexia independently associated with worse survival.

Effect of Prior Anti-Inflammatory Medication use on Cachexia Development and Cancer Survival

Santiago Olaechea

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Collaborators: Bhavani Gannavarapu, MD; L. Anne Gilmore, PhD, RD; & Rodney Infante, MD, PhD

Background: Cachexia, observed across a wide range of cancer types, is a multifactorial syndrome of unintentional weight loss through the depletion of skeletal muscle and fat mass. A variety of inflammatory pathways, especially those involving TNF and IL-6 signaling, have been implicated in the development of cachexic syndrome. Currently, ASCO guidelines for management of cachexia have little support for administration of NSAIDs after diagnosis and moderate support for corticosteroid administration. However, little is known on the effects of these medications in the initial development of cachexia. We aim to determine whether previous use of certain anti-inflammatory medications could serve as a protective measure against the development of cancer cachexia and discover what relationship exists between the use of these medications before diagnosis and outcomes across cachexic and non-cachexic groups.

Methods: Database of 3,180 adult patients with lung or GI cancer and past medication use was established using UT Southwestern EPIC EMR system. Cachexia status was defined using the international consensus (>5% weight loss 6 months prior to cancer diagnosis). The data was then refined categorically and evaluated using descriptive statistics (chi square testing, Kaplan-Meier, Log-Rank).

Results: Low dose aspirin, other chronic NSAIDs, and Prednisone group use before diagnosis was significantly associated with decreased cachexia incidence ($P < 0.05$ for all). COX-2 inhibitor use before diagnosis was correlated with decreased cachectic outcomes with low statistical significance ($P = 0.0989$). Further studies with larger sample size are needed. Prednisone, prednisolone, or methylprednisolone use before diagnosis was associated with decreased survival across all patients in non-cachexia group ($P < 0.05$ for both), but in cachexia group only, this was not seen. Low dose aspirin use before diagnosis was associated with decreased survival only in the cachexia group ($P < 0.05$) but not in non-cachexia or overall groups.

Conclusion: Our current findings suggest these medications might have a protective effect against the development of cachexia, likely through modulation of inflammatory pathways, especially those of IL-6, TNF-alpha, and COX-2 pathways. Decreased survival seen for many of these medications, regardless of cachexia status, likely implies the role of comorbidities associated with administration of the medication. Loss of survival deficit in cachectic patients who previously took prednisone group of medication might denote a protective effect.

Creation of a Trauma-Informed Care Organizational Assessment Database

Mackenzie Parker

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Excellence Children's Health

Collaborator: Tanisha Clark, Med

Background: Trauma is a widespread public health issue. As understanding of the impact of trauma has increased, greater attention has been paid to trauma-sensitive practices in public serving organizations. One way this has occurred is through the development of various trauma-informed organizational assessments (TIOA). A TIOA is a systems-based measure that evaluates implementation of a trauma-informed approach.

Methods: We conducted a literature search of existing TIOAs and sought to characterize the assessments based on the domains addressed and the validity of the measures. Inclusion criteria for the assessments identified in the literature search included: assessments were systems-based (rather than individual-based), available at no cost, and addressed greater than one domain of trauma-informed care. Assessments were excluded if they measured only individual knowledge of trauma or the impact of a trauma-informed training.

Results: Our search yielded 13 unique, no-cost TIOAs across a variety of organizations. The target organizations included government and welfare agencies, public schools, and healthcare facilities. The TIOAs ranged in length from 19 items to 135 items (Mean=55). The following eight domains were identified in the assessments (in order of decreasing frequency): Policies and Procedures, Staff, Consumer-Agency Relationship, Services, Environment/Physical and Emotional Safety, Outreach/Partnership, Cultural Competence and Diversity, and Leadership.

Discussion: This study contributes to the growing effort to centralize information regarding trauma-informed care to make it more accessible to public service organizations. The TIOAs identified possessed several strengths including the use of widely accepted definitions of trauma and trauma-informed care, the ability to address diverse aspects of trauma-informed care over several domains, and the ability to access the assessments easily online with user-friendly instructions. Overall, however, we found a lack of standardization across TIOAs as several tools have been created and used for specific settings. Many TIOAs are published as non-unique adaptations of previously published measures. Additionally, most TIOAs (9/13) have not been validated by efficacy studies. Studies linking TIOA outcomes to the patient/client perspective of services are also lacking, illuminating a future area of study. Therefore, while many TIOAs exist, this research shows that more work is needed to standardize and validate assessments that are freely published online.

Sperm Cryopreservation Utilization Trends in Germ-Cell Tumor Patients at a Safety Net Hospital and Academic Cancer Care Center

Akshat Patel

Mentor: Aditya Bagrodia, MD, Department of Urology

Collaborators: Nathan Chertack, MD; Jeffrey Howard, MD, PhD; & Tolulope Bakare, MD

Introduction and Objective: To compare trends of sperm cryopreservation use in germ-cell tumor (GCT) patients at a tertiary care academic center and a safety-net county hospital.

Methods: A retrospective chart review was performed for patients who underwent initial pathological diagnosis and orchiectomy for GCT at either our safety net county hospital or academic tertiary care center from September 2006 to November 2018. Patient demographics, treatment regimens, and cryopreservation rates were reviewed. Categorical variables were reported as percentages and compared using Fisher's Exact test. Continuous variables were reported as median [IQR] and analyzed using the Mann-Whitney U test. Multivariable logistic regression was used to assess for independent associations and confounding variables.

Results: 201 patients underwent orchiectomy at our institutions, 106 (53%) at the safety net hospital and 95 (47%) at the tertiary care center. Safety net patients were younger (29 vs 33 years, $p=0.005$), more likely to have Hispanic ethnicity (79% vs 11%, $p<0.001$), and were less likely to be insured (20% vs 88%, $p<0.001$). Overall, forty-three (21.4%) patients employed cryopreservation services. Safety net patients were less likely to use sperm cryopreservation than tertiary academic center patients (10.4% vs 29.4%, $p<0.001$). Stage I patients were less likely to attempt cryopreservation when compared to patients with stage II/III disease (15.9% vs. 31.9%, $p=0.011$). There was no difference in sperm banking rates for patients that underwent adjuvant therapy versus surveillance, with regards to either chemotherapy (23.6% vs 20.2%, $p=0.59$) or retroperitoneal lymph node dissection (12.5% vs 22.6%, $p=0.425$). Patients who utilized cryopreservation were younger (27 [23-32] vs 31 [26-41], $p=0.001$) and more likely to be insured (30.5% vs 11.5%, $p=0.001$). On multivariable logistic regression, treatment at the tertiary academic center ($OR=4.17$, $p=0.007$) was a positive predictor and increased age ($OR=0.9$, $p<0.001$) was a negative predictor of sperm banking whereas insurance status ($OR=2.17$, $p=0.14$) and presence of metastatic disease ($OR=1.31$, $p=0.55$) were not significant.

Conclusions: Treatment at a safety net hospital is a negative predictor of sperm cryopreservation after orchiectomy. Fertility counseling should be more widely implemented independent of hospital setting to provide holistic care.

Surgical Outcomes of Pars Plana Vitrectomy with Scleral Buckling Versus Vitrectomy Alone for Retinal Detachments

Prem Patel

Mentor: David Callanan, MD, Department of Ophthalmology

Collaborators: Wayne Solley, MD & Patrick Williams, MD

Introduction: Retinal detachment is a sight-threatening condition that is among the most common indications for vitreoretinal surgery. The main techniques for surgical repair include pars plana vitrectomy (PPV), scleral buckle (SB), or a combination of the two (PPV/SB). PPV has become the treatment of choice over the past two decades, while scleral buckling is reserved as a supplement to PPV in high complexity cases. However, whether the addition of SB to PPV improves single surgical anatomic success (SSAS) in high-risk patients has been under debate. The purpose of this study was to compare surgical outcomes of PPV/SB versus PPV alone in patients with retinal detachment at high risk for re-detachment.

Methods: With IRB approval, we retrospectively reviewed 1,521 patients treated for retinal detachment by 11 vitreoretinal surgeons from Aug 2010 to Feb 2020. Our primary outcome measure was the single surgical anatomic success (SSAS), defined as attachment at 3 months after primary surgery without any additional surgeries during that interval. Patients with <90 days of follow-up data were excluded. Other collected data included: age, gender, pre-operative visual acuity, detachment morphology, macular status, lens status, final visual acuity, and length of follow-up. Patients with inferior retinal tears and/or phakic lens status were classified as high-risk.

Results: In our entire study population, both surgical techniques reported a combined single surgery anatomic success (SSAS) of 90.5%. Primary anatomic success in the PPV/SB group was significantly higher (221 of 235 eyes, 94%) compared to PPV alone (1155 of 1285 eyes, 89.9%, $p=.04$). In patients with inferior tears, outcomes were significantly higher in the PPV/SB group (96.9% versus 89.1%, $p=.02$). In phakic patients, the SSAS was higher with PPV/SB (112 of 118 eyes, 93.1%) compared to PPV alone (370 of 415 eyes, 89.1%), however this finding was not significant ($p=.07$). In the inferior tear and phakic subgroup, PPV/SB had significantly higher success rates than PPV (96.3% versus 77.9%, $p=.003$). There was no statistically significant difference in success rates between surgical technique in patients who were pseudophakic.

Conclusions: We report higher single surgery anatomic success rates in retinal detachment repair than previously described in literature. These results suggest that patients at high risk for re-detachment may benefit from PPV with SB, although single surgical anatomic success rates overall were high with or without SB.

Fixation Instability During Binocular Viewing in Children Following Dense Unilateral Cataract Extraction

Prem Patel

Mentor: Krista Kelly, PhD, Department of Ophthalmology

Collaborators: Serena X. Wang MD; Christina S. Cheng-Patel; Eileen E. Birch PhD; & Jeffrey Hunter, Jr BA

Introduction: Previous research has focused on the qualitative aspects of fixation instability in children with deprivation amblyopia following dense unilateral cataract extraction, such as the presence of fusion maldevelopment nystagmus (FMNS).^{1,2} Here, we quantify fixation instability and vergence instability (unstable eye alignment) using the bivariate contour ellipse area (BCEA; log deg²) during binocular viewing in children following cataract extraction.

Methods: Seventeen children (aged 4-13 years) with a history of dense unilateral cataract were compared to 46 age-similar controls. Children fixated a stationary 0.3 deg dot for 20 seconds with both eyes open. Eye positions were recorded using a 500 Hz remote video binocular eye tracker (EyeLink 1000; SR Research). BCEA was calculated per eye for fixation instability and for vergence instability (left eye position – right eye position). Visual acuity, stereoacuity, and Worth 4-Dot suppression were also obtained.

Results: Compared with controls, children with a history of cataract had larger affected eye fixation instability (mean±SD=0.52±0.37 vs -0.35±0.23 log deg²; p<0.001), larger fellow eye fixation instability (-0.19±0.21 vs -0.39±0.29, p=0.011), and larger vergence instability (0.50±0.32 vs -0.38±0.29, p<0.001). No relationship was found between fixation or vergence instability and affected eye visual acuity, stereoacuity, or suppression.

Conclusions: Fixation instability and vergence instability during binocular viewing in children following dense unilateral cataract extraction is significantly more unstable than peers for their age. Vergence instability may limit potential for recovery of binocular vision in these children.

Knowledge and Attitude Towards the Human Microbiome: A Single-Center-Cross-Sectional Survey

Juliana Pineider

Mentor: Stephanie Savory, MD, Department of Dermatology
Collaborators: Joan Reisch PhD & Tamia Harris-Tryon MD, PhD

Background: The term “microbiome” refers to the 10-100 trillion microbial organisms that reside on and within the human body. Over the past decade, there has been growing public and scientific interest in the microbiome especially in regard to disease prevention. Further, the consumer marketplace is increasingly replete with oral and topical “prebiotics” and “probiotics” claiming to enhance the microbiome with “good bacteria.” These products are promoted to improve wellness, mental health, and resistance to illness on the basis of limited evidence. Despite this rapid growth of scientific knowledge and consumer industry, little is known of the public’s perceptions of the microbiome.

Objective: To understand our patient’s knowledge and attitude towards the microbiome and if physician’s may play a role in further education.

Methods: A survey was developed and IRB approved at UTSW. Patients of the UTSW Dermatology clinic were randomly approached and asked to participate. In total, 119 participants were approached and 110 accepted for a response rate of 92.4%.

Results: The mean knowledge questions answered correctly was 7.6 ($\pm$ 3.6) out of 15 (range of 0.5-14.5) or roughly 50%. Self-identifying ‘healthcare professionals’ versus ‘non-healthcare professionals’ ($p=0.02$) and respondents with ‘some college’ versus ‘masters/doctoral degree’ ($p=0.04$) demonstrated differences in knowledge. The majority of patients had a favorable view of the microbiome (3.8 ($\pm$ 1.6) out of 5). 33.6% of respondents reported prebiotic and/or probiotic usage with a higher consumption in females compared to their male counterparts (40.6% versus 21.1%, $p=0.04$). A positive correlation was found between attitude and knowledge score ($r=0.6$, $p<0.0001$).

Question	Yes (%)	No/IDK (%)
Have you heard of the microbiome?	36.4	63.6
Do you know what the microbiome is?	21.8	78.2
I wish I knew how to enhance my microbiome.	72.9	27.1
I wish my doctor would educate me more about the microbiome.	77.6	22.4

Conclusion: From our survey results, we found that our patient population lacks knowledge of the microbiome but has a desire to learn more. With increasing consumer information about probiotics, prebiotics, and the microbiome, physicians have an essential role to play in consultation. We hope these findings will serve to launch a larger investigation into the general knowledge of the skin microbiome and facilitate education on this subject.

Recovery of Vocal Cord Motion Among Pediatric Patients

Courtney Prestwood

Mentor: Romaine Johnson, MD, MPH, FACS, Department of Otolaryngology

Objectives: Patients with vocal cord paralysis can experience feeding, respiratory, and vocal problems leading to disability and decreased quality of life. Current guidelines recommend waiting a period of 12 months for spontaneous recovery before spontaneous intervention. This study aims to determine the time to spontaneous recovery and vocal cord movement in a pediatric population, and to create a model for evidence-based patient counselling.

Methods: Retrospective single institution longitudinal cohort study on vocal cord paralysis recovery. Patients were categorized based on spontaneous recovery with vocal cord movement or no recovery. Recovery rates were determined using the Kaplan-Meier method.

Results: Of 158 cases of vocal cord paralysis over a 4-year period, 36 had spontaneous recovery with symptom improvement and return of motion. For those who recovered, the average recovery was 8.8 months, and 78% recovered within 9 months. Two groups emerged from the data: an early recovery group with spontaneous recovery before 12 months and a late recovery group after 12 months. Children with hoarseness and paralysis due to cardiac surgery were less likely to recover, and children with aspiration were more likely to recover. Children with gastrointestinal comorbidities were less likely to recover; however, those who did recover were more likely to be a part of the later group. Based on our model there is about a 3% chance in recovery between 9 and 12 months.

Conclusions: Patients should be counseled about earlier interventions. Waiting the conventional 12 months for only a 3% chance of spontaneous recovery without intervention or laryngeal EMG may not be the preferred options for some patients and their families.

Prospective Quantification of Heteroresistance Among *Pseudomonas Aeruginosa* in Cystic Fibrosis Patients

Meredith Rae

Mentor: David Greenberg, MD, Department of Internal Medicine

Collaborators: Victor Obuekwe, BS, Ithiel Frame, MD, PhD, Daniel Maxwell, MD, & Christine Pybus, MS

Background: *Pseudomonas aeruginosa* (PA) is the leading cause of morbidity and mortality in cystic fibrosis (CF) patients. Heteroresistance (HR), in which members of a bacterial population display varying antimicrobial susceptibility testing (AST), can occur but is not well quantified or understood on phenotypic or genotypic levels.

Hypothesis/Goals: HR can be missed during standard AST in the laboratory. Prospective, additional AST could quantify and characterize otherwise unknown HR and whole genome sequencing (WGS) could identify potential genetic drivers of HR.

Methods: We prospectively collected 30 unique sputum samples from a group of 20 patients with CF (range of 1-5 samples per patient). In addition to standard AST on isolates selected by the laboratory (n = 1-3 isolates per patient), we collected additional isolates (n = 3-16 per sample), yielding a total of 267 additional isolates. We included only non-mucoid PA samples and performed AST on these isolates using 13 common antimicrobials and the 2019 CLSI breakpoints, yielding 3,471 additional drug-isolate results. We analyzed the data for the prevalence of HR and rates of HR across drugs, patients, and samples. We then calculated the number of instances where standard AST reported sensitivity to a given drug while resistant isolates were found on further AST. Lastly, we performed WGS on 145 isolates and used Fisher's exact test to measure association of gene variants to AST phenotypes.

Results: Median age was 39 (n=19). 47% of patients had the ΔF508 CFTR mutation. Among the 267 isolates, 60% demonstrated HR with regard to at least one drug and 30% demonstrated HR to four or more drugs. Cefepime demonstrated the lowest rate of HR across patients (4.5% of isolates). Piperacillin-tazobactam, meropenem, and amikacin showed the highest rates of HR (15.7, 13.5, and 11.2% of isolates, respectively). AST results from additional isolates 'unmasked' resistance to at least one drug in 5 of the 30 samples. This was seen a total of 7 times in the 5 samples (meropenem n = 2 isolates, piperacillin-tazobactam n = 2, tobramycin n = 1, aztreonam n = 1, gentamicin n = 1). WGS revealed many unique variants that were associated with phenotypic resistance. This included mutations in the porin *oprD* that were significantly associated with meropenem resistance (p = 0.003).

Conclusion: Standard AST of sputum samples from CF patients can obscure a rich diversity of HR. HR to at least one agent was present in a majority of samples (60%) and HR to four or more agents was found in 30% of our samples. Sampling error during standard AST procedures can result in HR populations being reported as uniformly sensitive to a given agent, despite the presence of unsampled resistant isolates. This likely contributes to instances of clinical failure with reportedly effective drugs. Lastly, WGS of our samples revealed thousands of statistically significant genotypic associations with resistance to common antibiotics. These results have implications for both diagnosis and treatment of patients with PA infections and CF.

Acknowledgements: The Greenberg Lab and Infectious Diseases Biorepository.

Child Welfare and Autism: A Descriptive Study at an Integrated Pediatric Primary Care Center

Jenny Raman

Mentor: Jill McLeigh, MS, PhD, Department of Pediatrics

Collaborators: Micah Tatum, BS & Mohsin Khan, MD

Background: Children with Autism Spectrum Disorder (ASD) have a 2.4times higher risk of entering the child welfare system than children without autism. Much of the current literature focuses on the ASD diagnosis as increasing susceptibility to neglect, abuse, and/or involvement with the child welfare services. However, the literature lacks information on autistic children once they have entered the child welfare system and are being evaluated and medically managed by primary care providers. A greater understanding of autistic children in the child welfare system could improve patient outcomes by informing primary care providers as they conduct new patient visits after initial foster care placement, psychological assessments, well child checks, and integrated patient encounters.

Methods: Descriptive study was conducted retrospectively using a dataset extracted from the electronic medical record. Institutional Review Board approval was received. Children younger than 18 years old with an ASD diagnosis who presented between January 2017 and December 2018 to either of two pediatric primary care outpatient clinics exclusively serving children in the child welfare system were included. The dataset included race, ethnicity, gender, age, placement type (foster care, kinship, CPS), exposures (physical abuse, sexual abuse, neglect, domestic violence, other), coexisting conditions (medical, mental health, behavioral), psychotropic medication use, and therapy use (PT, OT, ST).

Results: There were 55 participants with an ASD diagnosis. There were more biologically males (82%) than females. Placement type was predominantly foster homes (87%) followed by kinship (9.1%) and CPS (3.6%). Exposures included neglect (87%), physical abuse (18%), sexual (6%), domestic abuse (6%), and other (11%). Majority of children had at least one chronic medical condition (62%), mental health condition (62%), and behavioral condition (46%). Therapies included PT, ST, or OT (36%) and psychotropic medications (62%).

Conclusions: At a specialized center for patients in child welfare system, we found that there were high percentages of children with comorbid chronic medical, behavioral, and mental health conditions and receiving psychotropic medications and/or therapy services. This highlights a significant area of need that autistic children entering foster care. Future directions could look at multiple centers as well as compare frequencies of risk factors and comorbidities between autistic children inside and outside of the child welfare system. This is still an area of research that is severely lacking for a very vulnerable population.

Missed Opportunities in HPV Vaccine Administration in a Pediatric Primary Care Clinic

Jenny Raman

Mentor: Jenny Francis, MD, MPH, Department of Pediatrics & Infectious Disease

Collaborators: Stephanie Trekner, MD; Courtney McNeely, BS; Serena Rodriguez, PhD, MA, MPH; & Sonia Allouch MD

Background: Vaccine delivery services on a local, clinical level should constantly be assessed to minimize missed opportunities in vaccine administration.

Objective: We conducted a mixed-methods study to identify quality improvement targets for adolescent HPV vaccination within a pediatric primary care clinic. We sought to: (1) develop a process map to describe adolescent clinical vaccination processes, (2) identify gaps in the delivery of adolescent vaccines, and (3) track adolescent vaccination opportunities to identify and compare trends in adolescent vaccination delivery of HPV, Tdap, and meningococcal vaccines.

Methods: We conducted key-informant interviews with providers, nurses, medical assistants, and front desk staff at a pediatric primary care outpatient clinic. Interview topics included participants' roles within the clinic, HPV vaccination processes, vaccination documentation, and patient hand-offs between clinical team members. Findings were translated into a process map illustrating patient flow, provider and staff roles in vaccination, and gaps in service delivery. Retrospective chart review was conducted using quality improvement reports of vaccine administration extracted from the electronic health record for patients who were due for a vaccine (HPV, Tdap, Meningococcal) from 1/1/2019 to 12/31/2019. All non-sick visits were included for patients 11 to 19 years old who were eligible to receive the vaccine. Rates of opportunities taken in HPV vaccine administration were compared to those taken in Tdap and meningococcal vaccine administration. Rates of opportunities taken in HPV vaccine administration were analyzed for differences by gender, age group, provider type, and visit type.

Results: In a pediatric outpatient clinic, we demonstrated that eligible children were receiving the HPV vaccine at a lower rate (66%) annually than Tdap (67%) or MCV4 (77%) vaccines. The following subgroups had the highest rates of opportunities taken in HPV vaccine administration in each respective category: 11-12 year olds (age), resident/fellow (provider type), and established well visit (visit type). Notable gaps in process map included EHR glitches (records not documented in the EHR, missed pre-charting, follow up visits not scheduled) and provider concerns (staff believing HPV is 'optional' or provider not knowing the schedule).

Conclusion: One possible conclusion is that this establishes a baseline for HPV vaccine trends compared to Tdap and MCV4 trends. Using a process map, gaps were identified in the vaccine process that could explain missed opportunities in vaccine administration.

Thromboembolic Events in Cancer Patients Undergoing Upper Extremity Surgery

Amani Ramiz

Mentor: Alexandra Callan, MD, Department of Orthopedics

Collaborator: Kathryn Gallaway, BA

Background: The incidence of venous thromboembolism (VTE) after upper extremity surgery is not well described in the literature. Consequently, guidelines for VTE prophylaxis have not been established. In addition to developing guidelines for a general orthopedics population, it is essential to consider the effect of metastatic cancer on VTE risk when developing treatment plans for orthopedic oncology patients.

Aim: The aim of this study is to describe the incidence of VTE in the first 30 days following major upper extremity surgery and to determine whether metastatic cancer increases the risk of VTE.

Methods: A retrospective study of patients in the National Surgical Quality Improvement Program database between 2011 and 2018 was conducted. Cases were identified using procedure codes for shoulder arthroplasty, open reduction internal fixation, and prophylactic fixation.

Results: 36,054 patients were included in our analysis. 555 (1.5%) had metastatic cancer. The incidence of VTE events in the first 30 days following surgery was 0.6% for healthy patients. However, the incidence of VTE in patients with metastatic cancer was 3.4% (OR 5.658, 95% CI 3.542 – 8.996). Cancer patients had a higher overall complication rate (10.8% vs 3.1%, $p < 0.0001$) and were more likely to experience unplanned readmission (12.6% vs 3.1%, $p < 0.0001$), unplanned reoperation (1.8% vs 0.9%, $p = 0.0325$), and death (6.7% vs 0.3%, $p < 0.0001$) in the early postoperative period.

Conclusions: While VTE events are rare in upper extremity surgery, the presence of metastatic cancer significantly increases the risk of VTE in the first month following surgery. This study suggests that patients with metastatic cancer undergoing upper extremity surgery should receive VTE prophylaxis.

CAR T-Cell Therapy in Relapsed/Refractory Diffuse Large B-Cell Lymphoma (R/R DLBCL): A 'Real-World' Analysis of Patterns of Failure and Role of Bridging Therapy

Revathi Ravella

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Collaborators: Elizabeth Ren Zhang-Velten MD PhD, Farrukh T. Awan MD MS, Syed M. Rizvi MD, Jennifer L. Shah MD, Neil B. Desai MD, & Praveen Ramakrishnan Geethakumari, MD MS

Introduction: In R/R DLBCL patients receiving CAR T-cell therapy (CAR-T), bridging therapy (BT) with chemotherapy, targeted therapy, and/or radiation therapy (RT) is often administered during the manufacturing window after collection and prior to CAR-T infusion to aid in tumor debulking and/or control symptomatic disease. We sought to compare the patterns of failure in patients who received CAR-T for R/R NHL at a single-institution based on the type of BT received.

Methods: An IRB-approved single-institution retrospective review was performed of all R/R DLBCL patients who underwent leukapheresis for planned CAR-T with axicabtagene ciloleucel (axi-cel). For 16 patients, PET/CT scans immediately before CAR-T, as well as D+30, D+90 post CAR-T infusion were analyzed, with response assessment per the Lugano classification. FDG-avid (Lugano 4 or 5) lesions on pre-CAR-T scan were recorded as index lesions and compared to residual or new FDG-avid lesions on all available post-CAR-T scans.

Results: At last follow up, 11/15 patients (73%) were alive (3/4 with no BT, 3/5 with bridging chemotherapy, 4/5 with RT, 1/1 with Bruton's tyrosine-kinase inhibitor (BTKi)) and 8/15 (53%) were without disease progression (3/4 with no BT, 3/5 with chemotherapy, 2/5 with RT, 0/1 with BTKi); one patient was lost to follow up. Six of 16 (38%) patients had metabolic complete response (CR) at D+30 and 6/14 (43%) at D+90. In comparison among type of BT received, D+30 and D+90 CR rates, respectively, were 1/4 (25%) and 2/4 (50%) for no BT, 4/6 (67%) and 3/5 (60%) for bridging chemo, and 1/5 (20%) and 1/4 (25%) for bridging RT. In analysis of patterns of failure, there were 48 total index lesions identified on pre-CAR-T PET/CT scans. On D+30 PET/CT, the rates of CR were 14/20 (70%) in lesions without BT, 8/15 (53%) in lesions treated with bridging chemo, 6/7 (86%) in lesions with bridging RT. By D+90, the rates of CR were 12/16 (75%) in lesions without BT, 8/9 (89%) in lesions treated with bridging chemotherapy, and 4/4 (100%) of lesions treated with bridging RT.

Conclusions: Patients who require BT before CAR-T have higher relapse rates, likely reflecting more aggressive disease biology. Bridging RT to CAR-T appears to be safe and effective in providing local control, even at palliative doses, but may not impact overall outcomes. However, these data suggest that bridging RT should be considered in sites where local control is a priority, such as symptomatic sites or sites where recurrence may cause significant morbidity. The optimal timing and combination strategies with RT and CAR-T for R/R DLBCL needs to be explored prospectively.

Obstructive Sleep Apnea in Children Under 3 Years of Age

Swathi Rayasam

Mentor: Ron Mitchell, MD, Department of Otolaryngology

Collaborator: Romaine Johnson, MD

Background: Pediatric obstructive sleep apnea (OSA) is a disorder characterized by complete or partial obstructions of the airway during sleep. Children with OSA under 3 years of age have not been extensively studied though they are more likely to have severe OSA.

Objective: To define the demographics, comorbidities, and polysomnographic characteristics of children with OSA under 3 years of age, as well as to look for predictors of severe OSA in this age group.

Methods: Children under 3 who had a polysomnogram (PSG) at Children's Medical Center Dallas/UT Southwestern between 8/2012 and 3/2020 were included in this study. Demographics, comorbidities, and PSG parameters were compared in the following groups: age 0-1 versus 1-3, age 0-2 versus 2-3, and children with or without severe OSA. Univariate analysis was used to determine differences between the age groups; multiple logistic regression analysis to identify predictors of severe OSA while controlling for differences in the age groups. Finally, ANOVA analysis was used to determine which variables predicted the AHI to move furthest away from the group median. $p < .05$ was considered significant.

Results: A total of 439 children were studied. The mean age was 1.8 years, 286 (65%) were male, 138 (31.4%) were obese, and 298 (67.9%) were either African American or Hispanic. Of children undergoing polysomnography (PSG), 98.6% had OSA and 35% had severe OSA. Children under 1 year of age more commonly had GERD (47% versus 25%; $p < .001$) and laryngomalacia (16% versus 3.9%; $p < .001$), while tonsillar hypertrophy was more common in children over 2 years (62% versus 41%, $p < .001$). Comorbidities were common with 63% having at least one comorbidity, most commonly GERD (29%) and prematurity (20%). Down Syndrome (OR: 3.82, 95% CI: 1.58-9.23, $p = .003$) and tonsillar hypertrophy (OR: 2.06, 95% CI: 1.35-3.13, $p = .001$) correlated positively with severe OSA. While Down Syndrome (Margin: 17.9, 95% CI: 11.70-24.08), African American ethnicity (Margin: 11.6, 95% CI: 8.79-14.33), and tonsillar hypertrophy (Margin: 9.0, 95% CI: 6.97-11.07) were associated with the AHI deviation furthest away from the median for all patients.

Conclusion: Children under 3 years of age are more likely to be male and have comorbidities such as GERD, prematurity, or DS. Children under 3 years with Down Syndrome and tonsillar hypertrophy have a high risk of severe OSA, and symptomatic children under 3 years with one or both of these comorbidities should be prioritized for PSG especially if they have tonsillar hypertrophy.

Temporal Associations of Acute Kidney Injury and Maternal Complications in an Obstetric Population

Meghana Reddy

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Collaborators: Aldeboran Rodriguez, MD; F. Gary Cunningham MD;
David Nelson, MD; & Don McIntire, PhD

Objective: Acute Kidney Injury (AKI) is a quality metric for severe maternal morbidity. Precise definitions of renal injury and AKI, such as the Kidney Disease: Improving Global Outcomes (KDIGO) definition, have been established and validated for non-pregnant individuals. However, the definition of AKI is not validated in obstetric populations, leading to potential deficits in diagnosis for this population. Our aim was to examine pregnancies complicated by preeclampsia with severe features (SPE) comparing outcomes of those with AKI on admission and those who developed AKI during their delivery admission.

Methods: This was a retrospective cohort study of women with prenatal care <20 wks and diagnosis of SPE and delivery >34 wks at Parkland Hospital from 1/2015 to 12/2019. KDIGO criteria for AKI diagnosis were applied: no AKI, AKI on admission, or AKI during admission. Demographics and perinatal outcomes were compared using Kruskal-Wallis test and Pearson chi square test with $P < 0.05$ significant.

Results: 4028 women met inclusion criteria; 1096 (27%) met KDIGO criteria for AKI. 17% (n=690) had AKI on admission and 10% (n=406) developed AKI during delivery admission. There were significant differences in maternal demographics: maternal age, race, nullparity and BMI and outcomes (eclampsia, postpartum hemorrhage) between the groups (Table). Fetal outcomes were not different (Table).

Conclusions: More than a fourth of women with SPE >34wks have AKI by KDIGO criteria, with the majority (63%) present on admission. Women who developed AKI intrapartum were more likely to have eclampsia and postpartum hemorrhage. AKI as a quality marker for maternal care requires understanding of presence on admission.

Low BMI (10th Percentile) Increases Obesity Risks for Surgical Site Infections and Wound Dehiscence after Pediatric Foot Deformity Correction Procedures

Joel Rodriguez

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Collaborators: Farzam Farahani, BSA; Joel Rodriguez, BS; Dane K Wukich, MD; & Jacob R. Zide, MD

Purpose: This study aims to compare postoperative complications between obese and non-obese pediatric patients undergoing surgical foot deformity correction.

Methods: Pediatric patients who had undergone operative foot deformity correction were retrospectively identified by cross-referencing reconstructive foot-specific CPT codes with ICD-9/ICD-10 deformity codes using the American College of Surgeons 2012-2017 Pediatric National Surgical Quality Improvement (ACS-NSQIP-Pediatric) database. Patients were stratified into normal weight and obese cohorts based upon Center for Disease Control BMI-to-age growth charts. Univariate and multivariate analyses were then performed to assess for obesity as an independent predictor of post-operative complications.

Results: Of the 3,924 patients identified, 1,063 (27.1%) were obese. Obese patients were older (10.31 years vs. 9.33 years; $p=0.009$), more often male (64.7% vs 58.7%; $p=0.001$), and taller (56.3in vs 51.3in; $p<0.001$) than normal weight patients. There were no differences in pre-operative comorbidities between the normal weight and obese cohorts. Obese patients had a higher overall post-operative complication rate compared to normal weight patients (3.01% vs 1.32%; $p=0.001$). Univariate analysis revealed a significantly higher rate of wound dehiscence in obese patients (1.41% vs 0.59%; $p=0.039$) as well as a higher surgical site infection (SSI) rate that trended towards, but did not reach, statistical significance (1.32% vs. 0.59%; $p=0.061$). No differences were noted in unplanned readmissions (1.03% vs 0.9%; $p=0.968$) or unplanned reoperations (1.03% vs. 0.45%; $p=0.175$) within 30 days of surgery between the two groups. In multivariate analysis, obesity was found to be an independent predictor of both wound dehiscence (adjusted OR=2.16; 95%CI=1.05-4.50; $p=0.037$) and SSI (adjusted OR=3.03; 95%CI=1.39-6.61; $p=0.005$).

Conclusion: Obese children undergoing foot deformity correction surgery had higher overall complication rates than normal weight patients. Obesity was found to be an independent predictor of both wound dehiscence and SSI within 30 days of surgery.

A Quantitative Craniometric and Volumetric Analysis of Infants with Isolated Sagittal Craniosynostosis

Sanchit Sachdeva

Mentor: Christopher Derderian, MD, Department of Plastic Surgery

Collaborators: Lucas Harrison BS; Naomi Cole BS; Eliza Ferrari BS;
& Rami Hallac PhD

Introduction: Compensatory growth patterns in sagittal synostosis (SS) include bifrontal bossing, occipital protuberance, biparietal constriction and anterior malposition of the vertex, collectively resulting in scaphocephaly. We performed a craniometric and volumetric assessment of subjects with SS and controls to quantify the effects of SS on growth in each cranial fossa.

Methods: A retrospective analysis identified 96 total infants (0-2 month: n=38, 2-4 month: n=58) with non-syndromic sagittal craniosynostosis (SS). CT scans were analyzed using Mimics Medical 22.0 and Materialise 3-matic 14.0 software to obtain cephalic index, anterior/middle/posterior fossa heights and volumes. Patients were separated into 0-2 month and 2-4 month old groups and compared to age-matched normocephalic controls using a 2-tailed t-test.

Results: Both age-groups when compared to controls displayed significantly lesser cranial indexes (0-2 months: 0.82 ± 0.05 vs 0.69 ± 0.04 , $p < 0.001$; 2-4 months: 0.85 ± 0.04 vs 0.68 ± 0.03 , $p < 0.001$). Both age-groups when compared to controls displayed significantly greater vertical height in the anterior fossa (0-2 months: 58.20 ± 5.48 mm vs 46.00 ± 5.81 mm, $p < 0.001$; 2-4 months: 62.50 ± 5.05 mm vs 49.40 ± 5.81 mm, $p < 0.001$). The 0-2 months group when compared to controls displayed significantly greater anterior fossa volume (123.46 ± 25.72 mL vs 93.77 ± 22.78 mL, $p < 0.001$) and posterior fossa volume (264.26 ± 45.68 mL vs 239.52 ± 48.95 mL, $p = 0.030$). The 2-4 months group when compared to controls had significantly increased anterior fossa volume (153.25 ± 25.76 mL vs 114.17 ± 30.06 mL, $p < 0.001$) and posterior fossa volume (348.56 ± 50.03 mL vs 314.98 ± 56.05 mL, $p < 0.001$). The 2-4 months group when compared to controls had significantly lesser volume in the middle fossa (204.15 ± 27.20 mL vs 217.75 ± 32.56 mL, $p = 0.015$). Both age-groups when compared to controls showed significantly greater anterior fossa contribution (0-2 months: $22.10 \pm 3.09\%$ vs $18.50 \pm 4.41\%$ respectively, $p < 0.001$; 2-4 months: $21.80 \pm 0.03\%$ vs $17.70 \pm 4.45\%$, $p < 0.001$) and significantly lesser middle fossa contribution (0-2 months: $30.70 \pm 2.03\%$ vs $34.6 \pm 2.30\%$, $p < 0.001$; 2-4 months: $28.90 \pm 0.02\%$ vs $33.60 \pm 2.59\%$, $p < 0.001$.) relative to total intracranial volume.

Conclusion: There is a significant increase in the vertical dimension of the anterior cranial fossa in SS. Compared to controls, the anterior cranial vault contributed disproportionately greater volume, the middle cranial vault contributed disproportionately less volume and the posterior vault contributed a proportionate volume.

Outcomes and Complications of Pelvic Organ Prolapse Vaginal Mesh Removal

Fatou Sahor

Mentor: Philippe E. Zimmern, MD, Department of Urology

Introduction/Background: Complications related to the use of transvaginal mesh for the treatment of pelvic organ prolapse (POP) led to the 2019 FDA ban on the sale of the transvaginally placed mesh for POP. Although the use of the mesh had decreased significantly prior to the ban, FPMRS specialists are still treating vaginal mesh-related complications. The purpose of this work was to assess the outcomes and complications of vaginal mesh removal at our institution.

Methods/Materials: After IRB approval was obtained, a retrospective review of the patients undergoing transvaginal and abdominal vaginal mesh removal in our FPMRS practice was performed. The medical records for these patients were reviewed, including provider notes, operative reports, imaging, and outside medical records. Data was categorized into demographics, preoperative, intraoperative, 30 day postoperative, 90 postoperative and beyond.

Results: 134 patients, mean age of 58.3 years old, were identified with an average follow-up of 41 months. At presentation, 60 women (44%) already had at least one prior mesh removal surgery at an outside institution. The majority of patients presented with pain (69%), dyspareunia (65%), and mesh erosion (63%). The average time between mesh placement and removal was 71 months. 84% of mesh excisions were performed vaginally and 58% of patients also had a mid-urethral sling excision at the time of vaginal mesh removal. All patients underwent an extensive mesh excision and most were anterior vaginal mesh. The mean operative time was 147 minutes. Mean blood loss was 99cc and no blood transfusion was required. Two ureteral injuries and one rectal injury were recognized and repaired intraoperatively. Postoperatively, there were 6 readmissions (4.4%), one of which was for an unrecognized rectal injury. While 13.4% of patients underwent concomitant POP surgeries with the mesh removal, 20.1% required subsequent POP repair and 34% of patients required repeat vaginal mesh excisions. At the last follow-up, 9.7% of patients had persistent pain.

Conclusions: Vaginal mesh removal is a complex surgery that is performed for multiple indications and has overall a low complication rate. Only 20% of patient required subsequent POP repair.

Oral Levodopa Formulation Does Not Affect Progression fo Parkinson's Disease

Ambica Sethi

Mentor: Richard Dewey, MD, Department of Neurology
Collaborators: Sonam Dilwali, MD & Morgan McCreary, PhD

Objective: Motor fluctuations develop in most patients treated with carbidopa/levodopa for Parkinson's disease (PD). The continuous dopamine stimulation (CDS) hypothesis suggests that longer-acting forms of levodopa might improve outcomes, but this has been inadequately tested in humans. We undertook to determine if there is any difference in symptom progression rate among patients taking immediate-release carbidopa/levodopa (IR), controlled-release carbidopa/levodopa (CR), or carbidopa/levodopa/entacapone (CLE) using standard outcome measures in a naturalistic study.

Methods: We evaluated PD subjects prospectively followed for up to 48 months in the Parkinson's Disease Biomarker Project. Bayesian linear or generalized linear mixed effects models were developed to determine if oral levodopa formulation influenced the rate of symptom progression as measured by 8 outcome measures.

Results: At baseline, the IR, CR and CLE groups were similar except that the CR group had milder disease and was represented at only one site, and the CLE group had a longer disease duration. In the primary analysis, there was no difference in rate of symptom progression as measured by the MDS-UPDRS part II, part IV or total score. In the secondary exploratory analysis, there was no difference in progression rate as measured by change in levodopa equivalent daily dose, Montreal Cognitive Assessment, Parkinson's disease questionnaire mobility sub-score, Schwab and England Activities of Daily Living Scale, or a global composite outcome.

Conclusions: We found no difference in symptom progression rate in patients taking IR, CR or CLE. This clinical observation supports pharmacokinetic studies demonstrating that none of these oral levodopa formulations achieve CDS.

Demineralized Bone Matrix in Anterior Cruciate Ligament Reconstruction with Patellar Tendon Autograft Reduces Patient Morbidity

Aaron Shi

Mentor: Jay Shah, MD, Department of Orthopedic Surgery

Collaborator: Breann Tisano, MD

Introduction: Kneeling pain is commonly associated with anterior cruciate ligament reconstruction (ACLR) utilizing bone-patellar tendon-bone (BTB) autograft, attributable to pressure at the donor site on the patella and tibial tubercle. Demineralized bone matrix (DBX) is a collagen scaffold containing growth factors that has been shown to improve tendon-bone healing, helping recreate a fibrocartilaginous enthesis. However, there exists a paucity of literature on pain and functional outcomes concerning grafting BTB autograft donor sites with DBX. We hypothesize that grafting donor sites in ACLR with BTB autograft with DBX will reduce patient morbidity and exhibit similar pain and functional outcomes in comparison to those with ACLR with allograft with no donor site.

Methods: Between 2017 and 2019, 120 patients who underwent ACLR by a single surgeon at a single institution were identified. Revision cases or multiple-ligament injured knees were excluded with the final cohort including 32 in the BTB-DBX group and 28 in the allograft group. Surgical technique included grafting the harvest sites with DBX in BTB autograft patients. Telephone interviews were conducted to collect patient-reported pain outcomes and Lysholm and Kujala Scores. Patient demographics and physical exam findings were collected from electronic medical records. Student t-tests were used to compare continuous variables, and Chi-square tests were used to compare proportional data between the groups.

Results: There were no statistically significant differences with respect to mean Kujala score (85.8 vs. 81.7, $p = 0.40$), mean Lysholm score (87.3 vs. 86.1, $p = 0.74$), patient reported anterior knee pain (50% vs. 35.7%, $p = 0.27$) and kneeling pain ($p = 0.37$) at final follow-up between the BTB-DBX and allograft groups, respectively. There was no statistically significant difference with respect to BMI (27.4 vs. 29.6, $p = 0.06$) between the BTB-DBX and allograft groups, respectively. However, a difference with respect to age (22.7 vs. 31.4, $p < 0.0001$) was observed between the BTB-DBX and allograft groups, respectively.

Conclusion: Grafting the donor sites with DBX in ACLR with BTB autograft yields similar pain, functional outcomes, and Kujala and Lysholm scores in comparison to allograft reconstructions with no donor site. These findings may allow for improved patient outcomes and quicker tendon-bone healing for ACL surgeries utilizing patellar tendon autografts, especially in older patients. Future research is required to determine the biological mechanism for minimal pain associated with BTB-DBX autografts.

Identification of Abnormal Pupil Dilation Velocity as a Biomarker of Cerebral Injury in Neurocritically Ill Patients

Prachi Singh

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Collaborators: Sonia E. Stutzman, PhD; Aardhra Venkatachalam, MPH; DaiWai M. Olson, PhD, RN, CCRN, FNCS; & Arianna Barnes, RN, BSN, CCRN, SCRNP, PHN

Introduction: The pupillary light reflex (PLR) is a clinical measure which describes how the pupils respond to light stimuli. Changes in the PLR reflect the function of neuronal structures involved in the PLR, and other intrinsic factors which influence the PLR. One component of the PLR is the pupillary dilation velocity (DV) which can now be objectively measured with automated infrared pupillometry.

Objective: The purpose of this study is to calculate mean DVs for Glasgow Coma Scale (GCS) derived injury severity classifications, stratified by multiple confounding variables.

Methods: In this study, we examined 68,813 pupil readings from 3,595 patients to determine normal DV with brain injury categorized based upon a GCS as mild (13 -15), moderate (9 -12), or severe (3 -8). the variables: age, sex, race, pupil size, intensive care unit (ICU) length of stay, intracranial pressure, use of narcotics, GCS, and diagnosis were considered confounding and controlled for in statistical analysis. Machine learning classification algorithm based logistic regression were employed for identifying DV cutoffs for GCS categories.

Results: The odds ratio and confidence intervals of these factors were shown to be statistically significant in their influence on DV. Classification based on the area under the curve (AUC) showed that for mild GCS the DV threshold value was 1.2 mm/s, with the false probability rates of 0.1602 and 0.1902 and areas under the curve of 0.8380 and 0.8080 in the left and right eyes respectively. For moderate GCS the DV was 1.1 mm/s, with false probability rates of 0.1880 and 0.1940 and areas under the curve of 0.8120 and 0.8060, in the left and right eyes respectively. Furthermore, for severe GCS the DV was 0.9 mm/s, with false probability rates of 0.1980 and 0.2060 and areas under the curve of 0.8020 and 0.7940, in the left and right eyes respectively. These values are different from the previous method of subjective description and from previously estimated normal DVs.

Conclusion: Faster DVs were observed in patients with lower GCS, indicating that decreasing velocities may indicate a higher degree of neuronal injury.

Pediatric Rhegmatogenous Retinal Detachments: Etiologies, Clinical Course, and Surgical Outcomes

Madeline Sparks

Mentor: Angeline Wang, MD, Department of Ophthalmology

Collaborators: Pedro Davila, MD; Yu-Guang He, MD; & Daphne Fuerte

Purpose: Pediatric rhegmatogenous retinal detachments (RRD) make up a small percentage of all retinal detachments and typically present late with poor visual outcomes. We performed a retrospective clinical study to better characterize the predisposing factors, clinical course, surgical methods, and outcomes of pediatric RRD at a major children's hospital in Dallas.

Methods: We performed an IRB-approved, retrospective review of data for patients under 18 years old who underwent surgical repair for RRD from January 1, 2004 to December 31, 2019. Exclusion criteria included a history of retinoblastoma, the presence of persistent fetal vasculature or active retinopathy of prematurity, and those who had follow-up of less than 6 months. Patient's age, race, gender, laterality, etiology, risk factors, presenting symptoms, fellow eye findings, exam findings at diagnosis, type and location of break, presence or absence of proliferative vitreoretinopathy (PVR), surgical procedures, post-op complications, initial and final best corrected visual acuities, and anatomic success were recorded.

Results: A total of 93 eyes of 87 patients were included. The majority of the patients were male (n = 65; 74.7%) and the median age was 11 (+/- 4.25) years. 90.3% of eyes had at least one predisposing factor of pediatric RRD, including prior ocular surgery (n = 49, 52.7%), trauma (n= 44, 47.3%), myopia (n=35, 37.6%), and congenital anomaly (n=19, 20.4%). 58% of eyes had greater than one predisposing factor. 78.4% (n=73) had macula-off detachments and 36.6% (n=34) had PVR grade C or worse at the time of presentation. 52.7% (n=49) achieved anatomic success after the first operation. Overall, 71.0% (n=66) achieved anatomic success after their final surgery.

Conclusions: The majority of the cases of pediatric RRD in this study are associated with the risk factors of congenital/developmental anomalies, myopia, trauma, or previous ocular surgery. Pediatric patients with RRD often present late as shown by the high incidence of macula-off detachments, as well as the presence PVR Grade C or worse. The majority of patients were able to achieve anatomic success after surgical repair using scleral buckle and/or vitrectomy.

Racial Differences in Optical Coherence Tomography Angiography (OCTA) Parameters Among Subjects Without Glaucoma

Casey Strauss

Mentor: Karanjit Kooner, MD, Department of Ophthalmology

Collaborators: Betty Tong; Jane Gu; Jeffrey Wooliscroft; Aaron Hurd; Saheba Bhathagar; & Andrew Davis

Background: Optical Coherence Tomography Angiography (OCTA) is an imaging modality that provides three-dimensional scans of the retina and optic nerve. One major challenge facing OCTA analysis is lack of an established normative database showing how values differ between races. Having normative OCTA values for different races could help clinicians better interpret patients' OCTA values.

Methods: In this IRB approved retrospective study, a total of 1080 eyes from 536 patients (mean age 63.24 ± 12.87) with no evidence of glaucoma underwent OCTA imaging in a university eye clinic. Eyes with myopia of 6 diopters or more were excluded. Eyes were randomly selected from each individual for analysis. OCTA parameters were analyzed using one-way ANOVA and Tukey HSD post-hoc tests to determine significant differences in mean OCTA values between white, black, Hispanic, and Asian eyes.

Results: The mean central vessel density (VD) for white eyes (28.03 ± 12.74) was significantly higher than the mean central VD for black eyes (22.61 ± 14.44 , $p=.010$). The mean foveal avascular zone (FAZ) area for white eyes (0.255 ± 0.107) was significantly less than the mean FAZ area of black (0.365 ± 0.146 , $p<.001$), Hispanic (0.336 ± 0.121 , $p<.001$), and Asian eyes (0.323 ± 0.124 , $p=.001$). The mean central retina inner thickness for white eyes (50.46 ± 9.66) was significantly higher than the mean for black eyes (40.47 ± 9.3 , $p<.001$). Disc area was smaller in white eyes (2.10 ± 0.416) than in black (2.42 ± 0.484 , $p<.001$), Hispanic (2.35 ± 0.512 , $p=.006$), and Asian eyes (2.29 ± 0.483 , $p=.038$).

Conclusion: Our data suggests that there are significant differences in normative OCTA values between different races. These racial differences may be attributed to varying levels of susceptibility to pathologic processes, but exact mechanisms are not yet known. Our data may be valuable in interpreting normative OCTA values. Further studies are needed to elucidate the mechanisms that lead to racial differences in OCTA parameters.

Characterization of Hematocrit in the Postpartum Period: What Degree of Anemia is Problematic?

Lisa Thiele

Mentor: Catherine Spong, MD, Department of Obstetrics and Gynecology

Collaborators: Alexandra Ragsdale, MD, Lisa R Thiele, John J. Byrne, MD, MPH,
Amanda C. Zofkie, MD, Donald D. McIntire, PhD

Objective: To characterize the natural history of hematocrit in the postpartum period and determine the anticipated magnitude of hematologic change from discharge to postpartum follow-up. The goal is to provide accurate counseling of postpartum anemia and determine criteria for asymptomatic blood transfusion.

Study Design: In a contemporary cohort of 2019 deliveries, the primary analysis was the change in last hematocrit (Hct) prior to discharge to the first Hct at postpartum follow-up, adjusting for time. Women with Hct prior to discharge and postpartum follow-up were included. Oral iron was given to all. Analysis was performed to evaluate influence of demographics, medical complications, and pregnancy characteristics on changes in Hct. Statistical analysis included chi-square, paired Student's t-test, Student's t-test for independent groups, and analysis of variance.

Results: Of our hospital's 12,456 deliveries, 9,003 met inclusion criteria. The average Hct prior to discharge was 30.9% and at postpartum follow-up was 38.9%. Hct increased from discharge to postpartum follow-up an average of 7.93% (95% CI 7.85, 7.99). To look at a normal group, those with multiple gestation, severe preeclampsia, chronic hypertension, and diabetes were excluded; the average increase in hematocrit was 8.19% (95% CI 8.12, 8.26). The rise of Hct was significantly lower for those with chronic hypertension (6.9+3.6%, $p<0.001$), diabetes (7.3+3.3%, $p<0.001$), and severe preeclampsia (6.9 +3.7%, $p<0.001$). Severity of anemia influenced the rise in Hct in the postpartum period (Figure 1). In women with anemia (Hct <30%), the postpartum rise in Hct was 9.49% (95%CI 9.38, 9.6) in normal and 7.9% (95% CI 7.86-8.0) overall. The impact of race, age, parity, and BMI did not clinically alter the findings.

Conclusion: Asymptomatic women with postpartum anemia (Hct <30%) will have a Hct of 37-39% at their postpartum follow-up. This study establishes the natural course of Hct in the postpartum period. Women with pre- existing and obstetric complications experience less hematologic recovery and adapt more slowly to postpartum physiological changes.

Anticoagulation in Elective Spine Cases: Rates of Hematomas versus Thromboembolic Disease

Dharani Rohit Thota

Mentor: Michael Van Hal, MD, Department of Orthopedic Surgery

Collaborator: Paul Nakonezny PhD

Background: One of the major complications of surgery is venous thromboembolism (VTE) which can range in presentation. Spine surgery is an especially complex balance between minimizing the risk of a VTE and also the increased risk of a hematoma which can lead to devastating neurological outcomes. We hypothesized that pharmacologic prophylaxis would significantly increase the rates of bleeding complications requiring reoperation, but not significantly change the risk of VTE in our patient population.

Methods: The elective spine surgery cases that were recorded for a single academic center between 2015 and 2017 were identified. A total of 3790 patients were initially identified. 260 patients were excluded. The cohort was then propensity matched. This matched a single patient who did not receive anticoagulation to a single patient who did within the institution. This left 1776 patients with 888 patients in each arm. The primary outcomes were unplanned reoperation for hematoma, and venous thromboembolism (VTE) events within the 30-day perioperative period.

Results: The incidence of VTE, PE, and unplanned reoperation for hematoma in the total cohort was 0.96%, 0.34%, and 1.13%, respectively. The incidence of VTE, PE, and unplanned reoperation for hematoma in the anticoagulation arm was 0.90%, 0.34%, and 2.03%, respectively. The incidence of VTE, PE, and unplanned reoperation for hematoma in the no-anticoagulation arm was 1.01%, 0.34%, and 0.23%, respectively. Predicted odds of VTE and PE were not significantly different; however, the odds of an unplanned reoperation for hematoma (OR=7.535, 95% CI: 2.004 to 28.340, p=0.002) were greater for those who received pharmacological anticoagulation.

Conclusion: In this study, anticoagulation does not lead to lower rates of VTE events, but it increases the risk of symptomatic hematomas which require a return trip to the OR. This raises the question as to whether anticoagulation should be used in routine cases as it has a statistically significant impact on hematoma rates. While this was not a randomized controlled trial, we attempted to correct for this with propensity matching.

The Effect of Plevic Tilt on Clinical Outcomes After Hip Preservation Surgery in Femoroacetabular Impingement Syndrome and Hip Dysplasia

Abhinav Thummala

Mentor: Joel Wells, MD, MPH, Department of Orthopedic Surgery

Collaborator: Paul Nakonezny, PhD

Introduction: Pelvic tilt is thought to be a compensatory mechanism in hip pathology, specifically in femoroacetabular impingement syndrome (FAIS) and hip dysplasia. Despite the apparent role of pelvic tilt in hip pathology and kinematics, little is known on the relationship between pelvic tilt and degree of pre- or post-operative symptoms. The primary purpose of this study is to investigate the relationship between pre-operative pelvic tilt and post-operative outcomes in patients undergoing hip preservation surgery for either FAIS or hip dysplasia.

Methods: The study relied on a prospective hip preservation database of demographic, radiographic, and outcomes data for 89 patients who underwent hip preservation surgery with a primary diagnosis of FAIS or hip dysplasia. Pelvic tilt was assessed on the standing AP radiograph with the PS-SI measurement: the perpendicular distance from the pubic symphysis to the inferior-most points of bilateral sacroiliac joints. The iHOT-12, HOS Score, Harris Hip Score (HHS), UCLA Activity Score, and EQ-VAS were used to assess hip function and pain levels pre- and post-operatively.

Results: The average pelvic tilt (PSSI distance) was 86.44 ± 18.33 cm for the FAIS group and 96.15 ± 15.09 cm for the dysplasia group. The results from the multiple linear regression analysis revealed a significant positive relationship between pre-surgery PS-SI distance and change in iHOT12 score (regression coefficient=0.384, SE=0.192, $R^2=0.259$, $p=0.046$); as Pelvic Tilt PSSI in the standing position increased, iHOT12 hip function improved following hip preservation surgery. No other significant relationship emerged between Pelvic Tilt PSSI standing and change in hip outcomes.

Conclusion/Discussion: The improvement in hip outcomes was greater for patients with more anterior tilt and less for patients with posterior pelvic tilt. The magnitude of pelvic tilt was therefore associated with improved post-operative outcomes, albeit not significantly. Recent studies established femoral version as a relevant pre-operative variable in arthroscopic management of FAI, but these did not include pelvic tilt as a covariate. Our model included femoral version as a covariate, and the co-dependence of tilt and femoral version could therefore explain the results represented here. These results allow for an initial investigation on pelvic tilt in patients undergoing hip preservation surgery. Further investigation is necessary to assess changes in pelvic tilt and longer-term outcomes.

Patient Outcomes in Frontal vs. Bifrontal Osteotomy for Olfactory Groove Meningiomas

Abhinav Thummala

Mentor: Tomas Garzon-Muvdi, MD, Department of Neurosurgery

Collaborator: Aaron Plitt, MD

Introduction: Olfactory groove meningiomas represent 5-15% of all meningiomas. Many olfactory groove meningiomas don't cause apparent neurologic symptoms and grow slowly, resulting in relatively large tumors upon presentation. The location of the tumor and relatively large size at diagnosis present a unique challenge to surgeons, and extensive research has been conducted into the merits of a variety of surgical approaches. Despite this research, few studies explore the difference between bilateral and frontolateral approaches in accessing and treating olfactory groove meningiomas. The primary purpose of this study is to compare post-surgical outcomes in patients treated for olfactory groove meningiomas with bilateral or unilateral subfrontal approaches.

Methods: The study utilized a prospective database of demographic, radiographic, and outcome data for all patients surgically treated for olfactory groove meningiomas with a bilateral or unilateral subfrontal approach between 2003 and 2015. Clinical outcomes were assessed pre-operatively and at most recent follow-up. Other calculated outcomes included recurrence and progression-free survival (PFS).

Results: Six patients underwent a unilateral craniotomy, and sixteen patients underwent a bilateral craniotomy. In the unilateral group, 1 of 5 patients (20%) underwent a subtotal resection, while all 16 patients in the bilateral group underwent gross total resection. No patients in the unilateral group had post-operative complications, while 2 of the 16 in the bilateral group had post-operative complications (12.5%). The unilateral group had a mean PFS of 4.26 ± 2.60 years, and the bilateral group had a mean PFS of 3.54 ± 3.16 years. The results from the Fisher's tests and the t-test suggest that none of these associations were statistically significant.

Discussion: This research addresses the lack of information about surgical approach to allow for informed care of olfactory groove meningiomas. The analysis suggested that there were no statistically significant differences between the two approaches. The unilateral group showed slightly higher rates of subtotal resection, and the bilateral group showed higher rates of post-operative complications. One limitation of this study was the small cohort. Further research should explore the relationship between surgical approach and longer-term outcomes in olfactory groove meningiomas to further clarify the role of surgical approach in this subset of patients.

Developmental Status and Associated Risk Factors in Young Children in Foster Care

Karlyn Tunnell

Mentor: Jill D. McLeigh, PhD, Department of Rees-Jones Center Children's Health

Collaborator: Cecilia Lazcano, MS

Objective: Children in foster care have been recognized as being at higher risk of developmental delay by the American Academy of Pediatrics (AAP). This study used the Ages and Stages Questionnaire (ASQ-E) to determine: 1) The percentage of children seen at one pediatric foster care clinic who exhibited developmental concerns 2) The association between risk factors common to children in foster care and developmental status 3) The association between these risk factors and developmental status in particular developmental domains.

Method: This is a cross-sectional study that used the Ages and Stages Questionnaire-3 (ASQ-3), demographic, and health data obtained from electronic health records to calculate frequencies and percentages of children in foster care with developmental challenges. The association between developmental status and risk factors was assessed using chi-square and bivariate logistic regression analysis.

Results: 796 children were included in this study, of which 68.5% had scores indicating developmental concern (≥ 1 S.D. below the mean), and 39.8% of children had scores indicating developmental delay (≥ 2 S.D. below the mean). Higher odds of having developmental concern was associated with being male (OR 2.169, 95% CI 1.595-2.950) and exhibiting trauma symptoms (OR 1.51, 95% CI .993-2.295). Higher odds of having developmental delay was associated with being male (OR 1.716, 95% CI 1.278-2.303), being born premature (OR 2.165, 95% CI 1.438-3.259), exhibiting trauma symptoms (OR 1.441, 95% CI .975-2.130), and experiencing physical abuse (OR 1.541, 95% CI 1.040-2.283). Lower odds of having developmental concern was associated with kinship placement (OR .55, 95% CI .359-.842). When analyzing delays in each of the 5 domains tested in the ASQ-3 and risk factors, children who experienced physical abuse had higher odds of DD in the communication (OR 1.632, 95% CI 1.019-2.615), fine motor (OR 2.092, 95% CI 1.370-3.194), and gross motor (OR 1.796, 95% CI 1.132-2.848) domains, while being in kinship placement decreased the odds of a score indicative of DD in the communication (OR .296, 95% CI .138-.634) and problem-solving (OR .504, 95% CI .265-.958) domains.

Conclusion: Our findings support previous research suggesting that children in foster care are at increased risk for developmental delay. Frequent and increased screening is necessary for early identification and intervention.

Cholesteatoma Recidivism in Planned Second Look Surgery Versus Primary Reconstruction with Diffusion Weighted Imaging

Aaron Tverye

Mentor: Joe Walter Kutz, Jr, MD, FACS, Department of Otolaryngology

Collaborators: Daniel E. Killeen, MD; Kamlesh Jobanputra, MD; Marco C. Pinho, MD; Jacob B. Hunter, MD; & Brandon Isaacson, MD, FACS

Objective: Cholesteatoma can be treated with primary resection and reconstruction with diffusion weighted MRI (DW-MRI) used for surveillance or with staged resection in two planned surgeries. The aim of this study is to compare residual cholesteatoma between these strategies.

Study Design: Retrospective review

Setting: Academic center
Methods: Study enrolling all patients who underwent canal wall up tympanomastoidectomy for cholesteatoma treated from 2010-2018. Only patients who underwent staged second look procedure or primary reconstruction with DW-MRI were included. Primary endpoints were residual cholesteatoma.

Results: Eighty patients were enrolled in this study--33 patients underwent primary reconstruction with DW-MRI (PR+DW-MRI), and 47 patients underwent planned second look surgery (SSLS). Median follow-up period was 33 months (range: 10-59) for PR+DW-MRI group and 29 months (range: 6-78) for the SSLS group. Cholesteatoma recurrence occurred in three patients (9.1%) in the PR+DW-MRI group and 12 patients (25.5%) in the SSLS group ($p=0.06$). Residual disease was identified in three patients (9.1%) on DW-MRI, while it was seen on second look surgery in 36.17% of the SSLS group, which was significantly different ($p=0.006$). On multivariate logistic regression, staged second look surgery (OR 21.3, $p=0.003$), need for mastoidectomy (OR 17, $p=0.02$) and protympanum involvement (OR 33.2, $p=0.01$) were significantly predictive of residual cholesteatoma when controlling for prior surgery, age, gender, laterality, use of the endoscope, and involvement of oval window, sinus tympani, and aditus ad antrum.

Conclusion: The surgeon's decision to stage cholesteatoma resection, need for a mastoidectomy, along with protympanum involvement were significantly predictive of residual disease.

The Role of the Artery of Ligamentum Teres in Revascularization in Legg-Calvé-Perthes Disease

Angel Valencia

Mentor: William Zachary Morris, MD, Texas Scottish Rite

Collaborators: Harry Kim, MD & Molly McGuire

Background: Legg-Calvé-Perthes disease (LCPD) is idiopathic avascular necrosis of the femoral head in children. Past studies suggest that the artery of ligamentum teres (LT) supplies the capital femoral epiphysis (CFE) in the minority of immature hips. However, a recent cadaveric study supported that most immature hips are supplied by the artery of LT and suggested that this medial vascular source may influence the pattern of revascularization in LCPD.

Methods: Retrospective review of perfusion MRI (pMRI) from 64 hips in early stage LCPD (Waldenström Stage I-IIa) was performed. Two independent graders determined the presence of one of three patterns of perfusion based on medial (artery of LT) or lateral perfusion (medial femoral circumflex artery/MFCA) on coronal and sagittal MRI series: Type I—lateral perfusion only, Type II—separate medial and lateral perfusion, or Type III—coalescent medial and lateral perfusion. Lateral pillar classification was obtained for the 60 hips that reached late fragmentation.

Results: We identified 64 patients (75% male) with mean age at diagnosis of 8.5 ± 2.1 yrs (range 5.1 – 14.1 yrs). 36% (23/64) hips underwent pMRI during Stage I and 64% (41/64) during Stage IIA. Perfusion MRI revealed separate and distinct medial and lateral sources of perfusion (Type II) in 50% (32/64) hips. In Stage I, the distribution of Type I/II/III hips was 26%/52%/22%. However, in Stage IIA there was a non-significant trend towards greater coalescence of the medial and lateral perfusion with a distribution of Type I/II/III of 7%/49%/44% ($p=0.057$). During late fragmentation stage, the distribution of Lateral Pillar B, B/C, and C hips was 38%/37%/25%. There was a weak, but significant negative linear correlation between perfusion type and lateral pillar classification ($r = -0.30$, $p=0.02$). A kappa value of 0.92 confirms excellent agreement between grader in classifying perfusion category.

Conclusion: The presence of separate and distinct areas of perfusion of medial and lateral CFE provides further evidence of the important role of the LT vessels in the early stages of LCPD. The changes in perfusion pattern with disease progression likely reflect that MFCA and LT vessel revascularization occur separately, but ultimately coalesce posteriorly over time.

Obesity and the Incidence of Difficult Intubation

Jesus Valencia

Mentor: Tiffany Moon, MD, Department of Anesthesiology & Pain Management

Collaborator: Katelynn Smith

The prevalence of obesity in the United States remains high at 43.4% and continues to rise, with the fastest rates of increase occurring among the morbidly obese (BMI³40 kg/m²) and the super obese (BMI³50 kg/m²). Morbidly obese individuals have a greater incidence of airway complications in the operating room. Individuals with a higher body mass index (BMI) are known to be difficult to mask ventilate, and desaturate much quicker than non-obese individuals. Thus, the ability to predict intubation difficulty is invaluable to the practicing anesthesiologist.

Airway management is an essential aspect of an anesthesiologist's responsibilities, and complications such as the lack of adequate airway management can be severe when they are not anticipated. The morbidly obese have many comorbidities, but BMI alone may be a poor predictor for difficult intubation. This study aims to determine and compare the incidence of difficult intubation in non-obese versus obese surgical patients using the previously validated intubation difficulty scale (IDS). As a secondary objective, anthropometric and demographic factors were evaluated to assess their potential as independent predictors of difficult intubation.

Over a 3-year period, patients age 18-80 undergoing general endotracheal anesthesia at a large, county, tertiary hospital were analyzed. IDS was used to define easy versus difficult intubation. Enrolled patients were stratified into two cohorts based on BMI: the non-obese group (BMI<30 kg/m²) and the obese group (BMI³30 kg/m²). Preoperative examination of patients included the evaluation of waist circumference, neck circumference, thyromental distance, sternomental distance, Mallampati scores and the upper lip bite test.

Of the 4003 patients enrolled, 37.6% had a moderately difficult intubation and 5.4% were significantly difficult. The incidence of no difficulty, moderately difficult, and significantly difficult intubation in the non-obese cohort (n=1660) was 59.9%, 35.5%, and 4.6%, respectively. Whereas the obese cohort (n=2343), had an incidence of 54.9%, 39.2%, and 5.9% for easy, moderately difficult, and severely difficult intubation. Thus, we conclude that obesity does increase in the incidence of moderately and severely difficult intubations, compared to non-obese patients.

The Impact of SARS-CoV-2 on Liver Transplantation: Did Recipients Take on More Risk?

Benjamin Wang

Mentor: Malcolm MacConmara, MD, Department of Surgery, Surgical Transplantation

Collaborator: Cyrus Feizpour, MD

Background: Each year 20-30% of patients on the UNOS liver transplant wait list will die before a donor organ offer is received. During the SARS-CoV-2 pandemic, liver transplantation was classified as a CMS Tier 3b procedure which should not be postponed, however the pandemic disrupted management of potential donors and liver procurement processes. The aim of this study was to assess the impact of the pandemic on donor liver numbers and donor organ quality. In addition, risk-taking was compared between different regions of the US.

Methods: The UNOS national transplant database was used to identify donor and recipient characteristics for liver transplants performed across the US during the pandemic, specifically from March 1st - August 31st, 2020. Donor risk index (DRI), a validated score composed of known donor risk factors that correlate with risk of post-transplant graft failure, was calculated for all donor organs used. Comparison was made to the same time period in 2019 using a two-tailed t-test. Statistical significance was defined as $P < 0.05$.

Results: During the SARS-CoV-2 pandemic, overall deceased donor liver transplant volume decreased by 3.5%. Calculated DRI for transplanted livers was significantly increased during the pandemic (1.57 ± 0.43 , $n = 3091$), compared to 2019 (1.48 ± 0.42 , $n = 4239$, $P < 0.01$). Multiple factors contributed to an increased DRI, including a 10% increase in donors who died from anoxia-related events, increased cold ischemia time, and significantly wider sharing patterns (>4 -fold increase in national sharing vs local sharing). Compared to other regions in the US, the northeast transplanted livers with the highest DRI (1.63 ± 0.42 vs 1.56 ± 0.44 , $P < 0.01$). In addition, the proportion of liver allografts transplanted with $DRI > 2$ —indicating high risk for 1-year graft failure—increased from 11% in 2019 to 16% in 2020. Only 0.03% of liver donors received a positive NAT SARS-CoV-2 test.

Conclusion: The SARS-CoV-2 pandemic rapidly changed the liver transplantation donor landscape in 2020. Higher-risk organs were used to maintain overall transplant volume, especially in regions of the US most affected by the pandemic. Allografts from SARS-CoV-2-positive donors were not used for transplantation. As the pandemic continues, safe strategies are needed to prevent worsening of organ scarcity and ensure that life-saving transplant activity can continue without compromising transplant recipient outcomes.

Hip Joint Translation Can Be Detected with Standing and Supine Radiographs

Angela Zhang

Mentor: Joel Wells, MD, MPH, Department of Orthopedic Surgery

Collaborators: Paul Nakonezny, PhD; Avneesh Chhabra, MD; & Nicholas Fey, PhD

Purpose: Joint translation and microinstability in normal hips occur because the femoral head and acetabulum are not perfectly spherical. In patients with developmental dysplasia of the hip (DDH), bony abnormalities allow greater intraarticular movement and results in damage, pain, and osteoarthritis. The aim of this study was to determine if hip joint translation can be detected by measuring standard radiographic parameters on standing and supine x-ray and if body mass index (BMI) is associated with the severity of dysplasia.

Patients and Methods: We retroactively identified 186 hips in 93 patients who presented with hip pain and were diagnosed with DDH. Standard radiographic parameters were measured on pre-surgical weight-bearing AP pelvis and 45 degree bilateral Dunn radiographs of both hips for each patient.

Results: Of the 93 patients, 83 were female and 10 were male. Mean age was 30.76 ± 9.26 years. Femoral head extrusion index ($p < 0.0001$) and Tonnis angle ($p = 0.034$) were significantly greater on standing x-ray than on supine x-ray. The odds of having an intact Shenton's line ($p = 0.0052$), negative cross-over sign ($p = 0.0007$), and negative femoro-epiphyseal acetabular index ($p < 0.0001$) were significantly greater in the standing position. Finally, higher BMI was associated with increased femoral head lateralization ($p = 0.0217$), femoral head extrusion index ($p = 0.024$), and Tonnis angle ($p = 0.0082$); and smaller lateral center-edge angle ($p = 0.0264$).

Conclusion: These findings demonstrate dysplastic hips transitioning between standing and supine positions have a true increase in femoral head extrusion index and Tonnis angle that reflects joint translation not present in normal hips. Furthermore, patient BMI is significantly related to the severity of dysplasia, and possibly amount of translation and instability. Future work may investigate the relationship between specific measures of translation, joint stability, advanced imaging, and patient outcomes. With this information, clinicians can perform a more comprehensive evaluation of hip dysplasia patients and identify those at increased risk of joint damage based on a simple series of x-rays.

Survival and Disease Progression Following Isolated Locoregional Recurrence Status Post Head and Neck Radiotherapy

Lucian Zhao

Mentor: David Sher, MD, MPH, Department of Radiation Oncology

Collaborators:

Background: Salvage treatment options for solitary locoregional recurrent head and neck squamous cell carcinoma (rHNSCC) is oftentimes limited once primary chemoradiotherapy is exhausted. It is important to identify good candidates for salvage treatment to minimize morbidity.

Objective: To determine if clinical, patient, or disease-specific variables can predict overall survival and progression free survival (OS/PFS) for rHNSCC.

Methods and Materials: UTSW RadOnc database of 1149 patients with HNC from 2001 to 2018 yielded 90 patients with rHNSCC that met inclusion criteria. Data analysis was completed using KM and Fine-Gray competing risks analysis in R.

Results: Initial N and recurrent T-stage were associated with significantly decreased OS and PFS. Salvage treatment was associated with increased OS and PFS. Narcotic use and recurrent N stage were associated with decreased PFS. Definitive primary radiation increased PFS. All $p < 0.05$.

Frequency of Frontotemporal Lobar Degeneration (FTLD) in the Homeless Population

Cecilia Zhou

Mentor: Charles White, MD, Department of Pathology

Collaborator: Jeffrey J. Barnard, MD

Frontotemporal dementia (FTD) is a group of highly heritable neurodegenerative syndromes characterized by personality, language and/or behavior disturbances. The underlying neuropathological features, collectively called frontotemporal lobar degeneration (FTLD), include circumscribed atrophy in the frontal and temporal lobes accompanied by protein inclusions in neurons. Examples of the neuropsychiatric manifestations of FTD include decreased personal hygiene, public urination, and lack of social boundaries. Patients do not have insight into their disease, and their progressive deterioration causes caregiver burnout.

Due to the neuropsychiatric manifestations of FTD and the greater prevalence of mental illness in the homeless population, we hypothesize FTLD neuropathology to be present in a disproportionately large number of homeless subjects when compared to a general autopsy sample of individuals of the same age. Currently, no other literature exists on this subject.

Over the course of February 2020 – January 2021, sixty autopsy brains from subjects 55 years or older will be obtained from the Dallas County Medical Examiner's Office. Thirty of these brains will be from individuals with a history of homelessness, and the other thirty will be from control cases without a history of homelessness. A complete FTLD histologic workup will be performed on all sixty autopsy brains; this process will allow for neuropathologic diagnosis of all currently known FTLD subtypes as well as other neurodegenerative disorders that may masquerade clinically as FTD. Following the results of the histologic workup, statistical analysis using chi-square will be performed.

Currently, we have collected and analyzed nine brains from deceased individuals with a history of homelessness. The histologic workup has resulted in no evidence of FTLD in these cases. However, our study is on-going, and we have only yet examined 1/3 of our anticipated population.

Although there exists a large quantity of research about FTD, this research project is the first of its kind: there are no other studies about FTLD and neurodegenerative disease in the homeless population. Our findings will provide valuable information for initiatives preventing homelessness and treating mental illness in this vulnerable population. Additionally, this study will provide insight into the demographics of neurodegenerative disease in the Dallas community.

Is There a Difference in the Diagnostic Outcomes of Calcifications Initially Identified on Synthetic 2D Versus Full-Field Digital Mammography Screening?

Haoling (Holly) Zhu

Mentor: Basak Dogan, MD, Department of Radiology

Collaborators: Dogan Polat, MD; Phil Evans, MD; Ann Mootz, MD; Timothy Blackburn, PhD.; & Yin Xi, PhD

Purpose: To compare the outcomes of microcalcifications recalled on full-field digital (FFDM) and FFDM and combined tomosynthesis (Combo) to synthetic (SM) screening mammograms.

Method: We reviewed medical records, radiology, and pathology reports of all patients found to have abnormal calcifications requiring further evaluation on mammography screening at our institution between 11/1/2016-11/1/2018 and collected patient demographics, calcification morphology and distribution, and mammography technique (SM, FFDM, or Combo). We used biopsy pathology or at least 1-year imaging follow-up to establish overall diagnostic outcome (benign or malignant). Fisher's exact test was used to compare validation rates at diagnostic work-up, BI-RADS category, and final outcome of calcifications identified on each screening technique. T-test was used for continuous variables.

Results: Of 699 calcifications in 596 women recalled, 176 (30%) of 596 were from SM and 420 (70%) FFDM/Combo. There was a significantly higher rate of calcifications unvalidated at diagnostic work-up for SM compared to FFDM/Combo (0.8% vs. 10%, $p < 0.0001$). SM calcifications were more likely to receive BI-RADS 2/3 at diagnostic work-up compared to FFDM/Combo ones (55% vs. 42%, $p = 0.003$). Of 346 (49%) calcifications that underwent biopsy, 88 (25%) were malignant (36% of SM vs. 22% of FFDM/Combo, OR: 0.5 [95% CI: 0.3, 0.8] $p = 0.01$). Of 622 lesions with established diagnostic outcome, there was no difference between having an overall benign or malignant outcome between SM and FFDM/Combo (17% vs. 13%, OR: 0.8 [95% CI: 0.5, 1.2] $p = 0.27$).

Conclusions: Synthetic tomosynthesis screening results in a higher rate of false positive and unvalidated calcification recalls compared to FFDM/Combo. Clinical Relevance: SM is comparable to FFDM+Combo in recalled calcification outcomes and can be safely implemented as a standalone screening technique.

TABLE OF CONTENTS

Community Health, Global Health, Medical Education, and Quality Improvement

Louise Atadja *	105	Hiren Patel	124
Alana Carrasco *	106	Arifa Plumber	125
Trey Cinclair *	107	Cayenne Price *	126
Christine Dobbi*n	108	Sarah Prickett *	127
Ashely Farley, Courtney Johnson, Katherine Cantu, Shivani Raman, & Thanos Rossopoulos,	109	Mathews Roy, Anjanya Singh, Imran Murtuza, & Isabel Weiss	128
Taylor Fitzgerald	110	Collin Sanderson *	129-131
Yue (Alice) Gao	111	Devin Shah *	132-134
Isabel Gonzalez	112	Stephanie Shea	135
Lin Guo	113	Prachi Singh *	136
Deena Habazi	114	Arlen Suarez	137
Waqas Haque	115-116	Tuyet Nhi Tran *	138
Maria Ilyas *	117	Chinmayee Venkatraman *	139
Reena Jasani	118	Jennifer Wang *	140-141
Brian Lue	119-120	Virginia Wang	142
Maishara Muquith *	121		
Umer Nadir	122		
Akshat Patel	123		

KEY

Ω Oral Presenter - UT Southwestern Medical Student Research Forum

* Poster Presenter

Pathologic Fracture Secondary to Acute Hematogenous Osteomyelitis in Children

Louise Atadja

Mentor: Matthew Boyle, FRACS, Starship Children's Hospital Auckland, NZ

Collaborators: Anna McDonald, MBChB & Haemish Crawford, FRACS

Background: Acute hematogenous osteomyelitis can result in significant destabilization of bony architecture, resulting in pathologic fracture. Pathologic fractures in children with acute hematogenous osteomyelitis have been underreported, and the ideal management of such fractures thus remain unclear. This study investigates the risk factors for development of pathologic fracture following acute hematogenous osteomyelitis and presents the treatment course of a series of patients from initial infection onset to management of pathologic fracture.

Methods: We retrospectively reviewed a previously established osteomyelitis database at Starship Children's Hospital in Auckland, New Zealand, to identify pediatric patients who had developed a pathologic fracture secondary to acute hematogenous osteomyelitis. The database included all pediatric patients who had been managed for acute hematogenous osteomyelitis within the greater Auckland region from 2008 to 2019. A total of nine patients with pathologic fractures were included in the present study. These patients were compared to a group of 27 patients (matched according to age, sex, and site of infection) managed for acute hematogenous osteomyelitis without further development of pathologic fracture.

Results: At the time of initial presentation, limb swelling ($p=0.0198$), a reduced range of motion of the adjacent/affected joint ($p=0.0027$), and limb erythema ($p=0.0497$) were observed more often in patients who subsequently developed a pathologic fracture compared to those who did not. Patients who subsequently developed a pathologic fracture also demonstrated a significantly higher CRP on initial presentation compared to patients who did not subsequently develop a fracture ($p=0.0070$). Patients who developed a pathologic fracture had a longer hospital admission duration ($p=0.0418$), were more often admitted to the Pediatric Intensive Care Unit ($p=0.0418$), and more frequently experienced multiple hospital readmissions ($p=0.0012$) compared to patients who did not develop a fracture.

Conclusion: We found that pediatric patients presenting with clinically and serologically more severe acute hematogenous osteomyelitis have an elevated risk of developing pathologic fracture. Prophylactic treatment plans such as early immobilization and casting may be necessary for patients presenting with these risk factors to prevent the long and often difficult treatment of pathologic fracture.

Characterizing Local Disease Burdens and Prescription Rates in Four Indigenous Communities of Rural Guatemala

Alana Carrasco

Mentor: Mary Chang, MD, MPH , Department of Emergency Medicine

Collaborator: Kimberley Johnson BS

Purpose: Health disparities are present in the rural populations of Guatemala, and understanding the epidemiology of different communities is imperative to address underlying needs and provide more effective medical interventions. While infectious diseases and ailments related to poor living conditions are still present, the high prevalence of diseases of lifestyle pose significant public health issues. Lack of access to treatment, limited infrastructure, and high cost of medications pose barriers to adequate care of these chronic issues, putting these populations at risk for potentially worse health outcomes. The aim of this study is to characterize the local disease burdens and pharmaceutical needs of 4 areas in rural Guatemala routinely visited by a non-governmental organization. The goal is to understand the medical needs of these populations in order for healthcare providers to deliver more effective care.

Methods: This is a retrospective chart review of patients seen by a non-governmental organization from March 2019 to February 2020 at 4 clinics in rural Guatemala that predominantly serve Indigenous populations. Inclusion criterion was patients seen in the clinics by a medical provider, including women and children. Exclusion criteria were patients missing data on sex or age. 1,094 patients were included in the study, and a descriptive analysis of patient demographics, diagnoses, and prescribed medications was performed. This study received approval from the University of the Texas Southwestern Institutional Review Board, Refuge International, and the local committee members in charge of the clinics at each of the different locations.

Results: 1,094 patients were included. The mean age was 32.4 years. 70.7% were female, and 29.4% were pediatric. The most common diagnoses overall were gastrointestinal (16.9%), dermatologic (11.8%), obstetrical/gynecological (11.3%), and musculoskeletal (10.5%). In the pediatric population, the most common diagnoses were dermatologic (21.2%), gastrointestinal (18.2%), and respiratory (15.4%). 4% of prescribed medications were NSAIDs, and 11.3% were gastrointestinal. In pediatric patients, 13.5% of medications prescribed were NSAIDs, 13.5% were vitamins/supplements, and 11.0% were albendazole. The rate of hypertension in the adult population was 16.5%, and the rate of diabetes was 11.3%. 83.5% were overweight and 40.8% were obese. In the pediatric population, 11.8% were overweight and 4.7% were obese.

Conclusion: Providers serving these and similar communities should be prepared to encounter similar disease burdens and can be best prepared by ensuring adequate stocks of NSAIDs, albendazole, vitamins, and gastrointestinal medications.

The Role of Physician Owned Distributorships in Orthopedic Surgery: A Narrative Review

Trey Cinclair

Mentor: Shaleen Vira, MD, Department of Orthopedic Surgery

Background: The rapid proliferation of PODs (Physician Owned Distributorships) has had a notable impact on the delivery of care by orthopedic surgeons. The POD business model creates the opportunity for increased affordability of care to patients, while also inciting a potential for conflicts of interest for physician-investors providing medical care and profiting from this pursuit.

Objective: The objective of this paper is to review the recent history of PODs and their impacts on both orthopedic patients and medical practice in the United States. From this, several solutions to PODs are offered and analyzed for their potential impacts. **Methods:** A systematic review was performed using inclusion criteria as follows: 1) POD-affiliated orthopedic surgical cases, 2) available data on implant cost, surgical cost, and/or surgical intervention rates, 3) POD-affiliated retrospective or prospective studies with at least 1 patient.

Key Results: Preliminary analysis of the existing grey literature demonstrated that currently, PODs both satisfy and dissatisfy ethical principles outlined in the AAOS. The business model of PODs leads to lower costing implants; however, higher rates of surgery utilization accompany this development. The legal history of PODs highlights adverse outcomes and attempts to further regulate this model. There are clear potential advantages and disadvantages to POD proliferation in the United States. Ultimately, the balance of this scale will determine the future for PODs in Orthopedic practice. This has implications for both the healthcare system and patients.

Conclusions: As PODs are still relatively new, they still have potential to alleviate rising costs to the US Healthcare System and orthopedic patients. Nevertheless, PODs continue to pose a large potential for abuse and mistreatment of patients. Future studies should look at the POD safety and efficacy. Finally, policymakers need to keep the protection of patients and surgeons in mind when defining regulations of the practice of PODs to ensure safe practices for all parties.

Limitations: As there is a general lack of data on this subject and each POD is unique, it may be difficult to generalize these conclusions to all PODs.

Knowledge and Attitudes of Individuals Experiencing Homelessness Regarding the Novel Coronavirus (COVID-19)

Christine Dobbin

Mentors: Mary Chang, MD, MPH, Department of Emergency Medicine
Patti Pagels, MPAS, PA-C, Family Medicine

Individuals experiencing homelessness are disproportionately impacted by global disasters, while concomitantly met with inconsistent access to crisis communication and mitigation resources. This study serves as a preliminary review of public health knowledge and attitudes among homeless populations during the novel coronavirus (COVID-19) pandemic. Residents of three Dallas County homeless shelters (n = 105) participated in this cross-sectional study via a quantitative and qualitative survey disseminated in April of 2020, one month after the county's first reported case of COVID-19. Results indicate high levels of awareness regarding the novel coronavirus, as 25% of respondents answered 80% of knowledge-based questions correctly and 50% answered 60% of knowledge-based questions correctly. A vast majority of respondents had access to a mask for personal use (96%), hand sanitizer (95%), and hand soap (99%), with 67% reporting the use of a mask at all times. While over half (55%) reported an interest in receiving a COVID-19 vaccine, a smaller proportion of respondents (36%) reported an increased interest in receiving a flu vaccine following the emergence of COVID-19. A significant proportion of those interested in a COVID-19 (64%) or flu vaccine (74%) were between the ages of 50-69. Additionally, levels of stress positively correlated with knowledge scores ($r = 0.96$; $p < 0.009$). Most respondents (89%) felt as though their current shelter had good precautions in place to prevent the spread of coronavirus. These findings suggest an appreciable cognizance of public health guidance pertaining to COVID-19 among participating shelter residents. Such heightened literacy within this distinctly high-risk and hard-to-reach population demonstrates the preclusive efficacy of shelters as key leaders in crisis management.

A Longitudinal Study Assessing the Factors that Influence Medical Students Attitudes towards Underserved Communities

Ashley Farley; Courtney Johnson; Katherine Cantu; Thanos Rossopoulos; & Shivani Raman

Mentors: Nora Gimpel, MD; Philip Day PhD, Department of Family Medicine

Context: Amidst a nation with immense health care needs, the number of physicians willing to work in underserved areas in the United States is decreasing. Studies utilizing the Medical Student Attitudes Towards Underserved (MSATU) questionnaire have shown a significant decrease in medical students' interests towards working with underserved populations as they matriculate through their medical education. More recent data collected by the AAMC suggests a more positive shift, with the percentage of graduating medical students who plan to care primarily for an underserved population increasing from 28.2% in 2015 to 36.1% in 2019. In order to support this positive change, it is important to understand what factors influence students throughout their training.

Objective: To examine medical student attitudes towards underserved populations, with a specific focus on variables and experiences that promote more positive attitudes towards working with this group.

Study Design: A questionnaire will be implemented that includes existing validated instruments to assess attitude and questions targeted towards common experiences during medical training. Participants will be surveyed at different time points during training, starting the first year of medical school with multiple time points extending into residency, to assess attitude changes over time. Population Studied: UT Southwestern Medical School students followed through medical school and onto residency programs.

Setting: UT Southwestern Medical School. Ongoing

Goals: We seek to identify factors that are common among participants with more favorable attitudes towards working with underserved populations. By identifying these experiences and learning components, medical educators would be able to tailor opportunities available to students during training in order to prepare the future healthcare workforce to respond passionately to complicated health care needs.

Preliminary Results: We administered the timepoint one surveys to the class of 2024 and received 66 responses (28% of the class) during the fall of 2020. Some early results analysis showed that nineteen students participated in research, nine students have had a global health experience, and nine students have had experience in a free clinic. We look forward to tracking how these factors and others correlate with attitudes towards working with underserved communities now and as students' progress through their medical education. We are in the process of receiving results from timepoint two which was administered to the class of 2023 in December 2020.

Anesthesia Exposure Factors during Medical School on Applying into an Anesthesiology Residency

Taylor Fitzgerald

Mentor: Alycia Wanat-Hawthorne, MD,

Department of Anesthesiology & Pain Management

Collaborators: Kathryn Jan, MPH; Anthony Q. Dao, BA; Amy Woods, MD; & Aditee Ambardekar, MD

Background: Between 2014 and 2019, the number of applicants into anesthesiology residency programs within the United States increased dramatically, with the number almost tripling at UT Southwestern (UTSW). Quantity and quality of exposure to a specialty may impact medical students' decisions in applying to a specialty; however, few studies have examined current influences.

Objectives: We sought to determine which factors, if any, between types, timing, and quantity of anesthesiology exposure affect students' decisions to apply to an anesthesiology residency program. **Methods:** This is a mixed-method study retrospectively examining quantitative and qualitative factors that potentially influence current UTSW students' decisions to apply to an anesthesiology residency program. Responses were collected through a secured REDCap survey which incorporated 5-point Likert scales, multiple choice, and free responses. The study population consists of students in UTSW's Classes of 2014 to 2021 applying into an anesthesiology residency.

Results: 11/14 UTSW Class of 2021 medical students applying to anesthesiology residency completed the survey. 72.7% of students became interested in anesthesiology during medical school. 100% noted use of simulation sessions with anesthesiologists during the pre-clerkship curriculum. Participants took an average of 1.8 anesthesiology electives. 81.8% participated in anesthesiology research, with each student working on an average of 2.56 projects. 54.5% of participants reported shadowing an anesthesiologist. 54.5% of students noted participation in the Anesthesiology Student Interest Group, with 33.3% of these participants holding a leadership position. All students strongly agree or agree that their experiences in anesthesiology were enhanced by the faculty and residents, they had an adequate amount of time with attending physicians and residents during clerkships, and they have a favorable view of anesthesiology.

Conclusions: Anesthesiology applicants of the 2021 Match Cycle appear to have largely become interested in anesthesiology during their pre-clerkship curriculum and explored multiple avenues of exposure to anesthesiology through shadowing, courses, and research. The participants provided favorable reviews of their interactions with anesthesiology courses, faculty, and residents. Next steps are to disseminate the survey to UTSW alumni and analyze the data as compared to the national trend to see if changes in the medical school curriculum can be associated with applicant number and positive perspectives.

Implementing Fitness and Nutrition Education in Urban, Underserved, Community-Based Montessori Schools: Challenges and Lessons Learned

Yue (Alice) Gao

Mentor: Nora Gimpel, MD, Department of Family Medicine

Collaborators: Philip Day, PhD & Tiffany B. Kindratt, PhD, MPH

Context: In Texas, 33% of children are overweight or obese. Childhood obesity is linked to adult obesity and a litany of other health issues. Many interventions have established health curriculum programs in traditional public schools to help children maintain healthier weights and lifestyles, but little literature exists for their use in Montessori education. In light of this, UT Southwestern partnered with a Montessori network to meet the health needs of their community.

Objective: To implement fitness and nutrition curricula adherent to Montessori principles and evidence-based practices, and determine avenues for improvement based on lessons learned.

Human Subjects Review: Non-regulated research. Design: Cross-sectional needs assessment was conducted for health concerns of Lumin community. Stakeholders collaborated to develop fitness and nutrition curricula for elementary students, while other components (ex. health fairs, parent education classes) were also incorporated.

Setting: Lumin Education is a network of Montessori public elementary schools that serve mostly Hispanic low-to middle-income families in Dallas, Texas. All participants are Lumin Education students from 2 campuses. Program implemented in partnership with UT Southwestern Department of Family and Community Medicine. Intervention/Instrument: Fitness and nutrition curricula based on Coordinated Approach to Child Health curriculum, adjusted to reflect Montessori principles.

Main Outcome Measures: Pre- and post-tests of fitness ability and nutrition knowledge to measure program impact. Evaluation of all records and interviews of key stakeholders to assess program process and to explore areas of refinement.

Anticipated Results: This program has received positive feedback from the Lumin community. Curricula follows Montessori principles by avoiding disruption of self-directed learning, giving students a choice of fitness activities, and incorporating discussions and hands-on tasks into nutrition lessons to spark students' interests. This effort has faced challenges, such as issues with consistent communication between stakeholders, garnering community interest for secondary program activities, and recruiting student volunteers.

Conclusions: This partnership based on CBPR practices has been able to implement and sustain a fitness and nutrition program that follows Montessori principles, and relies mainly on faculty and student volunteer contributions.

Developing a Student-Lead Patient Navigator Program for Individuals Experiencing Homelessness

Isabel Gonzalez

Mentor: Nora Gimpel, MD, Department of Family Medicine

Collaborators: Nicholas Campalans; Umaru Barrie; Thanos Rossopoulos; Alison Liu, MPH; Natalie Bonner, MS; Brayden Seal; Claire Abijay; Arlen Suarez; Ashlyn Lafferty; Kyle Swartz; Philip Day, PhD; & Patti Pagels, MPAS, PA

Context: People experiencing homelessness encounter complicated barriers to medical care while facing greater burdens of disease. Patient navigation improves health outcomes for those with chronic illnesses experiencing homelessness. Additionally, patient navigation as a healthcare trainee promotes self-identification as a change agent. However, opportunities for student engagement in patient navigation for people experiencing homelessness are limited.

Objective: To describe the development of a new student-led patient navigator program (PNP) for patients experiencing homelessness.

Study Design: A PNP that provides navigation services at free in-shelter clinics for people experiencing homelessness was designed using a multi-pronged development structure over a 9-month period. An initial group of students met with community stakeholders to outline primary health-related needs and barriers faced by individuals experiencing homelessness. A mission and vision were then created, from which the following programmatic components were identified: curriculum, navigation system, resource database, quality improvement and research, and marketing and communications. Components were assigned leaders to generate timelines, specific aims, and details of operation and substructure. Recruitment of a dedicated leadership team was accomplished by engaging peer networks via e-mail and in-person meetings. Reporting structures were built to ensure accountability and effective coordination between teams.

Results: By July of 2020, over 40 students and numerous faculty from UT Southwestern Medical School and Health Professions programs were engaged in development of the PNP. A 3-month long curriculum was built in which 47 students enrolled in fall 2020. A year-long navigator fellowship experience was developed that enables iterative cycles of longitudinal patient navigation, pairing student navigator teams with clients for 3 15-week cycles. An online resource database of over 110 community, social service, and healthcare groups was created. Assessment tools and infrastructure were built to monitor client and learner-related outcomes.

Conclusion: Guided by a robust developmental structure, this program plans to bridge critical gaps in care for individuals experiencing homelessness, link curricular experiences with service-learning opportunities for health professions students, and generate additional insights into the optimization and implementation of this PNP.

Effect of Experiential Learning in Smoking Cessation for Homeless Individuals on Medical Students' Knowledge and Perceptions

Lin Guo

Mentor: Philip Day, PhD, Department of Family Medicine
Collaborators: Thanos Rossopoulos; Hayden Mbroh, PhD;
Patti Pagels, MPAS PA-C; & Victoria Udezi, MD

Context: Educational opportunities in smoking cessation and delivering care to underserved populations are often ancillary in standard medical school curricula. Experiential learning in these areas may advance learners' understanding and inclinations towards community health.

Objective: To assess the impact of volunteering for a homeless smoking cessation program on medical students' specialty interests, smoking cessation knowledge and attitudes, and willingness to work with the underserved.

Study Design: Longitudinal, quantitative survey measuring the knowledge and perspectives of medical student volunteers at the beginning and at the end of their involvement in a homeless smoking cessation program. Setting: Participants are 13 self-selected UT Southwestern student volunteers who manage a weekly smoking cessation class for homeless men residing at Union Gospel Mission's Calvert Place shelter in Dallas, TX.

Instrument: A 78-item Likert scale survey gauging attitudes towards the underserved, specialty preference, and confidence delivering smoking cessation services is administered at the beginning and at the end of volunteer involvement.

Outcome Measures: Numerical ratings on the Volunteer Functions Inventory (VFI), the Desire to Work with Underserved Population Scale, medical specialty ranking, the Smoking Knowledge, Attitudes, and Practices (S-KAP) measure, and Self-Efficacy score.

Results: Pooled 2018-2019 and 2019-2020 cohort data reveal high baseline desire to work with underserved populations and altruism that does not change significantly after 1 year of service. Self-efficacy and knowledge scores in delivering smoking cessation education, however, improve ($p < 0.05$). While interest in primary care did not change significantly with service, an observed decrease in preference for Basic Science Research after 1 year may reflect clinical learning and development.

Conclusions: The results of this study can help Family Medicine departments enhance medical school education in smoking cessation and healthcare for the underserved. The results also elucidate the impact of experiential learning and volunteer work on medical student's interest and attitudes towards primary care.

Assessing the Institutional Impact of Student-Run Free Clinics at an Academic Medical Center

Deena Habazi

Mentor: Nora Gimpel, MD, Department of Family Medicine

Collaborators: Nikita Agarwal

Background: Student-Run Free Clinics (SRFCs) provide essential primary care to underserved populations, while also offering service-learning and leadership opportunities for students. Unlike many community organizations, SRFCs nationwide do not typically release regular impact reports displaying achievements and future goals. The University of Texas Southwestern Medical Center (UTSW) in Dallas, Texas has partnered with community organizations to form four SRFCs, which have played a critical role in student learning, community involvement, and patient care since 2006. The purpose of this project is to assess and report the institutional impact of these SRFCs on students and faculty and describe challenges and visions for these clinics in a formalized impact report.

Methods: Structured 10-question interviews were performed in May-June 2020 by two interviewers via email or video meetings with 16 total students and faculty involved with four SRFCs at UTSW. Questions explored interviewees' involvement with the clinics, their perception of the SRFCs' impacts on the academic institution, challenges faced, and future visions. Video interviews were transcribed verbatim from recordings. Quantitative data about students' services was collected from sign-up forms.

Results: From 2016-2020, 16,186 student volunteer hours were recorded across all four clinics, with 883 unique students participating. On average, 3,237 hours were dedicated to serving the SRFCs per year, reaching upwards of 4,539 hours in 2019. Student themes included the ability to practice clinical medicine early in the medical curriculum and understand the outpatient community clinic setting. Faculty interviews described the opportunity to mentor students in a welcoming teaching environment and empower students to take leadership roles in the clinical setting. Both groups shared a common desire and satisfaction with serving the local underserved population. Shared challenges and visions for the clinics include better time management, increasing clinician engagement, and focusing on sustainability.

Conclusion: These findings illustrate the positive experiences and outcomes from participation in SRFCs by students and faculty, as well as the high level of interest in the student body. By putting together an impact report, SRFCs nationwide may benefit from increased institutional exposure and insight into improving the clinics for the community and those involved.

Key Attributes of a Medical Learning Community Mentor: The Mentee Perspective

Waqas Haque

Mentor: Carol North, MD, MPE, Department of Psychiatry

Collaborators: Jennifer Coias, MD; E. Whitney Pollio, EdD, MSN, RN; Rana Yazdani, MD; James M. Wagner, MD, MSc; & David E. Pollio, PhD, MSW

Purpose: To assess the elements necessary to be a successful learning community (LC) mentor to medical students from the mentee's perspective.

Method: This qualitative study analyzed four focus group discussions lasting 45 to 90 minutes conducted at University of Texas Southwestern Medical School, which has an established LC, in the year 2018. The groups included 14 pre-clerkship students and 8 clerkship students. Investigators evaluated transcriptions of the focus group discussions using ATLAS.ti software.

Results: Three overarching categories of discussion emerged from the group discussions: 1) Relationship Competence, 2) Teaching Competence, and 3) Ethical and Compassionate Medical Practice Competence. Relationship Competence themes included "walk with me", relationship is most important, and one-on-one. Teaching Competence themes included above and beyond, recognize and address mentor limitations, and safe and enriching environment. Ethical and Compassionate Medical Practice Competence themes included ethical decision making and compassionate care for diverse patient populations. Mentees focused on various aspects of the mentor-mentee relationship as the single most essential competence.

Conclusions: Themes mentees discussed as important qualities of a successful mentor may denote qualities to be prioritized in faculty development and mentor recruitment. Future studies could investigate how the LC environment informs former medical students and promotes patient outcomes.

Dermatology Journal Editors Accepting Pharmaceutical Payments: An Analysis of the Open Payments Database, 2013 to 2018

Waqas Haque

Mentor: David Hsieh, MD, Department of Internal Medicine

Collaborators: Eman Haque

Introduction: Pharmaceutical payments may impact interpretation of clinical research and prescribing patterns of physicians. A growing area of research has similarly uncovered industry relationships among dermatologists in various contexts. Journal editors hold significant impact on disseminating knowledge and highlighting practice changing evidence. Accordingly, we sought to examine relationships with industry among journal editors who accepted pharmaceutical payments in leading dermatology journals.

Methods: We assessed the seven American journals among the leading 20 dermatology journals as determined by impact factor. This was done in accordance with previous studies observing that industry payments are concentrated among editors of high impact factor journals in the field. Editor names and position (Chief, Associate, or Assistant) were extracted from journal websites, and were matched with the CMS Open Payments “general payment” dataset for all available years from 2013 to 2018.

Results: This was a cross-sectional analysis of seven dermatology journals and 571 total editors, 329 of whom were American-licensed physicians and thereby eligible to appear in the Open Payments website. Among these editors, 218 (66.3%) received industry payments totaling \$21,952,402, and the mean and median dollar value of payments per editor was \$100,699 and \$3,638 (interquartile range: \$364-\$57,108). The mean and median number of payments per editor respectively was 133 and 28 (interquartile range: 5-151). The largest dollar value of payments was attributed to consulting fees (36.53%), compensation for speaking (34.71%), and travel and lodging (10.27%). The 62 Associate Editors in the sample had a mean (median) dollar value of \$89,343 (\$1,856) in payments per editor, respectively. In contrast, 154 Assistant editors received a mean (median) value of \$104,016 (\$4,646) in dollar value per editor.

Discussion: This study establishes the presence of substantial financial relationships with industry among editors of leading dermatology journals. Limitations of our study include the cross-sectional design, limited journals queried, and the possibility that journal editors may not have held positions during the period of inquiry (2013-2018). We encourage journals to refine their COI policies to promote full disclosure of editors.

Improving Utilization of Peritoneal Dialysis Amongst Undocumented Immigrants at Parkland Hospital

Maria Ilyas

Mentor: Joseph Berger, MD, Department of Internal Medicine- Nephrology

Background: Patients with ESRD comprise less than 1% of the Medicare population, however they are responsible for 7% of all Medicare spending. Hemodialysis (HD) and peritoneal dialysis (PD) have equivalent clinical outcomes; however, PD is more cost-effective and is associated with improved patient quality of life. Undocumented immigrants, previously ineligible for dialysis, now qualify for non-traditional funding and are suspected to have low PD utilization.

Objectives: Establish baseline utilization rate of PD amongst patients at Parkland stratified by funding status, design an intervention to improve utilization of PD, and assess impacts of interventions on PD utilization and patient understanding of dialysis modalities.

Methods: The intervention was designed by using interview data to identify patient and provider barriers to selection of PD and stratifying the top failure causes through failure modes and effects analysis (FMEA). PD utilization rates before and after the intervention were determined through a retrospective chart review. The impact of the intervention on patient understanding was assessed with patient surveys.

Results: The chosen intervention was to revise educational class materials to address common misconceptions. The existing education class underwent revisions in March 2020. Prior to the class update, there was a discrepancy in utilization rates of PD versus HD in the traditionally and non-traditionally funded patient groups. The utilization rate for PD was 14.3% in the non-traditionally funded group, compared to a 21.0% utilization rate in the traditionally funded group. After the updated class was implemented, PD utilization in the non-traditionally funded group increased to 26.1%, and to 22.9% in the traditionally funded group. Preliminary data from post-class patient surveys suggests that patients with a better understanding of class material are more likely to make an earlier selection of a dialysis modality.

Conclusions and Limitations: Addressing patient misconceptions about peritoneal dialysis by updating educational materials is an intervention that can increase the utilization rates of PD in patients with non-traditional funding. External factors could have played a role in increased PD utilization, more survey data is needed to establish a more robust correlation.

Applying an LDL-C Threshold-Based Approach to Identify Individuals with Familial Hypercholesterolemia

Reena Jasani

Mentor: Amit Khera, MD, MSc, Department of Internal Medicine- Cardiology

Collaborators: Zahid Ahmad, MD; Ruth Schneider, APN, RN; Carol Tujardon, RN; & Mujeeb Basit, MD, MMSc

Background: Familial hypercholesterolemia (FH) is an inherited disorder associated with increased LDL-C and risk of premature coronary heart disease, for which early detection and management is crucial. However, FH remains underdiagnosed and undertreated. We aimed to evaluate the LDL-C threshold-based approach to identifying patients with FH to determine the optimal LDL-C range for FH consideration.

Methods: Individuals from UT Southwestern Medical Center with an LDL-C level ≥ 190 mg/dL at any time were enrolled in an FH registry. These 5,786 patients were divided into four categories of LDL-C: 190–219, 220–249, 250–299, and ≥ 300 mg/dL. From each category, 100 individuals were randomly selected for manual chart review to determine 1) the presence of secondary causes of dyslipidemia and 2) diagnosis of possible/definite FH by modified Simon Broome criteria and 3) probable/definite FH by modified Dutch Lipid Clinic Network (DLCN) criteria.

Results: Of the 400 individuals with an LDL-C level ≥ 190 mg/dL (mean age 52 years $\pm$ 14), the presence of secondary causes increased across each LDL-C category ($p < 0.001$) with the greatest prevalence in those ≥ 300 mg/dL (52%). The prevalence of FH also varied by LDL-C category, with the highest prevalence of FH by Simon Broome criteria in the 220–249 mg/dL category (52%) and by DLCN criteria in the 250–299 mg/dL category (46%).

Conclusions: Among those with LDL-C ≥ 190 mg/dL, the prevalence of secondary causes increases with higher LDL-C, while the diagnosis of FH has a parabolic relationship. Patients with intermediate LDL-C (220–299 mg/dL) may be the optimal group to prioritize for FH screening.

Evaluating the Effectiveness of a Student-Run Smoking Cessation Clinic

Brian Lue

Mentor: Philip Day, PhD, Department of Family Medicine

Collaborators: Priya Garigipati, BS; Thanos Rossopoulos, BS; Jennifer Min, BS; Nora Gimpel, MD; & Patti Pagels, MPAS, PA

Background: Seventy-five percent of the homeless population in the United States are habitual smokers. UT Southwestern medical students are addressing this issue via a smoking cessation program for the homeless in Dallas, Texas. Program evaluation would inform the effectiveness of student education in delivering this curriculum.

Methods: Students lead weekly smoking cessation classes and individual coaching sessions. Addiction levels, willingness to quit, and CO levels are measured weekly. Paired t-tests in these categories, along with class attendance, retention, and use of NRT are measured.

Results: Preliminary data on 270 individual participants through February 2020 reveal favorable changes in group means between first and follow up visit. Completed analysis of 120 participants in 2018 demonstrate attendees of multiple sessions reducing tobacco usage. Mean values for all measures decreased for each of the first four sessions that a client attended. The average number of sessions clients attended increased to 2.39 in 2018 from 1.24 in 2017. Additional data collection is ongoing.

Conclusion: Measures of class effectiveness continue to improve yearly. Results show that medical students are effective in supporting homeless individuals seeking to quit smoking.

A

Assessing Barriers to Smoking Cessation and Level of Long-Term Health Impacts of Smoking Among Homeless Population

Brian Lue

Mentor: Philip Day, PhD, Department of Family Medicine

Collaborators: Priya Garigipati, BS; Thanos Rossopoulos, BS; Jennifer Min, BS; Nora Gimpel, MD; & Patti Pagels, MPAS, PA

Background: Psychosocial barriers hinder smoking cessation, despite desire to quit. UT Southwestern medical students address barriers at a local clinic, but an analysis of barriers and knowledge of long-term health impacts of smoking has not been done.

Methods: Surveys were obtained via scales of self-reported addiction, readiness to quit, and CO. Data between January 2018 and February 2020 (n=270) gauged cessation, but client learning and social factors need analysis. Unpaired t-tests in these categories along with self-reported barriers to quit, quality of life, and awareness of related health impacts are assessed. Data collection is ongoing.

Results: Preliminary data show improvement in understanding of health effects in return clients, but further analysis is needed. Mixed-method analysis of biopsychosocial factors would show areas for improvement.

Conclusion: Improvement in retention and awareness of health effects are seen. These measures among clients with and without NRT treatment access and emotional support require analysis to improve services offered.

Female Investigators, by-line Recognition and Global Sex Disparities in Cooperative Oncology Trials

Maishara Muquith

Mentor: David Hsieh, MD, Department of Internal Medicine

Purpose: Despite an increasing number of women in medicine, female disparities in academic medicine are readily apparent in authorship, leadership positions, pay and NIH funding, and recognition by scientific awards. Identifying specific barriers to the advancement of female in academic medicine is essential to remedy such inequalities. Given the importance of clinical trial research in the professional development of oncology investigators, we examined the prevalence of US and international female authors and investigators in large pivotal cancer trials.

Methods: All phase 3 oncology clinical trials published 4 major journals (NEJM, Lancet, Lancet Oncology, JAMA) between 2019 and 2020 were analyzed. The primary outcome measure was the proportion of female investigators and authors.

Results: We analyzed 97 clinical trials involving 62 countries, 2,334 authors, and 13,788 investigators. The percentage of female authors was 22% while the percentage of female investigators was 28%. 22% and 20% of first and last authors respectively were female. Among countries with greater than 10 investigators across all trials, the proportion of female investigators ranged from 4% (Japan) to 79% (Philippines). For US investigators, the proportion of female investigators was 27%. Among 35 countries with sufficient workforce data, there was a positive correlation between the proportion of female physicians and the proportion of female investigators ($r=0.63$, $p < 0.01$). However, the average proportion of female investigators in these countries (31%) was significantly lower than the average proportion of female physicians (46%).

Conclusion: Females are underrepresented among first and last authors in pivotal phase 3 oncology trials. Females are also underrepresented as investigators across almost all nations assessed, which cannot be attributed to the proportion of female physicians in individual countries. The greater number of female investigators than female authors suggest that there may be sex bias in the recognition of research efforts in publication by-lines. Since prior research shows that females are underrepresented in leadership committees in medicine, including in oncology, one avenue that may perpetuate this sex disparity is through a lack of female sponsorship and mentorship. This creates a vicious cycle of continuing sex disparities. Further exploration of barriers to the participation of female investigators in cancer trial research and scientific recognition is warranted.

Anesthesia Management on Dispositions for Pediatric Patients after Perioperative CPR Events

Umer Nadir

Mentor: LyTorre Vidaurri, MD, MBA,
Department of Anesthesiology & Pain Management

Per the Pediatric Perioperative Cardiac Arrest Registry (POCA), nearly 20% of anesthesia-related pediatric cardiac arrests occur during emergence or recovery from anesthesia. Patients recovering from anesthesia are at risk for serious physiologic compromise due to the proximity to the surgical procedure, residual effects of anesthetic and analgesic medications, and underlying or unknown risk factors. Beecher and Todd's founding study identified an increased risk of perioperative cardiac arrest in children compared with adults, and literature has identified multiple factors associated additional risk for perioperative cardiac arrest, including age (< 6 months), American Society of Anesthesiology (ASA) Physical Status of 3 or greater, and whether or not the surgery was emergent. In addition to higher risks of cardiac arrests, previous literature has identified multiple factors related to harm and mortality after a cardiac arrest event. Factors such as ASA physical status of 3 or greater, a known cardiac origin of arrest, the time of day at which the arrest occurred, and whether or not the surgery was emergent were related to a higher risk of mortality after a cardiac arrest event.

Utilizing a thorough review of previous literature, this guideline provides a framework for dispositioning patients based on age, etiology of the cardiac arrest, ASA physical status, presence of comorbidities, time of day, emergency status, and whether or not the patient was reintubated. Based on the listed information, a recommendation on disposition will be made in order to reduce variations in dispositions of patients that have undergone a perioperative CPR event.

This guideline was created with an analysis of the Wake Up Safe and POCA databases. In a study by Christensen et al, Age<6 months, ASA Physical Status ≥3, and ASA Emergency Status were significantly correlated with cardiac arrest. Analysis of the factors associated with mortality after arrest showed that ASA Physical Status and Emergency Status were significant. "After hours" arrests, on nights or weekends, carried a more than 2-fold risk for mortality, therefore, we have included "After Hours" as a criterion for admission. The American Heart Association's review article, Pediatric Post-Cardiac Arrest Care, identified that etiology of the arrest had a strong correlation with morbidity, especially when the etiology was cardiac or unidentifiable in nature, and thus, those etiologies were added to the admission criteria. Finally, medication-related problems were also identified by Morray, et. Al. as a frequent cause of anesthesia-related cardiac arrest, and thus we have included medication-related events as a high-risk identifier.

Implementation and Evaluation of Pilot Program Providing Patient Navigation to Individuals Experiencing Homelessness

Akshat Patel

Mentor: Nora Gimpel, MD, Department of Family Medicine

Collaborators: Alison Liu, Brayden Seal, Akshat Patel, Tri Pham, Kevin Ma, Natalie Bonner, Ashlyn Lafferty, Nicholas Campalans, Thanos Rossopoulos, Umaru Barrie, Philip Day, PhD, & Patti Pagels, MPAS, PA-C

Background: Individuals experiencing homelessness demonstrate higher incidence of disease, limited access to healthcare, and overall poorer health outcomes. The unique obstacles faced by homeless populations require novel solutions in order to reduce barriers to care and ensure timely delivery of health services. A novel student-led Patient Navigator Program (PNP) connects persons experiencing homelessness to community resources and services specific to each client's goals and health needs. A pilot is underway to evaluate program design and readiness for implementation on a large scale.

Methods: The pilot program is currently underway and will be completed in November. A team of four medical student patient navigators are working with one client and their family to develop six SMART (specific, measurable, actionable, realistic, and time-bound) goals based on the client's social or health-related needs, identified by a pre-survey. The primary outcomes include the number of successful patient-navigator encounters and completion of SMART goals. Secondary outcomes include changes in patient attitudes and self-efficacy scores, as measured by pre- and post-surveys.

Results: As of 11/8/2020, the team has documented 13 total direct client-navigator encounters over the course of 14 weeks, in addition to weekly electronic communication and community resource management (Table 1). Of note, prior to PNP engagement, the client reported three unsuccessful attempts to apply for healthcare financial assistance, which we were able to achieve by week 6 of the cycle, linking her to primary care for "the first time in many years." Post-survey is incomplete and survey results have not been analyzed at this time.

Conclusion: A core challenge in achieving health equity is addressing the specific barriers to care faced by individuals experiencing homelessness. The pilot of PNP has provided insight into the future implementation of a sustainable community-based program to improve health outcomes among individuals experiencing homelessness. The program has expanded and will now have 8 teams working with clients throughout the spring semester.

Efficacy and Safety of Artemether-lumefantrine to Treat Uncomplicated Plasmodium Falciparum after a Decade of its use as First-Line Antimalarial Treatment in Manibia

Hiren Patel

Mentor: Michelle Hsiang, MD, Department of Pediatrics & Infectious Disease

Collaborators: Henry Ntuku, MD, PhD; Elias Duarte; Brooke Whittemore; Lucille Dausab; Petrina Uusiku; Stark Katokele; Bryan Greenhouse; Davis Mumbengegwi; Roly Gosling; & Michelle S. Hsiang, M

Since 2005, artemether-lumefantrine (AL) has been the first-line treatment against uncomplicated Plasmodium falciparum malaria in Namibia, a low transmission setting in southern Africa. The World Health Organization regularly monitors and recommends antimalarial drugs in order to contain the rapid spread of the disease and for the early detection of drug resistant strains of the parasite. To assess the efficacy of AL in Namibia, we conducted a secondary analysis of a longitudinal cohort study conducted in the Zambezi region. Febrile, symptomatic patients reporting to health facilities that were tested positive on the rapid diagnostic test were included in the study. A total of 44 patients were observed and given a 3-day course of AL and single low dose of primaquine as recommended by the WHO. At Day 7, 100% of the patients had successfully cleared the infection. 95% (42/44) of the participants had an adequate clinical and parasitological response with 2 patients presenting febrile at a follow-up visit classifying them as having late clinical failure, but likely due to non-malarial etiologies since there was still an adequate parasitological response. Our findings support the continued use of AL as the first-line antimalarial drug for the treatment of uncomplicated P. falciparum malaria in Namibia.

GIS Mapping of a County Hospital Emergency Department Patients During the COVID-19 Pandemic

Arifa Plumber

Mentor: Mary Chang, MD, MPH , Department of Emergency Medicine

Collaborators: Deborah Diercks, MD, MSc; Jeffery Metzger, MD; & Alexander Kirk, MD

Background: The first presumed positive case of SARS-CoV-2 (which causes COVID-19) in Dallas was reported on March 10, 2020. The following day, the World Health Organization deemed the spread sufficient to be termed a pandemic. This event precipitated business and school closures along with the implementation of physical distancing measures, which culminated in a Shelter-in-Place Order issued for Dallas County. The effect of COVID-19 and the Shelter-in-Place Order on emergency department (ED) visits by location is unknown.

Methods: This retrospective chart review examines whether there was a quantitative decrease in patient visits to a high-volume Dallas County hospital ED and whether this change occurred uniformly across all Dallas zip codes. The inclusion criterion was any Dallas resident who visited the hospital ED or urgent care, and there was no exclusion criterion. We mapped daily patient visits by zip code for three phases: Phase 1 was defined as the three months preceding the first COVID-19 case's announcement in Dallas, Phase 2 began with the first case's announcement, and Phase 3 began when the Shelter-in-Place Order was issued for Dallas until April 21, 2020. We compared this data to records over the same time period from the previous year to control for seasonal variation in the absence of a pandemic.

Results: There were 52,845 ED patient visits included in this study. The results indicate that a statistically significant decrease in patient visits occurred in all zip codes during the sample period: 46% between Phase 1 and 3 ($p < 0.0005$), as well as an overall decrease in visits during Phase 2 (11%, $p < 0.0005$) and Phase 3 (44%, $p < 0.0001$) compared to data from the previous year. The geographic distribution of visits indicate that most zip codes saw a reduction in visits over the sample period, especially zip codes further from the ED.

Conclusion: Overall, a significant decrease in ED visits per zip code was observed relative to a non-pandemic year, suggesting that the virus and Shelter-in-Place Order deterred patients from accessing healthcare. These results could have implications for future pandemic public health messaging and targeted outreach to communities with barriers to healthcare access.

Assessing Development of Clinical Reasoning in the Pre-clinical Period

Cayenne Price

Mentor: Thomas Dalton, MD, Department of Internal Medicine

Background: While clinical reasoning (CR) curriculum is a vital component of medical education, it remains one of the most challenging skills to teach and assess. Studies have demonstrated the effectiveness of incorporating case-based CR courses into pre-clinical curriculum; however, there is no consensus on the most successful method of delivery. We aim to determine whether and to what extent our students' CR skills are improving throughout the pre-clinical period.

Methods: We used a retrospective observational cohort design. 125 medical students enrolled in the pre-clinical curriculum in 2019 formed our cohort and engaged in six case-based learning (CBL) activities throughout the year. During each activity, students were presented with a virtual patient and instructed to complete the assessment and plan portion of a note. We used progression of these notes to assess improvement of CR. For assessment methodology, we used a modified version of a previously validated rubric coupled with scoring guides validated by expert faculty across various specialties.

Results: In comparison to the initial CBL activity, scores for differential diagnosis, explained well, alternatives well considered, decision-making skills, and overall clinical reasoning fell significantly ($p < 0.05$). The score for well-reasoned plan also fell but was not found to be significant ($p = 0.09$). Scores for interpretive summary and diagnostic reasoning skills improved slightly, however, were not found to be significant ($p = 0.052$ and $p = 0.17$ respectively). Most frequent overall score in the initial and final CBL activities was 16 and 18, respectively.

Discussion: In contradiction to our hypothesis, our students' documentation did not exhibit improvement in CR skills throughout the pre-clinical curriculum. The following factors may have contributed to this result:

- Inopportune timing of the activity during finals week
- Low-stakes nature of the activity due to lack of grading component
- Need for improvement in instruction and communicated expectations for the CBL activity

Given that the goal of our CBL sessions are, in part, to improve early CR skills, this data serves as evidence that improvements are needed in our curriculum to meet our educational aims and grow students' CR skills. However, we do feel that we have found a fair and reproducible method of assessing early clinical reasoning as evidenced by students' clinical notes in these simulated cases.

Conclusion: While fair assessment was achieved, further study is warranted to improve our CBL curriculum to accomplish the goal of effectively teaching CR during the pre-clinical period.

Universal Screening for Social Determinants of Health During Pregnancy using the Stress in Pregnancy Screen (SIPS) Tool: A Pilot Study in a Chicago Federally Qualified Health Center

Sarah Prickett

Mentor: Rebecca Eary, DO, Department of Family Medicine
Collaborators: Lauren Harriett, DO, MBA; Janedellie Romero, BA;
Rebecca Maddrell, MD; Lauren Keenan-Devlin, PhD, MPH;
Ann Borders, MD, MSc, MPH

Objective: Social determinants of health are potent predictors of adverse pregnancy outcomes and confer disproportionate disadvantage to individuals of minority groups and lower socioeconomic status. The Stress in Pregnancy Screen (SIPS) is a comprehensive and categorical tool designed to identify social factors which contribute to stress in pregnancy. The objective of this study was to implement SIPS at a Federally Qualified Health Center (FQHC) while gathering descriptive data from patients during their prenatal visits and connecting patients with targeted resources aimed at reducing reported stress.

Methods: The SIPS tool consists of 5 sections and was developed from a combination of previously validated screening instruments addressing 1) perceived stress, 2) relationship and family stress, 3) domestic violence, 4) substance abuse, and 5) financial stress. An actionable map accompanied the SIPS tool to guide clinicians scoring and patient referral to clinic- and community-specific resources. The SIPS tool was offered to pregnant patients seeking prenatal care at a Chicago FQHC between April 2018 and March 2019. Patients who consented and completed the tool were connected with the appropriate resources based on calculated score. Descriptive statistics were performed.

Results: Of 137 eligible patients, 135 (98%) consented and completed the SIPS tool. The majority of the sample identified as Non-Hispanic Black (87%), under the age of 35 (92%), and reported public or no insurance (87%). 91% of patients scored positive in at least one area of stress and were linked to appropriate resources. Most women who completed the tool (80%) reported stress in at least two categories with the most common being substance abuse and relationship and family stress.

Conclusions: The SIPS tool and actionable map provide a comprehensive method for capturing the burden of stress caused by social determinants of health and facilitating linkage to point of care interventions during pregnancy. Patients' responses indicate high level challenges patients face during pregnancy that may affect health and birth outcomes. This screening and scoring system is feasible in the clinical setting and can be modified and adapted to the resources available.

Creating a Covid-19 Telemedicine Elective

Mathews Roy; Anjanya Singh; Imran Murtuza; & Isabel Weiss

Mentor: Gary Reed, MD, Department of Internal Medicine

Collaborator: Carol Croft MD

Background: UT Southwestern Medical School suspended all in-person activities of medical students on March 17, 2020. Meanwhile, Covid-19 positive patients can experience worsening symptoms 7-10 days after symptom onset. If they are discharged from the hospital before that window of time without follow up, they may experience severe complications. In Dallas, Texas, patients discharged from the William P. Clements Hospital did not have an established follow up process. Thus, there was a demand for follow up on these patients and a supply of medical students wanting to engage with them, so a telemedicine elective was created.

Methods: The elective created consisted of incoming 3rd and 4th year medical student volunteers who received a call schedule, call script, patient assignments, flowsheet and note in Epic for documentation, and supervising attendings whom they had virtual rounds with. They also received SBAR handover education and Telehealth education to improve their patient care rounding skills and education about the pandemic and the most up to date CDC guidelines. They also visited a telehealth multispecialty COVID clinic as they would during their outpatient medical clerkship.

Interventions: The pandemic is rapidly evolving so rapid cycle PDSAs were employed to improve and standardize the protocol. All components of the elective from April through June underwent multiple improvements to stay up to date and in line with the CDC recommendations. A process map, FMEA, Driver Diagram were created to determine these interventions.

Results: Results regarding medical education as well as patient outcomes were analyzed from data collected through student surveys and patient chart reviews. Statistically significant results from the student surveys were an improvement of feeling informed about the current state of COVID-19 and in feeling comfortable interviewing patients over the phone from the beginning to the end of the elective. For patients it was the average length of stay was increased for males, chest x-rays with respiratory symptoms, and patients discharged to a nursing home/acute care living facility. The students improved at identifying which patients needed to be escalated to the ED and were also able to make more successful calls from April to May/June.

Conclusions: The strength of this elective is in providing students with an opportunity to have patient care during a time when others could not. The goal is to spread this telemedicine format to other components of the medical school curriculum as this pandemic continues to evolve.

Cultivating Medical Student Interest in Neuroscience Specialties Through a Multi-Modal Procedure Workshop

Collin Sanderson

Mentor: Hina Dave, MD, Department of Neurology

Collaborator: Khadijah Mazhar

Introduction: As the worldwide burden of neurologic and psychiatric disorders increases, the predicted shortfall of physicians in these fields continues to grow beyond current training rates. It is well documented that medical students often possess stigmatizing beliefs towards neuroscience-based careers. Preclinical medical education is where many medical students begin laying the foundation for interest in specialty choices, and at some medical schools it may be their only direct exposure. Thus, providing preclinical students with exposure to unique aspects of clinical neuroscience, including procedure-based specialties, is a possible avenue for increasing student interest.

Methods: We organized a hands-on multi-modal procedure workshop for preclinical medical students to learn exam skills and procedures used by adult/pediatric neurologists, neurosurgeons, and psychiatrists. The eleven different booths were run by faculty, residents, fellows, and technicians. Student attendance was optional. The workshop was situated next to a required student activity for convenience and to encourage attendance. Most of the booths involved some brief education as well as time for the students to take part in or practice the procedure. Students were free to move between booths according to their time and interests. Students who participated completed a survey on their interest in the relevant specialties before and after the workshop, and the helpfulness of each booth in understanding the procedure.

Results: 111 students attended the workshop, and 104 (93.6%) filled out the post-survey. 37 (35.6%) reported an increased interest in a career in the clinical neurosciences after the workshop. Of the 66 who reported no change in interest, 23 (34.8%) reported that they were already “very interested” or “definitely interested” before the workshop. The number of students who reported being “very interested” in the clinical neurosciences before and after the workshop increased from 27 to 43 students, respectively (59.2% increase), $X^2(1, N = 104) = 5.52, p = .019$. Only 1 student reported a negative change in interest.

Conclusion: A single hands-on procedure workshop significantly improved medical student interest in the clinical neurosciences. Although its impact on future specialty choice is unclear, enjoyable preclinical experiences such as a procedure workshop may be a useful addition to medical school curricula to foster interest in neurology and the clinical neurosciences.

Emergency Department Evaluation of Patients with Vertigo: HINTS and Neuroimaging

Collin Sanderson

Mentor: Shin Beh, MD, Department of Neurology

Objective: This study seeks to measure the current provider use of proven techniques for evaluating patients with dizziness in the ED to determine the kind of practice gap that exists there.

Background: Dizziness comprises approximately 4% of US ED visits. While most causes of vertigo are peripheral, central causes of vertigo are not uncommon, such as posterior circulation strokes which result in significant morbidity and mortality. Multiple studies have confirmed that a targeted history and examination including symptom timing, triggers, duration, and the HINTS exam (head impulse test, nystagmus, ocular alignment), can help distinguish peripheral from central causes of vertigo. This study investigated how elements of this approach were implemented by different providers in the ED setting.

Design/Methods: A retrospective review was performed on 2,017 patients presenting for urgent and emergent evaluation of dizziness in 2017. Presentations with non-neurologic etiologies (e.g. chest pain, hypoglycemia), and multiple presentations by the same patient were excluded. We investigated if providers inquired about timing (acute monophasic or acute episodic), duration, triggers, and if they performed the HINTS exam, positional testing, and neuroimaging. Chi-square tests were performed comparing the proportion of residents, attendings, and advanced practice providers (APPs) who performed each element.

Results: All pertinent elements of the history were obtained by only 12.7% of attendings, 20.2% of residents, and 15.9% of APPs. The HINTS examination was performed by 7.5% of attendings, 13.2% of residents, and 1.3% of APPs. Positional testing was performed by 7.7% of attendings, 18.6% of residents, and 2.5% of APPs. CT scans were ordered by 48.2% of attendings, 35% of residents, and 14.6% of APPs.

Conclusions: The majority of providers, regardless of type, did not obtain important elements of the history and physical examination but continued to order CT scans which are insensitive for posterior circulation infarctions. This suggests a significant research-practice gap and a potential area for quality improvement in the ED, and the difficulty in translating proven clinical research into practice.

Dizziness in the ED: Assessment Differences Between Providers

Collin Sanderson

Mentor: Shin Beh, MD, Department of Neurology

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A Design for a Virtual Medical Simulation Elective

Devin Shah

Mentor: Ravi Bhoja, MD, Department of Anesthesiology & Pain Management

Collaborators: I-Chun F. Lin, BA; Sarah Cao, BS; Vladyslav Bondar, BSA; Jessica Lowe, BA; & Vinay Kalvacherla, BA

Introduction: Team-based simulation has been widely recognized as an effective educational tool for teaching and evaluating clinical knowledge and skills.¹In 2019, a team of UT Southwestern medical students created a Medical Simulation Elective (MSE) to promote team-based simulations for the clinical management of acutely ill patients. However, the COVID-19 pandemic public health restrictions prevented the continuation of an in-person MSE. To address the need for an alternative to the in-person MSE clinical experience, we developed a virtual Medical Simulation Elective (vMSE).

Methods: A structured method for quality improvement—DMADV (Define, Measure, Analyze, Design, and Verify)—was employed to completely transition the MSE to the virtual environment.

Results: By integrating a framework for performing virtual simulations with the curriculum material and structure of the in-person MSE, we developed the vMSE for first- and second-year medical students. The vMSE consists of 6 two-hour virtual classes over the course of 12 weeks using the teleconferencing software Zoom. To receive credit, students enrolled in the elective must attend 5 of 6 classes. Each class consists of three parts: (1) a virtual chief complaint-focused lecture (chest pain, shortness of breath, abdominal pain, back pain, toxidromes, and headaches), (2) a virtual team roles-focused lecture (Team Lead, Airway, Physical, Procedures, and Floater), and (3) two or more virtual simulations from the SIMS Casebook². Each student will perform 1 of the 5 team roles for each virtual simulation. At the end of each simulation, the Floater will create an SBAR (Situation, Background, Assessment, Recommendation) statement to facilitate and strengthen proper patient handover techniques. An informal debriefing focused on the clinical scenario, team dynamics, and effective communication will occur after each simulation.

Conclusion: To evaluate the utility of the vMSE for teaching clinical knowledge, team dynamics, and critical communication skills, we plan on assessing and comparing its effectiveness to the in-person MSE using assessments derived from EMRA and Team STEPPS resources.

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Improving Physician Adherence to Clinical Practice Guidelines for the Diagnosis of Appendicitis in Pediatric Patients

Devin Shah

Mentor: Faisal Qureshi, MD, MBA, Department of Surgery, Pediatric Surgery

Collaborator: Jacqueline Fu, BS

Background: Appendicitis is one of the most common surgical conditions in children. The creation and utilization of clinical practice guidelines (CPGs) for the diagnosis of appendicitis has shown improvements in resource utilization without negatively impacting diagnostic accuracy or patient outcomes.

Local Problem: At Children's Health, the implementation of the previous appendicitis CPG utilizing the pediatric appendicitis score (PAS) for determining patients' risk of appendicitis was found to have poor rates of physician adherence. As such, a new imaging-first CPG was created and implemented for the diagnosis of appendicitis in pediatric patients. It is hypothesized that the newly developed and implemented CPG will also face poor adherence, limiting the benefits associated with CPG-directed care in this patient population.

Methods: A structured method for quality improvement was utilized in developing a project focused on improving physician adherence rates to the new CPG for diagnosing appendicitis in pediatric patients. By employing a theoretical, failure-focused approach, critical reasons for suboptimal adherence were identified. Process failures were sorted and stratified based on theoretical occurrence, severity, and detection levels. The highest impact failures underwent a root-cause-analysis. Change ideas and interventions were subsequently developed to combat high impact failures. Planned or actual interventions: Seven interventions in total were proposed. CPG integration into the electronic medical record (EMR) included: (1) an audit-feedback system at critical decision points, (2) forced explanations of non-CPG orders, (3) a radiologist-based checks and balances system, and (4) the standardization of imaging reports; non-EMR based interventions consisted of (5) an educational intervention, (6) knowledge and attitude assessment, and (7) a system for standardized performance reports. Of the seven proposals, five interventions were developed in detail, including the EMR-integration based interventions and the non-EMR system for standardized performance reports.

Conclusion: A data-driven approach must be used to evaluate the efficacy of the theoretical failures and analyze the potential effects of the proposed interventions on physician adherence.

A Novel Structure for Team-Based Virtual Simulations

Devin Shah

Mentor: Ravi Bhoja, MD, Department of Anesthesiology & Pain Management

Collaborators: I-Chun F. Lin, BA; Sarah Cao, BS; & Vladyslav Bondar, BSA

Introduction: Team-based in-person simulation (IPS) has been widely recognized as an effective educational tool for teaching and evaluating clinical knowledge and skills.¹ However, the COVID-19 pandemic public health restrictions have prevented or limited the continuation of IPS. To address the need for an alternative to IPS, we developed a structure for team-based virtual simulation (VS).

Methods: A structured method for quality improvement—DMADV (Define, Measure, Analyze, Design, and Verify)—was employed to completely transition a model of IPS to the virtual environment.

Results: Utilizing a teleconferencing software (Zoom), a document collaboration platform (Microsoft Teams), and the SIMS Casebook², we adapted a model for IPS to the virtual environment. Participants in the VS were categorized into 2 groups: the team and the facilitators. Each simulation consisted of three facilitators and five students. Facilitators (F) provided the team with patient information, imaging, and test results from the SIMS Casebook¹. The students were assigned to unique roles: Team Lead (STL), Airway (SA), Physical (SP), Procedures (SPR), and Floater (SF). All participants were present in the Zoom meeting. F1 provided SA with patient history information using Zoom Audio. F2 provided SP with physical exam findings using Zoom Chat. F3 used the Zoom Screen-Share feature to display imaging and test results ordered by SPR using a Teams-based order form. On the same shared document, SF recorded patient information. STL, SPR, and SF collaborated using Teams Messaging, Teams Call, or Zoom Chat. During periods of whole student team collaboration (i.e., time-outs, call-backs), all students were directed to use Zoom Audio. Inter-Facilitator communication occurred using the direct message feature of Zoom Chat.

Conclusion: Transitioning from IPS to VS can be accomplished using commercially available virtual platforms as described in this paper. Future studies should be focused on the efficacy of VS in comparison to IPS to determine whether VS can be incorporated into a medical school curriculum.

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Developing Wellness Through the Building Resilience in Medicine and Preventing Burnout Enrichment Elective

Stephanie Shea

Mentor: Blake Barker, MD, FACP, Department of Internal Medicine

Collaborators: Cameron Ward; Ofelia Negrete; Maryam Ali; & Haley Holderness,

Background: Education on wellness practices such as mindfulness have been shown to decrease burnout among healthcare providers and improve well-being. Students at UT Southwestern Medical Center created a peer-led elective for pre-clinical students focused on wellness and resilience education. In order to assess the effectiveness of this elective, a retrospective pretest design survey consisting of the Maslach Burnout Inventory, the Short Grit Scale, and the Perceived Stress Scale will be administered to learners in December 2020.

Description: Student leaders reviewed the literature on wellness interventions to identify best practices. Based on this review, as well as feedback from peers and self-reflection on personal experiences with wellness and burnout, they independently designed a series of twelve one-hour virtual sessions covering a range of topics including fostering empathy, navigating patient death, time management, and accepting critical feedback. Icebreakers were introduced at the beginning of each session to promote camaraderie and an inviting environment for discussion.

Outcomes: Fourteen students participated in at least ten of the twelve elective sessions held via the Zoom conferencing platform. Learners engaged in thought-provoking discussion on sources of burnout and coping mechanisms to combat burnout. Throughout the semester, students heard from physicians and allied health professionals who remained resilient and established effective ways to incorporate balanced lifestyles. Additionally, participants practiced mindfulness and cultivated healthy peer-group relationships in which vulnerability and health seeking behaviors are endorsed. Based on the robust participation received in the sessions, it is evident students recognize the powerful impact that sharing narratives, practicing coping strategies, and talking about potentially sensitive subject matter have on the development of personal resilience.

Conclusion: At the culmination of our study, we believe learners will show a positive increase in their ability to cope with emotional exhaustion, depersonalization, and low sense of personal accomplishment. They will also recognize an improvement in their stress level and an advancement in their ability to persevere despite adverse events inevitable to those practicing medicine.

Investigating Physician Knowledge and Care Response to Human Trafficking at an Academic Medical Center

Prachi Singh

Mentor: Victoria Udezi, MD, MPH, Department of Family Medicine

Collaborators: Nora Gimpel, MD

Context: Human trafficking occurs when an individual is exploited for commercial sex or labor through force, fraud, or coercion. The state of Texas reports the second highest number of cases in the country and is actively working on anti-trafficking efforts. Healthcare settings are critical for identifying and assisting victims and survivors. Studies estimate that 25 to 88% of trafficked individuals came into contact with healthcare professionals, mostly in primary care settings, but were not recognized and treated as such. This highlights the unique position of primary care clinicians to intervene in this vulnerable population and the importance of appropriate training for the current and future workforce.

Objectives: To assess human trafficking knowledge, training, and usual practices of resident and faculty physicians in specialties most often encountered by victims of trafficking.

Human Subjects Review: IRB-approved, expedited study.

Design: Cross-sectional study. A brief, 24-item survey distributed via REDCap to resident and faculty physicians in primary care, dental, and orthopedic specialties.

Setting: UT Southwestern Medical Center and Parkland Hospital.

Instrument: A 24-item anonymous survey based upon similarly constructed, previous studies, addressing the human trafficking knowledge, skills, and practices of resident and faculty physicians in primary care, dental, and orthopedic specialties.

Anticipated Results: Preliminary pilot data (n=46) reveal that majority (89%) of responders agree there is a strong responsibility for physicians to identify and treat human trafficking victims. All participants agree that human trafficking training should be a mandatory part of medical curriculum and that it would make them better practitioners, yet only 8 of 46 (17%) agrees that their medical training adequately prepared them. Fifty-four percent of respondents state that they have poor understanding and knowledge of human trafficking and ninety-four percent of respondents think that they have rarely or never encountered human trafficking in their practice.

Conclusions: Preliminary findings indicate the need to integrate human trafficking training in graduate medical education in order to develop skills needed for appropriate trauma informed care of populations affected. Survey participation and data analysis are ongoing.

Implementation and Evaluation of a Student Curriculum on Patient Navigation for Individuals Experiencing Homelessness

Arlen Suarez

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Collaborators: Claire Abijay; Alison Liu; Thanos Rossopoulos; Natalie Bonner (MS), Helena Zhang; Nidhi Desai; Aaron Shi; Nico Campalans; Umaru Barrie; Ashlyn Lafferty; Phillip Day PhD; & Patti Pagels PA-C

Context: Providing quality care in primary care settings for individuals experiencing homelessness requires understanding the barriers they face. This novel curriculum at UT Southwestern Medical School (UTSW) introduces students to the challenges experienced by homeless populations in Dallas, TX. Curriculum includes didactic sessions and immersion experiences regarding social determinants of health, healthcare access, ethical decision making, and motivational interviewing.

Objective: Evaluate curriculum efficacy in changing student attitudes of, knowledge about, and confidence in administering healthcare related services to homeless populations.

Human Subject Review: IRB exempt.

Study Design: Multi-year observational longitudinal study. Participant baseline data will be presented. Additional time points may not be available at time of conference.

Setting: UTSW medical and health professions students.

Intervention: Participation in six of seven 2-hour sessions and completion of either 1) a student-created navigation tool or 2) interview with a community provider. Pre and post-course surveys, consisting of mainly Likert scale questions, will be administered.

Outcome Measures: Surveys measure 1) attitudes towards homelessness using the Health Professionals Attitude Toward the Homeless Inventory (HPATHI), 2) objective knowledge on homeless populations at national and regional levels, 3) local needs, and 4) self-efficacy in working with homeless individuals.

Anticipated Results: Currently recruiting 32 students and collecting baseline data. Half of students are hypothesized to have prior experience volunteering with homeless populations. Intervention is expected to increase understanding of systemic inequities that result in homelessness, increase confidence in motivating patients to navigate the healthcare system, and improve attitudes toward homeless populations.

Conclusions: Curriculum development focuses on increasing awareness and knowledge on homeless populations. The goal is to develop necessary skills in healthcare professionals and primary care providers to advocate and provide quality care for this population.

Prospective Survey of Confidence and Ability to Differentiate Edible and Toxic Mushrooms in the General Population of Thailand

Tuyet Nhi Tran

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Background: Mushroom-related poisonings and deaths occur yearly in Thailand despite warnings from federal agencies. The primary objective of this study is to characterize the confidence and abilities of mushroom identification in Thailand. The secondary objectives are to determine 1) the association between the confidence and ability, and 2) demographic, beliefs, and behaviors that predict identification ability.

Methods: A prospective survey was distributed via the “Ramathibodi Poison Center” Facebook page from 5/5/2020 to 6/4/2020. Respondents 18+ years with informed consent were included. Respondents who identified as medical toxicologists, clinical pharmacology fellows, and mycologists were excluded. Demographics, confidence, false beliefs on mushroom identification, and the ability to differentiate mushrooms were collected. Confidence level ranged from 0 to 100. Participants with a confidence greater than the median were categorized as the high confidence (HC) group, while the remainder were in the low confidence (LC) group. Mushroom differentiation was assessed by a 24-picture-quiz. T-tests, ANOVAs, and linear regressions compared factors with scores. A Shapiro-Wilks test determined data normality.

Findings: Of the 340 respondents, 70.9% were women, 85.9% never foraged, 5% foraged >3 times, and 61% had >1 false belief. Common beliefs included that edible mushrooms: grew in the same area; do not darken silver utensils; do not change the color of rice/onions once boiled. The median confidence level was 10, thus 165 respondents were in the HC group and 175 in the LC group. The mushroom quiz scores of the HC group (mean 49.6%, standard deviation [SD] 8.8%) and the LC group (mean 48.8%, SD 7.5%) were not statistically different ($p=0.33$). Those who hiked 1-3x/year and 4-6x/year scored significantly worse than who did not hike (47.9% vs 50.2%, $p=0.012$, and 43.2% vs 50.2%, $p=0.018$, respectively). Finally, those who believed edible mushroom grew in the same areas as previous edible mushrooms scored lower (47.7% vs 49.7%, $p=0.045$).

Interpretation: Respondents of the survey could not accurately identify mushrooms regardless of the one's confidence with averages scores equating to a coin flip. This is especially dangerous with the high prevalence of false beliefs that overestimates confidence in consuming potentially life-threatening mushrooms.

A Geospatial Analysis of Road Traffic Accidents in Lagos State, Nigeria from May 2017 to December 2018

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Introduction: We analyzed the geospatial burden of road traffic accidents (RTAs) in Nigeria's most densely populated state, Lagos. This study is a follow-up to our performance evaluation of the Lagos State Ambulance Service (LASAMBUS), the emergency medical services (EMS) system that serves Lagos State's 20+ million residents. In Africa, there are just 25 EMS systems present in 16 countries, representing 30% of the continent. West Africa is particularly underserved, with EMS systems in only 2 countries, Ghana and Nigeria.^a The overwhelming majority of calls that LASAMBUS receives are RTAs. Therefore, we aimed to 1. Determine the geospatial distribution of RTAs, 2. Evaluate the outcomes of RTAs by local government area (LGA), and 3. Assess the efficiency of LASAMBUS' response by LGA.

Methods: We reviewed LASAMBUS intervention forms from December 2017 to May 2018, and categorized the outcomes of the RTA calls: I. Addressed Crash, II. No Crash (False Call), III. Crash Already Addressed, IV. Did Not Respond, and V. Other. We used the RTA address to determine the appropriate LGA, and explored additional associations between 1. Outcomes and LGAs, and 2. Causes of Delay and LGAs.

Results: We analyzed 1,314 LASAMBUS intervention forms and found that 5 LGAs accounted for over half of the RTA distribution: Eti Osa (15.1%), Ikeja (14.4%), Kosofe (10.1%), Ikorodu (9.4%), and Alimosho (6.5%). In these LGAs, Outcomes II. and III. represented around 50% of the total RTA burden. We observed variations in the burden of each outcome by LGA – for example, Eti Osa had the highest total number of RTAs with Outcome II, whereas Ojo had the highest proportion of RTAs with Outcome II. In 12% forms with a Cause of Delay listed, Poor Access and Traffic Congestion both had significant associations with the LGA distribution. We also found a significant difference in the mean response time between the diurnal (9:00am-4:59pm) and nocturnal (5:00pm-8:59am) periods.

Conclusions: This study found varied geographic distribution of RTAs, evaluated specific outcomes as addressed by LASAMBUS, and identified barriers to pre-hospital care management. We are continuing to study the spatiotemporal burden of RTAs in Lagos State to provide recommendations on targeted interventions.

Evaluating Awareness of Skin Cancer in Organ Transplant Recipients

Jennifer Wang

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Collaborators: Rajiv Nijhawan, MD

Organ transplant recipients (OTR) have a 65-fold higher risk of developing squamous cell carcinoma (SCC) than the general population due to long term immunosuppressants. Prior studies have highlighted the differences in presentation and risk factors, of SCC in Caucasian OTR compared to OTR of color. Specifically, in OTR of color, there is a potential association of SCC with HPV and higher incidence in sun-hidden areas like the groin-genital region. Although skin cancer is less common among people of color, they have higher morbidity and mortality rates. This may be attributed to their lower perceived risk of skin cancer and less knowledge of the presentation, risk factors and preventative behaviors against skin cancer. Therefore, increasing patient awareness among OTR of color of the differences in SCC afflicting people of color compared to Caucasian patients is necessary. By providing skin cancer knowledge more specific to their needs OTR of color will be able to practice comprehensive preventative behavior. This can lead to earlier identification of skin cancer and reduce ethnic health disparities. A cross-sectional telephone survey will be distributed to 384 OTR at Parkland and UTSW transplant clinics. Survey questions were either developed or adapted from previous studies. Survey was pilot tested to 8 OTRs and tested with Question Understanding Aid (QUAID) and Questionnaire Appraisal System (QAS). Survey questions aim to assess knowledge of skin cancer in OTRs and compare knowledge between Caucasian OTR and OTR of color. Further directions include designing and implementing an intervention that will educate OTR of color of their specific skin cancer risks to reduce the knowledge gap.

Assessing Patient Reported Quality of Care and Safety with Mohs Surgery During the COVID-19 Pandemic

Jennifer Wang

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Collaborators: Jesalyn Tate, MD & Rajiv Nijhawan, MD

COVID-19 has significantly impacted access and delivery of medical care to patients across all departments including Mohs surgery. Since skin cancer treatment with Mohs micrographic surgery requires in person visits, patients may experience additional concerns related to COVID-19 including potential of contracting the virus during a visit, inadequate personal protective equipment, surgical scheduling delays, etc. Although the UTSW Dermatology Surgical Oncology clinic has made efforts to improve patient safety at this time, it is important to gain a better understanding of patients' experiences and attitudes towards receiving medical care during the pandemic in general, as well as towards the implemented COVID-19 safety measures. A cross sectional telephone survey was administered and completed by 144 patients treated with Mohs surgery at UTSW Dermatology Surgical Oncology clinic from March 16-June 30, 2020. Survey questions measure patient reported outcomes of satisfaction, concerns about skin cancer treatment or delay, feeling of safety and reasons for feeling "unsafe". The goal is to assess patient reported current quality of care and sense of safety while receiving Mohs surgery for skin cancer treatment during the COVID-19 pandemic, in order to identify factors that influence patient concerns, discover areas for possible improvement, and guide future safety measures for treating patients in our clinic. From our data, prior to their visit, the majority of patients expressed some degree of concern in regards to skin cancer treatment during COVID-19 or the impact of COVID-19 on their skin cancer treatment. However, 99% of patients felt safe during their treatment. Overall patient satisfaction at the time of appointment was 9.65/10.

Video-Based Informed Consent in the SICU: A Feasibility Trial to Assess Quality and Satisfaction

Virginia Wang

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Collaborators: Manuela Ochoa, MD; Carol Hirsch Korn, NP; Madhuri Nagaraj, MD, MS; Ryan Dumas, MD, FACS; Thomas Shoultz, MD, FACS; & Michael Cripps, MD, FACS

Patient and family satisfaction in the intensive care unit (ICU) remain a complex challenge. The use of multi-media communication aids has shown benefit, but assessment of their performance is variable in rigor. Common barriers to adequate comprehension include age, educational background, and readability, with limited evaluation of preferred language and its impact on ICU patients. Parkland Hospital uses in-person and video-based translation to serve a culturally and linguistically diverse population. However, satisfaction regarding communication is unclear. In this study we evaluate the feasibility of traditional informed consent (IC) supplemented by video-based ICU consents (VBIC) and utilize a community-based focus group to assess satisfaction.

Video scripts for five common ICU procedures (tracheostomy, intubation, tube thoracostomy, IVC filter, and gastrostomy tube placement) were created and organized by introduction, indications, risks, benefits, and basic procedural steps. These three-minute videos were translated into Spanish after a rigorous process that met our institution's standard literacy level. A mock scenario was performed with an actor patient, an ICU provider, and a community-based focus group of seven members. The scenario first used the standard IC, followed by VBIC, with the FS-ICU 24 (a validated survey for ICU satisfaction) administered both before and after the VBIC. Survey questions, graded 1-5 on a Likert scale, assessed quality and access to information. Survey responses were analyzed pre- and post-VBIC. Mean participant ratings were higher post-intervention in all categories: frequency of communication with ICU doctors (pre-intervention 2.86 → post-intervention 4), ease of obtaining information (3.71 → 4.25), understanding (3.57 → 4.25), honesty (4.29 → 4.5), completeness (4.14 → 4.75), and consistency of information (3.33 → 4).

Implementation of a VBIC in common ICU procedures was associated with increased scores in all five core satisfaction values. This study demonstrates the feasibility of utilizing a community-based focus group to assess implementation of VBIC. Future steps include integrating VBIC into our standard informed consent process, assessing for improved satisfaction, and analyzing effects on patient outcomes.