The University of Texas Southwestern Medical Center

57 ANNUAL MEDICAL STUDENT RESEARCH FORUM

FIFTY-SEVENTH

Student Presentations and Guest Speaker

Herbert J. Zeh III, M.D., FACS

Professor and Chair of the Department of Surgery
Hall and Mary Lucile Shannon Distinguished Chair in Surgery
UT Southwestern Medical Center

January 22nd, 2019 • D1.600 • 3 - 5 pm

Poster Presentation and Reception, 5-6 pm
South Campus Cafeteria Foyer

THE UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER AT DALLAS

57th ANNUAL MEDICAL STUDENT RESEARCH FORUM

TUESDAY, JANUARY 22nd, 2019
Oral Presentations 3-5:00 pm
Poster Presentation 5-6:00 pm

PROGRAM DIRECTOR: Rene Galindo, M.D., Ph.D.

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57th ANNUAL MEDICAL STUDENT RESEARCH FORUM

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Dang-Huy Do
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Deborah Carlson, PhD, Department of Surgery

Amy Kuprasertkul
"Prostaglandin E2 (PGE2) in Urine pf Post-Menopausal Women with Recurrent Urinary Tract Infections for Monitoring of Urinary Tract Infections"
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"Prevalence of Esophageal Fibrosis in Eosinophilic GI Diseases"
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"Characterization of Poxvirus A51R Protein-Mediated Modulation of Host Microtube Networks"
Mentor: Don Gammon, MD, Department of Microbiology

PRESENTATION OF GUEST SPEAKER

Herbert Zeh III, MD, FACS

Professor and Chair of the Department of Surgery
Hall and Mary Lucile Shannon Distinguished Chair in Surgery

RECEPTION AND POSTER SESSION IMMEDIATELY FOLLOWING

57th Medical Student Research Forum

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Identyifying the Neuronal Circuits Mediating Fear Generalization at Memory Retrieval

Zachary Christian

Mentor: Wei Xu PhD, Department of Neuroscience

Memory generalization, the cognitive process of extending what we have learned from experience to new situations, is essential for adapting to the ever-changing environment. Generalization of fear memories serves as a protective factor for animals by allowing them to recognize potential dangers when animals are in environments similar to past harmful experiences. Aberrant generalization is implicated in multiple neuropsychiatric disorders. Overgeneralization of fear memories can lead to inappropriate anxiety, evident with post-traumatic stress disorder (PTSD). Similarly, overgeneralization of episodic memories is a consistent problem in patients with severe depression. Lack of generalization accounts for the behavioral inflexibility in autism spectrum disorders. By revealing the neuronal mechanisms underlying generalization, we can gain a better understanding of the process of memory and design targets for novel therapies that will benefit patients effected by mood and anxiety disorders.

Regulation of generalization can occur at memory encoding by determining the precision of memories, and at memory retrieval by evaluating the similarity between the memories and the new situations. Strives have been made to elucidate the neuronal mechanisms underlying generalization at the stage of encoding, but little is understood about how generalization occurs at the moment of retrieval. In this study, we aim to identify the critical brain circuits involved in generalization of fear memory during retrieval. Based on preliminary studies, we hypothesize that the brain circuit consisting of the prefrontal cortex, hippocampus and amygdala determines the generalization of fear memories when memories are retrieved.

To test this hypothesis, we stereotactically injected B6J mice with hM3D, a non-endogenous membrane receptor, into GABAergic interneurons of four candidate brain regions. After activating hM3D to achieve temporally specific and reversible neuronal silencing, memory generalization was tested using “freezing” times obtained during fear conditioning tasks. CA3 emerged as a region that may have an impact on memory retrieval. Neuronal silencing resulted in significant changes in freezing time compared to the control group. The next steps will be to test other candidate regions and determine which have the largest impact on fear generalization. Then, we will continue to elucidate the underlying neuronal mechanisms by conducting functional calcium imaging of these regions during memory retrieval to reveal the neuronal codes determining memory generalization levels.

Effect of Somatostatin Receptor Activation on Cell Migration and β1 Integrin Activation in Triple Negative (ER-, PR-, HER2-) Breast Cancer Cells

Pallavi Dev

Mentor: Jeffrey Frost PhD, Department of Integrative Biology & Pharmacology
Collaborator: Heather Carr PhD

Background: Octreotide is a somatostatin analogue that acts through Gi signaling to inhibit adenylyl cyclase and thus inhibit intracellular cAMP accumulation. β1 integrin is a cell surface molecule that links the actin cytoskeleton to the extracellular matrix to form focal adhesions that allow for cell motility. Surface β1 integrin expression and activation is upregulated in response to intracellular cAMP.

Objective: To determine the effect of somatostatin receptor (SSTR) activation on cell migration and β1 integrin activation in triple negative breast cancer cells.

Results: Treating triple-negative breast cancer cells with octreotide (OCT) resulted in a modest but significant decrease in migration towards FBS (0.828 fold compared to FBS only control, $p<0.0001$). Octreotide treatment decreased migration towards epidermal growth factor (EGF) as well (0.798, $p<0.001$). This decrease was not rescued by pertussis toxin (PTx), which inhibits Gi, as has been observed in neuroendocrine tumors. In fact, in breast cancer cells PTx further decreased FBS-stimulated migration when combined with octreotide (0.467, $p<0.0001$). PTx may have a detrimental effect on breast cancer cell survival, as a decrease in migration was also observed for the FBS+PTx condition (0.316, $p<0.0001$). The SSTR5 agonist L817818 also decreased migration, an effect which was partially rescued by the SSTR5 antagonist BIM23056 (FBS+L817818: 0.708, FBS+L817818+BIM23056: 0.802, $p=0.01$). Octreotide was found to decrease active β1 integrin expression in MDA-MB-231 cells at the 5 minute timepoint ($p<0.0001$). However, surface β1 integrin returned to baseline by 45 minutes and remained relatively constant up to 2 hours and beyond. 8CPT-cAMP rescued the octreotide-mediated decrease in active β1 integrin expression at the 5 minute timepoint, and generally elevated surface β1 integrin at all timepoints.

Conclusion: Stimulation of somatostatin receptors in triple negative breast cancer cells results in a decrease in active β1 integrin expression and cell migration. These results support the hypothesis that somatostatin agonists, such as octreotide or L817, bind to somatostatin receptors and cause activation of Gi, which inhibits adenylyl cyclase and reduces intracellular cAMP production. cAMP normally stimulates active β1 integrin expression, which allows for focal adhesion formation and cell motility. Because the effect of somatostatin has not been widely studied in breast cancer, these findings suggest that it has the potential to decrease cell migration, which opens possibilities for future research.

Multivalent Adhesion Molecule (MAM7) Inhibits S. aureus Infection in a Surgical Incision Rat Model

Dang-Huy Do

Mentor: Ryan Huebinger PhD
Deborah Carlson PhD, Department of Surgery
Collaborators: Kim Orth, PhD; Anne-Marie Krachler, PhD

Introduction: Multidrug-resistant bacteria have complicated the problem of tackling infections. Recently identified, Multivalent Adhesion Molecules (MAMs) are a group of bacterial adhesion molecules located on the outer membrane of Gram-negative bacteria, needed for virulence. The novel MAM7 inhibitor is composed of a recombinant MAM7 fragment bound to a scaffold to mimic the MAMs of bacteria. Previous findings have shown that MAM7 reduces *in vitro* methicillin-resistant *Staphylococcus aureus* (MRSA) from attaching to the host via competitive inhibition. Here, we examine the efficacy of MAM7 against multi-drug resistant *S. aureus* on a surgical incision rodent model to determine its ability to reduce bacterial virulence *in vivo*.

Methods: Twenty-four adult Sprague-Dawley rats were anesthetized and given a 4cm incision to the subcutaneous layer of their dorsum in a sterile environment. Immediately, $5x10^7$ CFU of bioluminescent *S. aureus* was applied to the wound followed by 12 animals receiving MAM7 (10^8 beads) and 12 control animals receiving an equal concentration of beads without the MAM7 protein. Incisions were sutured closed and appropriate pain medications were provided. An IVIS bioluminescent imager was used to image the rats every 24 hours over 9 days to assess the bacteria burden. The amount of light emitted from the live bacteria was measured as flux (photons per second) which acts as a surrogate for the total bacterial burden.

Results: Analysis of the flux from the bacteria revealed a statistically significant reduction in bacterial load in MAM7 inhibitor-treated rats compared to control rats for all daily pairwise measurements ($p=0.0114$-0.0002). The control rats displayed a progressive increase in bacterial load over the first 5 days, followed by a decline thereafter. Bacterial burden in the MAM7-treated rats continually decreased over the entirety of the 9 days. The most significant difference occurred at day 4 ($p=0.0002$). Images revealed that MAM7 also spatially constricted the spread of infection.

Conclusion: The MAM7 inhibitor group had a significantly lower bacterial burden than the control group. This novel adhesion molecule inhibitor has potential to prevent infection of multidrug-resistant bacteria in surgical infections.

Multi-level Optical Monitoring and Detection of Spinal Cord Ischemia

Feng Gao

Mentor: Thomas Floyd MD, Department of Anesthesiology
Collaborator: David Busch PhD

Background: Spinal cord ischemia is a disease of high morbidity and mortality often caused by surgeries repairing the thoracic and abdominal aorta. Current methods to monitor spinal cord hemodynamics such as electrophysiology methods, MR arterial spin labeling, and laser Doppler either have a slow response time or are unfeasible intra-operatively.
In this study, we developed an optical probe to monitor spinal cord blood flow and oxygenation in real-time at multiple sites along the spine.

Methods: Experiments were conducted on 8 adult domestic pigs. Probes were inserted into the epidural space through a laminotomy prior to asphyxia and local ischemia via catheter balloon inflation. Vital signs, anesthetic parameters, and spinal hemodynamics were measured continuously prior to intervention, throughout asphyxia, and during inflation/deflation of the balloon catheter. Optical blood flow measurements were compared against microspheres. Optical hemoglobin saturation of spinal cord was compared to mixed venous blood gases.

Results: The fiber optic probe detected changes in flow and oxygenation in all asphyxia and balloon inflation trials across multiple sites along the spine. We observed significant changes in spinal cord blood flow during balloon inflation in the epidural space. We also observed a significant correlation between optically measured hemoglobin saturation and mixed venous blood gases.

Conclusion: We developed an intra-operative tool that provides continuous, real-time monitoring of spinal cord hemodynamics at multiple sites along the spine. We hope this tool can more safely guide surgeons in reducing the incidence of spinal cord ischemia.

Advancement of Intraosseous Saline Wash and MSC Injection Technique for Treatment of Humeral Head Osteonecrosis

Vishal Gokani

Mentor: Harry Kim MD, Department of Orthopedic Surgery
Collaborators: Min Sung Park PhD, Mohit Singhal BS, Brad Niese BS, Jie Liu PhD

Introduction: Ischemic osteonecrosis of the femoral head in children, also known as Legg-Calvé-Perthes disease, is caused by a disruption of blood supply that leads to cell necrosis and femoral head deformity. One potential treatment involves saline washes to remove necrotic fat, inflammatory proteins, and cell debris from the bone followed by local injection of mesenchymal stem cells (MSCs), which can differentiate into osteoblasts and make new bone. The purpose of the study was to determine the efficacy of saline bone washing and local distribution of MSCs using three different inter-needle distances. We hypothesized that increasing inter-needle distance would decrease flow rate but increase protein mass removed, increase inter-needle pressure, improve washing efficacy, and maximize microbead distribution. **Methods**: Humeral heads (anatomically similar to femoral heads) harvested from piglets (37-42 lbs.) underwent three freeze-thaw cycles to mimic osteonecrosis, injection with intraosseous needles, and saline washing. Pressure and flow rate were detected with NodeCommander software. Wash fraction protein concentration was measured with Pierce BCA Assay. 1ml of saline containing $2.5x10^6$ NIR fluorescent particles, surrogates for MSCs, was injected into each sample. Microbead fluorescence was detected with IVIS Spectrum In Vivo Imaging System. Humeral head coronal sections were analyzed with OSTEOIMAGER Scanning Microscope to quantify washing efficacy using two densitometric parameters: average pixel light intensity and percent washed within the region of interest. Statistical analysis involved two-tailed unpaired t-test or ANOVA followed by Tukey-Kramer post-hoc test for 3 groups. **Results**: Mean flow rates significantly increased (8mm: $p=0.001$; 10mm: $p=0.0002$; 12mm: $p=0.004$) between the first and final saline washes. Mean initial flow rates decreased with increasing inter-needle distance (8mm vs. 10mm: $p=0.006$; 10mm vs. 12mm: $p=0.021$; 8mm vs. 12mm: $p<0.0001$). Larger inter-needle distances yielded higher protein concentration for the first three wash fractions (8mm vs. 10mm: $p=0.136$, 0.075, 0.013; 10mm vs. 12mm: $p=0.006$, 0.012, 0.207; 8mm vs. 12mm: $p=0.0001$, $p<0.0001$, $p=0.0001$). The 12 mm inter-needle distance produced significantly greater protein removal compared to 8 and 10 mm distances (8mm vs. 12mm: $p<0.0001$; 10mm vs. 12mm: $p<0.0001$). Comparing washed samples to unwashed controls, average pixel density (unwashed vs 10mm: $p=0.0108$; unwashed vs 12mm: $p=0.008$) and percent washed (unwashed vs 8mm: $p=0.010$; unwashed vs 10mm: $p=0.007$; unwashed vs 12mm: $p<0.001$) increased. With larger inter-needle distance, average pixel density increased (8mm vs. 10mm: $p=0.006$; 10mm vs. 12mm: $p=0.029$; 8mm vs. 12mm: $p<0.0001$), as did percent washed (8mm vs. 12mm: $p=0.001$). Microbead distribution was maximized in washed samples compared to unwashed controls, showing that washing improves microbead distribution. Increasing inter-needle distance also improved microbead distribution. **Conclusion**: A larger inter-needle distance produced significantly lower flow rate but increased protein removed, improved washing efficacy, and provided better microbead distribution. A larger inter-needle distance should be used clinically to increase the efficiency of necrotic fat, cell debris, and inflammatory protein removal from the osteonecrotic bone and to improve MSC distribution to stimulate new bone formation.

Rescue of Antibiotic Activity in Multidrug-Resistant Bacteria Through Antisense Mediated Efflux Pump Inhibition

Xincheng Ji

Mentor: David Greenberg MD, Department of Internal Medicine
Collaborators: Carolyn Sturge PhD, Christina Felder-Scott BS

Global antibiotic resistance has emerged as a significant threat to public health, necessitating novel approaches to antimicrobial therapy. *Acinetobacter baumannii* is a particularly drug-resistant pathogen which is responsible for a wide array of clinical infections, including life-threatening bacteremia in hospitalized patients. One of the main mechanisms of antibacterial resistance in *A. baumannii* is the utilization of RND transporters AdeABC and AdeIJK, efflux pumps which can export many classes of antibiotics out of the bacterial cell. Peptide-conjugated phosphorodiamidate morpholino oligomers (PPMOs) inhibiting the translation of efflux pump mRNA were tested for their ability to restore sensitivity to conventional antibiotics.

PPMOs against specific genes encoding different elements of efflux pumps (AdeA, B, C, J, K) were administered in combination with various classes of antibiotics to multiple strains of *A. baumannii.* These results were then compared to the minimum inhibitory concentration (MIC) of the antibiotic when administered to the strain alone to assess for the PPMO's efficacy.

PPMO targeting the -16-6 segment of the AdeC gene, coding for the outer membrane channel of the efflux pump, was effective in achieving an 8-16 fold decrease in the MIC of Piperacillin/Tazobactam (Pip/Tazo) on *A. baumannii* AYE. Similar results of a 4-8 fold decrease in Pip/Tazo MIC with AdeC targeted PPMO were seen in other strains. Combinations of Pip/Tazo with PPMOs targeting other components of the pumps did not produce any significant synergistic effects. PPMOs against the early sequences of AdeC and AdeJ, an inner membrane efflux component, also produced consistent 2-4 fold decreases in the MIC of Meropenem. The efflux pump PPMOs did not have any effect on *A. baumannii*'s susceptibility to Levofloxacin and Azithromycin. A significant decrease in Tobramycin MIC was observed with several efflux pump PPMOs. However, these results were replicated with a scrambled sequence, so the effect could not be attributed to efflux pump inhibition alone.

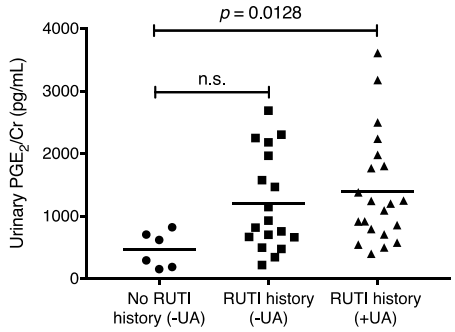
These results indicate that antisense molecules targeting earlier sequences of the outer membrane components of efflux pumps have the most promising synergistic effect with antibiotics. This pattern may guide the development of gene sequence targets for future PPMOs, and suggests at the possibility of using PPMOs as an adjunct to conventional antibiotic therapy in the future.

Prostaglandin E2 (PGE2) in Urine of Post-Menopausal Women with Recurrent Urinary Tract Infections for Monitoring of Urinary Tract Infection Evolution

Inkkaruch Kuprasertkul

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Nicole J. De Nisco PhD, Kim Orth PhD

Introduction: Studies in mice suggest targeting COX-2 for treatment of recurrent urinary tract infections (RUTI), but the role in human RUTI remains undefined. Our goal was to measure levels of PGE_2, a COX-2 product, in patients with and without RUTI to determine if PGE_2 had the potential to serve as urine biomarker for RUTI.
Methods: Following IRB approval, urine was collected from post-menopausal women seen at a tertiary care urology clinic and cultured. Patients had varying urine analysis (UA), history of urinary tract infections (UTI), and treatment regimens. Urinary PGE_2 levels were measured in triplicate for each sample by an accurate and commercially available PGE_2 ELISA that was normalized to urinary creatinine (Cr) by a quantitative creatinine assay. PGE_2/Cr levels were compared between patients classified by different criteria: history of UTIs, positive vs. negative UA, and bacteriuria count (>10^4 CFU/ml).
Results: Urine samples of 45 postmenopausal women were analyzed. Women with a history of RUTI with positive UA (+UA) (n=21) had significant (p = 0.0128) increased normalized urinary PGE_2 (mean=1403 pg/mg) compared to patients with no history of UTI with negative UA (-UA) (n=6, mean=464 pg/mg). In –UA women, PGE_2 levels between RUTI patients (n=18, mean=1204) and those with no lifetime history of UTI was not statistically significant. The latter never had values exceeding 1,000 PGE_2/Cr, whereas both groups with a history of RUTI had levels two to threefold higher. No difference was noted between patients with or without cultured bacteriuria.
Conclusions: In this exploratory study on post-menopausal women, we found a statistically significant increase in levels of urinary PGE_2/Cr in patients with a history of RUTI with +UA versus patients reporting never having a UTI. These new findings suggest that PGE_2 may be a useful urine biomarker for RUTI.



Cyclo-oxygenase 2 (COX-2) Detection in Bladde Biopsies of Post-Menopausal Women with Recurrent Urinary Tract Infections

Inkkaruch Kuprasertkul

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Nicole J. De Nisco PhD, Kim Orth PhD

Introduction: Increased resistance to antibiotics used to treat recurrent urinary tract infections (RUTIs) has created an urgent need for alternative treatments. Studies in mice have linked increased COX-2 levels in infected bladders to recurrence and FDA-approved COX-2 inhibitors protected mice against recurrence. Furthermore, results from randomized controlled trials suggest that NSAIDs may be an effective treatment for uncomplicated UTIs. Our goal was to determine if COX-2's role in human RUTI by studying COX-2 expression in bladder biopsies from post-menopausal RUTI patients.
Methods: Following IRB approval, cold cup bladder biopsies from control regions (absence of cystitis visually) and infected regions (presence of cystitis visually) were obtained from women with antibiotic refractory RUTI undergoing electrofulguration. Immunostaining was performed with antibodies against COX-2 and elastase. Stained tissues were visualized with confocal microscopy. ImageJ was used to quantify total urothelium cells, COX-2 expressing cells, and neutrophils, and localization recorded in the urothelium. A ratio of COX-2+ urothelial cells to total urothelial cells was calculated.
Results: COX-2 expression was detected in the infected regions of 2/3 patients (Table). In Patient 1, 41% of cells in the infected region expressed COX-2 compared to 10% in the control region. In Patient 3, the infected and control COX-2+ counts were 49% and 4%, respectively. Various cell types expressed COX-2, including umbrella cells, neutrophils, and transitional urothelial cells.
Conclusions: In this preliminary study, expression of COX-2 was detected in the urothelium of bladder biopsies from post-menopausal RUTI patients. These new findings suggest that selective COX-2 inhibitors may be useful in the treatment of RUTIs in humans.

Table. COX-2+ cells in biopsied bladder urothelium and neutrophils

	Biopsy site	COX-2+ cells in urothelium/ Total urothelial cells	COX-2+ neutrophils/ Total neutrophils
Patient 1	Control	35/351 (10%)	0/0 (0%)
	Infected	57/138 (41%)	4/9 (44%)
Patient 2	Control	26/432 (6%)	3/5 (60%)
	Infected	18/431 (4%)	0/3 (0%)
Patient 3*	Control	1/28** (4%)	0/2 (0%)
	Infected	76/155 (49%)	20/42 (48%)

COX-2 Cyclooxygenase 2, *patient previously fulgurated, **scant urothelial cells present

Dietary Effects on C. albicans Gastrointestinal Colonization of Mice

Patrick Lynch

Mentor: Andrew Koh MD, Department of Pediatrics & Microbiology
Collaborators: Animesh Mindra, Laura Coughlin, MSc

Background: 50-80% of humans living in Western nations are colonized with *Candida albicans* (CA), the most common human fungal pathogen, whereas indigenous humans in the Amazon rainforest have 7% CA gastrointestinal (GI) carriage rates. This disparity may be due to differences in antibiotic exposure and diet. Mice are inherently resistant to CA colonization, but can be colonized with CA after administration of antibiotics that deplete specific commensal anaerobic bacteria necessary for inducing GI mucosal immune effectors that promote CA colonization resistance (Fan et al. *Nat Med* 2015). The effect of diet on CA colonization resistance is largely unknown.

Hypothesis: A western diet, high in fat and sugar, will facilitate CA GI colonization in mice without the use of antibiotics, either by modulating gut microbiota composition or microbiota-derived metabolites.

Methods: C3H/HeN mice (female, 6-8 wks old, Envigo) were placed on 1) normal diet (ND) (Teklad Global 16% Protein Rodent Diet), 2) normal diet + 2% sucrose in drinking water, or 3) a western diet (WD) chow (AIN-76A Western Diet, Test Diet, 34% sucrose, 20% fat). Mice were challenged with *Candida albicans* strain SC5314 ($2x10^8$ CFU) via oral gavage once. CA GI levels were enumerated by culturing fecal homogenates on selective media. Water was changed 1-2/week to prevent CA contamination. Fecal gDNA was extracted for microbiome profiling (16S rRNA sequencing). At the end of the experiment, mice were euthanized, and RNA extracted from colonic and cecal contents.

Results: WD mice (n=10) had significantly higher CA GI levels (>2 log-fold) compared to ND mice (n=11) on all three days post-gavage (day 1: p=0.020, day 2: p=0.03, day 3: p=0.027, Mann-Whitney). Interestingly, three WD mice died three days post-gavage due to *S. aureus* dissemination. Nonetheless, a significant log-fold difference in CA GI levels persisted between WD and ND mice in the weeks post-gavage (p=0.003 (Week 1), p=0.174 (2), Mann-Whitney). No significant difference in CA GI levels was found between ND and 2% sucrose mice

Conclusion: Mice fed a Western Diet display an increased susceptibility to *C. albicans* GI colonization in the absence of antibiotic administration. A sugar-augmented diet alone fails to render mice susceptible to colonization. Gut microbiome profiling and *in vivo* CA transcription profiling (RNASeq) results are pending.

Characterization of Poxvirus A51R Protein-Mediated Modulation of Host Microtube Networks

Reilly Sample

Mentor: Don Gammon PhD, Department of Microbiology
Collaborators: Emily Rex, Dahee Seo

Viruses hijack host cell microtubule (MT) networks to both facilitate their movement to intracellular sites of replication and for egress from host cells after replication. Poxviruses, such as vaccinia virus (VV), disrupt MT organization through a number of microtubule-associated proteins (MAPs), although the mechanism of how each of these MAPs affect VV infection has not been characterized. VV A51R protein is a novel MAP that localizes with MTs in infected cells and contributes to VV pathogenesis. To understand A51R-MT interactions, we investigated a series of A51R truncation mutants for their ability to co-localize with MTs and protect them from treatment with nocodazole, a MT depolymerizing agent.

We began by analyzing A51R association with MTs via immunofluorescence-based confocal microscopy of FLAG-tagged mutants. BSC-40 (African Green Monkey) cells were transfected with expression plasmids encoding either wild-type (WT) FLAG-tagged A51R (334 amino acids) or a series of truncation mutants in which a premature stop codon was introduced at the following amino acid positions: Y324, R321, I312, V217, L193, and S184. Each construct was allowed to express for 24 hours. The cells were then fixed with methanol and stained with anti-FLAG and anti-tubulin antibodies, then visualized on an Olympus FV10i confocal laser scanning microscope. Additionally, in order to assess A51R's activity as a MT-stabilizing agent, BSC-40 cells were transfected with WT and truncation mutant constructs and then exposed to 0 μM, 10 μM and 40 μM concentrations of nocodazole.

Visual analysis of the coverslips revealed that while the WT protein appeared to bind and cluster MTs around the nucleus of transfected cells, all truncations failed to bind and aggregate MTs regardless of the protein truncation position. A point mutant, C251A, located in a highly conserved CXCC motif across many poxvirus strains, appeared to associate with MTs, but did not aggregate MTs like the WT protein. Upon visualizing the various nocodazole treatments, we noted that all mutants, including the C251A mutant and truncations, failed to protect microtubules from depolymerization.

Further studies will seek to characterize the specific binding site of A51R with tubulin. Additionally, given the variety of post-translational modifications made on tubulin, it may also be useful to know whether A51R has an affinity for a particular type of tubulin, which could hint at what cellular process or structures A51R targets. It is possible that our studies may reveal features of virus-MT interactions that are common among many medically relevant viruses and provide new potential therapeutics that target pathogenic viruses encoding MT-binding proteins.

Variations in Mevalonate Pathway Flux in Human Cells with Familial Hypercholesterolemia

Shan Su

Mentor: Russell DeBose-Boyd PhD, Department of Molecular Genetics
Collaborator: Marc M. Schumacher PhD

Introduction: HMG-CoA reductase is a membrane protein of the endoplasmic reticulum (ER) that catalyzes the reduction of HMG-CoA to mevalonate, a rate-limiting step in the synthesis of cholesterol and nonsterol isoprenoids. Sterol and nonsterol isoprenoids exert stringent feedback control on HMGCR through multiple mechanisms. This ensures constant synthesis of essential nonsterol isoprenoids, while avoiding toxic overaccumulation of cholesterol. One regulator of HMGCR is UBIAD-1, a vitamin K_2 biosynthetic enzyme. People with familial hypercholesterolemia (FH) suffer from cholesterol excess due to the inability of cells to take up cholesterol from the environment, leading to a cholesterol depleted cellular state and an increase in cholesterol production. In this study, we examine the effect of sterol and nonsterol isoprenoid depletion via statins followed by mevalonate treatment on the expression of genes and proteins in the mevalonate pathway and localization of UBIAD-1 in human fibroblasts.

Methods: Cells expressing FH mutations and control cells were grown on culture plates or coverslips and fed media containing FCS, or FCS plus compactin and 0.05mM, 0.2mM, 1mM, 3mM, or 10mM mevalonate. After overnight feeding, cells were harvested for immunofluorescence visualization, and qRT-PCR and immunoblot analysis of genes and proteins related to cholesterol and nonsterol isoprenoid synthesis.

Results: Immunoblot analysis indicates that FH cells generally express higher amounts of sterol biosynthetic enzymes but lower amounts of CoQ10 biosynthetic enzymes than control cells.
qRT-PCR showed that genes of the CoQ10 pathway in FH cells are expressed to a significantly less extent than in control cells, and that sterol synthetic genes are relatively unaffected in FH cells but upregulated in control cells fed compactin and mevalonate. Immunofluorescence and quantitation of UBIAD-1 Golgi localization indicate that compactin causes UBIAD-1 to migrate to the ER in both cells, and that FH cells require a greater concentration of mevalonate following the addition of compactin to restore Golgi localization.

Conclusion: The FH phenotype causes a cellular deficiency of sterols, causing cells to upregulate mechanisms toward sterol synthesis at the expense of CoQ10 synthesis, which leads to a relative CoQ10 deficiency in FH cells.

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Clinical Research

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Δ Dean's Research Scholar, τ T35 NHLBI Training Grant Funded
* Poster Presenter

Pain, Itch, and Quality of Life in Persons with Keloids

Oyindamola Akinseye

Mentor: Donald Glass II MD, PhD, Department of Dermatology
Collaborator:

Background: Keloids are exuberant scars which extend beyond the borders of the inciting cutaneous injury, they can be disfiguring, pruritic and/or painful and can cause significant impairment of quality of life (QoL). Our aim was to assess how severely keloids affect QoL and identify whether symptomatology (pain, itch) was associated with the severity of QoL impairment, using patient-reported measures of symptoms and quality of life.

Methods: Sixty-four individuals with keloid were enrolled in the study, along with 27 healthy controls. Participants completed the Short Form 36 (SF-36), the Dermatology Life Quality Index (DLQI), and visual analog scales (VAS) for both pain and itch.

Results: Compared with controls, keloid patients had significantly decreased quality of life. Pain and itch were associated with greater QoL impairment as indicated by DLQI and SF-36 scores. Keloid patients also had DLQI scores similar to those of other skin conditions such as acne, alopecia, and vitiligo.

Conclusion: Keloids have a significant impact on QoL, at a level comparable to other chronic dermatologic conditions. Pain and itch have the strongest association with quality of life impairment, indicating that physicians treating patients with keloids should also strive for symptom relief to improve quality of life.

Assessing Femoral Head Deformity in Prolonged vs Standard Non-weight Bearing for LCPD Patients After a Femoral Varus Osteotomy

Chukwubinyelum Amaechi

Mentor: Harry Kim MD, Department of Pediatric Orthopaedics
Collaborators: Molly McGuire MPH, William Morris MD

Background: Femoral varus osteotomy is a common procedure for Legg-Calve-Perthes disease. After surgery, patients are prescribed a non-weight bearing (NWB) protocol to reduce force on the femoral head. However, there are no studies investigating the optimal duration of NWB. In this study, we compare radiographic outcomes with standard duration of NWB (≤ 3 months) to prolonged NWB (≥ 5 months) after femoral varus osteotomy.
We hypothesize that patients with unilateral Legg-Calve-Perthes disease that undergo femoral varus osteotomy will have less femoral head deformity when prescribed prolonged NWB compared to those prescribed the standard duration of NWB.
Methods: We collected clinical data from 52 patients with unilateral Legg-Calve-Perthes disease and were treated with a femoral varus osteotomy. Each patient had ≥ 2 years of radiographic follow-up. Radiographic outcomes included Waldenstrom stage at time of surgery and epiphyseal quotient and deformity index at 2 year follow-up. We compared femoral head deformities of patients that underwent the standard NWB duration after surgery (≤ 3 months) to patients that had a prolonged NWB duration (≥ 5months).
Results: After surgery, 35 patients were prescribed standard NWB while 17 were prescribed a regimen of prolonged NWB (n=52). The data showed a significant difference between the duration of the two groups. At 2 year follow-up, there was no significant difference between the standard and prolonged NWB protocols with either the mean epiphysel quotient: (p=.23) or deformity index (p=0.11). We also performed subgroup analysis of 28 patients treated surgically in the early stages of the disease (Waldentrom I-IIA) as they may show greater benefit with prolonged NWB. We found no significant difference in the prolonged and standard durations with either the mean epiphyseal quotient (p=0.62) or deformity index (p=0.58).
Conclusion/Discussion: Prolonged NWB does not provide an advantage over standard NWB, regarding femoral head deformity. Even in the subgroup analysis performed in the patients treated in the early stages of Perthes (Waldenstrom I-IIA), the group that would theoretically benefit the most from prolonged NWB, there was no improvement in radiographic outcomes with prolonged NWB. This could potentially impact post-surgical protocols for patients undergoing a femoral varus osteotomy. However, our study was limited by its retrospective nature. Further study, ideally prospectively, is needed to further validate these findings.

Impact of Simulation-Based Education Curriculum in Volume of MIS Cases Performed by the Division

Joseph Balaban

Mentor: Diana Diesen MD, Department of Pediatric Surgery
Collaborator: Lorrie Burkhalter

Introduction: Evidence shows simulation in surgical education improves laparoscopic and thoracoscopic skills in a safe environment, while increasing physician competency and efficiency. Additionally, studies demonstrate simulation-based education (SBE) improves patient safety and outcomes. Despite enhancing the learning curve and technical skill of the fellows, there is minimal data to show the addition of a simulation curriculum changes the practice pattern of a division. The purpose of this study was to evaluate the impact of simulation-based education on volume of minimally invasive surgeries (MIS) cases within a division at a pediatric hospital.

Methods: After IRB approval, we performed a retrospective review of MIS cases performed in children less than one year of age. Inclusion criteria were cases in the 2 years pre (6/2013-6/2015) and post (6/2016-6/2018) implementation of an SBE curriculum for fellows. Patients were identified by billing codes and verified in EPIC. Data points included demographics and outcome variables. For both groups, any thoracoscopic or laparoscopic case was considered MIS, while complex MIS cases excluded isolated inguinal hernia repairs, gastrostomy tube placements, and pyloromyotomies.
Designed to improve cognitive, technical, and nontechnical skills, this curriculum consisted of 8-10 simulation sessions covering 4 different complex MIS procedures, all of which were proctored by two clinical faculty. The curriculum has since been integrated into the fellowship curriculum.

Results: Between 2013-2015, 1,407 children less than one year of age were operated on. 261 (18.6%) of those were MIS. 51 (3.6%) were complex. Between 2016-2018, 1,348 children less than one year of age were operated on. 441 (32.7%) of those were MIS. 125 (9.3%) were complex. Following the implementation of the curriculum, the amount of total MIS cases increased by 1.76 fold, while the amount of complex cases increased by 2.56 fold.

Conclusion: Implementation of a simulation curriculum corresponded with an increase in MIS cases in infants and an increase in number of complex MIS cases performed. This suggests that SBE curriculum may have advantages to a department, division, and hospital, in addition to the educational benefits to the trainee.

VATS Versus Fibrinolytics for Treatment of Primary Pediatric Empyema in Otherwise Healthy Children

Joseph Balaban

Mentor: Diana Diesen MD, Department of Pediatric Surgery
Collaborator: Lorrie Burkhalter

Introduction: Video-assisted thoracoscopic surgery (VATS) decortication and fibrinolytics via chest tube have been shown to be effective in resolution of pediatric empyema, but the difference in efficacy, hospital stay, cost, and failure rate is still debated. Furthermore, there are no studies to our knowledge showing treatment efficacies in specific subgroups. The purpose of this study was to identify any significant differences present between treatment options based on subgroup analysis.

Methods: This was a retrospective review of 161 patients seen at a pediatric hospital from 2007 to 2017. These patients were otherwise healthy children with a primary diagnosis of empyema and treated with either fibrinolytics via chest tube or VATS decortication. The health record for each patient was accessed to collect the following data: demographics, PMH, labs, radiology reports, and outcomes. Age, sex, and race were investigated to determine any differences in outcomes between those treated primarily with VATS and those treated with fibrinolytics. In addition, effusion characteristics were investigated.
Exclusion criteria were medically complex children as defined by the Children's Hospital Association, secondary empyema, and unrelated comorbid conditions requiring additional hospital stay.

Results: There were 95 patients in the fibrinolytic group and 66 in the VATS group. Upon presentation to the hospital, there were no differences in patient demographics or presentation. Out of the demographic factors we investigated, neither sex nor race predicted a substantial difference in outcomes regardless of primary treatment used. Similarly, with regards to effusion characteristics, neither treatment offered any significant benefit over the other.
Age, 5 or older, did predict a substantial difference in outcome. Additionally, there was an 8.3% failure rate in fibrinolytics patients over five (3/36) and a 3.4% failure rate for those younger than five (2/59). VATS had 5 failures out of 66 patients, all of which occurred in those under 5, for a failure rate of 7.6%.

Conclusion: Overall, neither treatment offered substantially different outcomes for most groups. However, children over the age of five seemed to benefit more from VATS than fibrinolytics, both in terms of positive outcomes and lower failure rates. The reasons for this are unclear and warrant further investigation.

Low Body Mass Index is Associated with Decreased Nodal Yield from Neck Dissection Specimens

Hamza Bhalli

Mentor: Baran Sumer MD, Department of Otolaryngology-Head and Neck Surgery

Background: Decreased lymph node count (LNC) from neck dissection (ND) specimens for head and neck squamous cell carcinoma (HNSCC), is correlated with decreased survival. The cause of this correlation is unknown. Undernutrition is the most common cause of secondary immunodeficiency worldwide but relatively rare in developed countries. HNSCC is unique as it is one of the few cancers that directly interferes with feeding. Therefore, in contrast to other cancers, weight loss due to mechanical obstruction or odynophagia and relatively low body mass index (BMI) is common in HNSCC. Suppression of immune function due to nutritional deprivation could be causative with respect to both decreased LNC and survival in HNSCC, independent of LNC as an indicator of surgical completeness. We hypothesized that lower BMI (<22) due to larger cancers in the upper aerodigestive tract in HNSCC patients undergoing ND would be correlated with decreased LNC reflecting generalized immunosuppression.

Methods: We conducted our study in a single tertiary care institution to reduce variations in surgical and pathological technique Retrospective review of UTSW database identified 428 Head and Neck SCC patients who underwent ND between 2006-2017. Clinical records and pathology reports were reviewed to quantify number of levels dissected and number of lymph nodes obtained. Variables such as Age, BMI, Tobacco history, DM, T-stage and sex were collected. Total LNC per surgery was normalized to the number of neck levels dissected to further reduce the impact of surgical technique. Stepwise linear regression analysis was performed to identify independent significant factors associated with the number of lymph nodes obtained. Stepwise logistic regression analysis was conducted to identify the independent significant factors associated with higher T-stage (3 or 4).

Results: There was a significant difference in average LNC per level dissected at 6.161 for patients with a BMI <22 and 7.736 for patients with a BMI ≥22 (p-value 0.0005). Multivariate analysis showed that among the variables tested only BMI (<22 vs. ≥22) was significantly associated with decreased LNC per level. (p=0.006) and that low BMI (≤22 vs. ≥22) was significantly associated with higher T-stage (p=0.0002) after controlling for the effects of tobacco, smoking, sex, Charlson-Age comorbidity index, and the number of lymph nodes.

Conclusions: Low BMI in HNSCC is associated with higher t-stage and lower LNC per level of neck dissected possibly reflecting a generalized acquired immunodeficiency due to undernutrition.

A Study to Evaluate the Effect of Statin Use on Allograft Function and Survival After Lung Transplantation

Neel Bhan

Mentor: Amit Banga MD, Department of Internal Medicine

Rationale: Recent literature has suggested favorable effects of statins on inflammatory states and diseases beyond dyslipidemia. There is clinical data showing association between statin use and improved outcomes among lung transplant (LT) patients. However, there is lack of data evaluating effects of statins on surrogate markers of allograft function such as surveillance bronchoscopy or imaging evidence of air trapping. METHODS: This was a single center retrospective chart review study. We included 193 patients (mean age 56±14 years, M:F 113: 80) who underwent single or bilateral LT during 2012-2014. Various demographic, clinical and laboratory variables including the use of statins before or within 1 year after LT were recorded. Study endpoints included development of primary graft dysfunction (PGD), highest lung functions achieved during the first year, development of air-trapping assessed on ventilation-perfusion scan (VQ) at 1 year, findings on annual surveillance bronchoscopy (grade of acute cellular rejection, Cd4 staining, other findings such as organizing pneumonia or diffuse alveolar damage), development of de-novo donor specific antibodies (DSA) and survival at 2-year post-transplant. RESULTS: The proportion of patients on statins before or within the first year of LT was 65.3% (126/193) among which majority were on statins before LT (n=86) while the rest were started after LT. Patients on statins were older ($p<0.001$), had higher pre-transplant body mass index ($p<0.001$), and were more likely to have an obstructive or restrictive diseases as the transplant indication ($p<0.001$). Statin use was associated with improved survival at 2 years post transplant (80.1% vs 65.7%; OR 1.58, 1.08-2.32, $p=0.03$, See Figure 1). However, there was no association of statin use with any other early or late outcome variables including PGD, highest lung functions achieved during the first year, acute cellular rejection or lymphocytic bronchiolitis at annual bronchoscopy, air trapping on VQ or development of DSA. On Cox proportional hazard modeling, statin use did not emerge as an independent predictor of 2year post-transplant survival. CONCLUSIONS: Although the crude post-LT survival is better among patients with statin use, the adjusted survival is not superior. Further, there is lack of association of statin use with any of the surrogate markers of allograft function, including PGD, air trapping, surveillance bronchoscopy or DSA. This data argues against a causal link between use of statins and improved survival among LT patients.

Effect of Mineralocorticoid Receptor Antagonists in Treating Anthracycline-Induced Cardiomyopathy, A Comparative Study Between Drugs Used to Treat Heart Disease in Survivors of Childhood Cancer Who Were Treated with Anthracycline Chemotherapy

Trey Bowen

Mentor: Angela Orlino MD,
Vlad Zaha MD, PhD, Department of Internal Medicine

Introduction: Childhood cancer survivors developing late cardiotoxic effects of anthracycline and radiation therapy have poor outcomes. Standard of care heart failure therapy fails to prevent progression of advanced chemotherapy induced cardiomyopathy. Recent studies have suggested cardioprotective effects of mineralocorticoid receptor antagonists (MRA) used for primary prevention in patients receiving treatment with anthracycline chemotherapy. However, the role of MRA in secondary prevention of late cardiomyopathy is not known. Therefore, we aimed to test the hypothesis that MRA treatment prevents progression of cardiomyopathy in childhood cancer survivors.

Methods: We performed a retrospective cohort analysis on 377 childhood cancer survivors in the After the Cancer Experience (ACE) program. We included all patients that: 1) were exposed to anthracyclines and completed treatment >2 years, 2) were at least 18 years of age, 3) had an echocardiogram within the past 10 years, and 4) had valid contact information. We extracted clinical history, laboratory data, and cardiac imaging data from the medical record and administered cross-sectional questionnaires regarding symptoms of cardiomyopathy. We analyzed longitudinal changes in study variables in 3 groups of patients: A) MRA within the past year, B) alternative cardiac-specific medications, and C) no cardiac-specific medication to evaluate the effect of MRA vs. other cardiac therapies vs. no therapy.

Results: 182 patients met inclusion criteria and 67 completed the study (37%). The anthracycline dose showed an inverse correlation with left ventricular ejection fraction (LVEF) ($p<0.01$) and a direct correlation with NT-proBNP ($p<0.05$) and left ventricular end-systolic volume ($p<0.05$). The cross-sectional questionnaire demonstrated lower frequency of ability to walk one block in group A (Reported limitation in walking one block in A vs. B vs. C, $p<0.05$), but there were no perceived differences in reported shortness of breath. LVEF on most recent echocardiogram was lower in group A than group C ($p<0.05$), but there was no significant difference in LVEF between groups A and B. Administration of MRA but not other cardiac therapies resulted in an improvement in LVEF (before vs. after MRA initiation, $p<0.05$).

Conclusion: MRA administration as a single drug or in combination with standard of care in the management of cardiomyopathy due to anthracyclines and radiation improves LV function and is well tolerated in survivors of childhood cancer. Further prospective investigation is necessary to confirm long term outcomes of this intervention.

The Effect of Diet on Urinary pH Fluctuations Among Older Women with Recurrent Urinary Tract Infections

Jacqueline Chavez

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Juliann M. Chavez, PhD; Alana L. Christie, MS; Feras Alhalabi

Introduction and Objectives: Acidic urine pH may be protective against recurrent urinary tract infections (RUTIs), a common problem in older women. Diets higher in animal protein and lower in fruits and vegetables have been associated with a lower urine pH. We compared diet intake to urine pH fluctuations throughout the day in healthy older women with RUTIs. **Methods**: Following IRB approval, $\geq$ 64 year-old women with documented RUTIs were enrolled. Participants were given 7-consecutive days pre-formatted charts to record urinalysis reagent strips (Medimpex) findings 4 times per day (before each meal and at bedtime) as well as concomitant information on their food/beverage intake (food diary) at each meal. No patients were on a controlled diabetic or renal diet. Urine cultures were obtained at baseline to ensure no infection during this recording. Nutrient content reported in each 7-day food diary was analyzed by an experienced registered dietitian (JMC) and compared to parallel fluctuations in urine pH. **Results**: Over 3 months, 12 women with a mean age of 71.8 ± 4.7 years (64-82) participated. Seven exhibited consistent urine pH values ($\leq$ 1 unit) over all 28 measurements, with a mean of 5.8 ± 0.46. Minimal daily diary changes were observed in 2/7 patients. Among 5 of 12 women with variable (>1 unit) urine pH values, only total carotenoid was associated with a decrease in urine pH (P = 0.0187). All other nutrients were associated with an increase in urine pH (Table 1). Drops to pH 5 occurred between all measurement times: pre-breakfast and pre-lunch (11), pre-lunch and pre-dinner (13), pre-dinner and bedtime (13), and bedtime and pre-breakfast (10). A drop to pH 5 was observed in 11% (pH 7 to 5), 17% (pH 6.5 to 5) and 72% (pH 6 to 5). **Conclusion**: In this exploratory study, nearly 40% of older women with RUTI exhibited significant changes in urine pH over one week associated with dietary nutrients found in whole grains, leafy vegetables, nuts, and legumes. A longitudinal study is needed to determine if changing an individual's diet to decrease the urine pH might affect the rate of RUTIs.

Table 1: Nutrients associated with an increase in urine pH (P < 0.05).

Micronutrients		Macronutrients	Other
Copper	Potassium	Carbohydrates	Caffeine
Magnesium	Pyridoxine	Fructose	Fluids
Niacin	Riboflavin	Glucose	Food weight
Pantothenic Acid	Thiamin	Fatty Acid Chain 6:0	
		Tyrosine	

Urine pH Variability Over Time in Women with Recurrent Urinary Tract Infections

Jacqueline Chavez

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Alana L. Christie, MS; Feras Alhalabi

Introduction and Objectives: Little is known about the variation of urine pH in older individuals. This can be relevant for the efficacy of antibiotics administered in the treatment of recurrent urinary tract infections (RUTIs) and possibly for preventive measures. We report on changes in urine pH in infected and uninfected urine samples from women with RUTIs.

Methods: An IRB-approved, prospectively maintained database of women with antibiotic-refractory RUTIs managed with electrofulguration (F) at a tertiary care center was reviewed. Included were women with at least 6 months follow-up post-F, and an electronic medical record (EMR) documenting complete list of medications, urinalysis with urine pH at time of urine culture to determine infected (I) versus non-infected (NI) status, and creatinine and urea levels at the time of the urinalysis. Mixed model analysis was used to assess for significant association of positive culture, creatinine, and urea with pH, using a compound symmetric covariance structure to account for the correlation of multiple pH measurements from the same patient.

Results: From 2005-2017, 283/477 patients met study criteria. A total of 926 urine pH and culture results were studied, 288 I and 638 NI. Average number of urine cultures per woman was 3 ± 2.6 (1-16). Mean age was 64 (18-92) years, and 95% were Caucasian. Mean follow-up was 24 (12-144) months. Mean creatinine level was 0.84 ± 0.28 mg/dL (0.37-2.49), and mean urea level was 17.1 ± 8.1 mg/dL (8-58). Renal failure (GFR<45) was noted in seven individuals (3.7%). Creatinine measurements >1.5 mg/dL were observed only at urine pH $\leq$7, and urea levels >30 mg/dL were only observed at urine pH $\leq$6. Creatinine levels were more associated with urine pH than urea (P = 0.0441 and P = 0.0556, respectively). The median urine pH observed in both I and NI cultures was 6, and there was no change in urine pH compared to age for I or NI cultures.

Conclusion: Despite variability in urine pH for an individual, this large longitudinal study comparing urinary pH in women with infected and non-infected urine samples indicates no median urinary pH difference and no major influence in women with normal kidney function.

Prospective Evaluation of Daily and Weekly Urine pH Variations in Postmenopausal Women with Recurrent Urinary Tract Infections

Jacqueline Chavez

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Alana Christie, MS; Feras Alhalabi

Introduction and Objectives: Recurrent urinary tract infections (RUTIs) are a common problem among older women. Antibiotics such as nitrofurantoin and sulfamethoxazole have been shown to be effective in a urine pH 5-6 range, whereas fluoroquinolones are more effective at an alkaline pH. Little is known about patterns of daily changes in urine pH which could influence the antibiotic response.

Methods: Following IRB approval, women 64 years or older with documented history of RUTIs were enrolled. Participants were given urinalysis reagent strips (Medimpex) and pre-formatted charts to measure and record their urine pH at home 4 times per day before each meal and at bedtime. A 7-consecutive day collection period was recorded, yielding 28 measurements per patient. Urine cultures were obtained at baseline to ensure no active infection at the time of urine pH measurements. For those able to provide a second week of measurements, an additional urine culture was repeated before starting the second week.

Results: Over a two-month period, 12 women with a mean age of 71.8 ± 4.7 (64-82) years participated. Mean interval time between two, 7-day measurement periods was 8 (0-17) days. Urine pH variation was observed in every individual, but urine pH measurement range $\leq$ 1 unit was observed in 58% of participants. The median pH across all data points was 6 (5-8). Median urinary pH for the first 7-day measurement period was 0.2 pH units lower than for the second 7-day period (95% CI -0.3 to -0.1; P=0.0089). Drops in pH were observed between all measurement times. Eleven occurred between pre-breakfast and pre-lunch, 13 between pre-lunch and pre-dinner, 13 between pre-dinner and bedtime, and 10 between bedtime and pre-breakfast. The magnitude of pH drops varied, including pH 6 to 5 (75%), pH 6.5 to 5 (13%), pH 7 to 5 (10%), and pH 7.5 to 5 (2%).

Conclusion: We observed important daily fluctuations in urine pH in women with RUTIs. This novel finding may provide guidance when selecting and timing antimicrobial therapy and guide new research in ways to modulate urine pH that could reduce RUTIs and/or improve antibiotic delivery.

Impact of Urine pH on Antibiotic Response in Women with Uropathogenic Escherichia coli Recurrent Urinary Tract Infections

Jacqueline Chavez

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Alana Christie, MS; Feras Alhalabi

Introduction and Objectives: As early as Brumfitt in 1948, the relationship between the effectiveness of certain uro-antibiotics and urinary pH levels has been considered.[1] Some antibiotics are more effective at a urine pH range 5-6, whereas others work better at a more alkaline (urine pH 7-8) range. We compared the urine pH of women infected with *E. coli* to their antibiotic treatment response.
Methods: An IRB-approved, prospectively maintained database of well-characterized women with antibiotic-refractory recurrent urinary tract infections (RUTI) managed with electrofulguration (F) at a tertiary care center was reviewed. Included were women with at least 6 months follow-up post-F, an electronic medical record (EMR) documenting urine pH value at the time of each urine culture, and at least one *E. coli* positive urine culture. Total number of urine cultures post-F, urine pH variability, antibiotics prescribed, and the interval (months) between antibiotic administration and another UTI episode were reviewed.
Results: From 2006-2016 23 women met study criteria, with mean follow-up of 2 (1-9) years and mean age of 66 (28-92) years. Total number of urine cultures was 181, including 93 positive (I), 88 negative (NI), and 54 with *E. coli*. The average number of urine cultures per patient was 7 ± 3.8 (2-16). Median urine pH observed was 6, with no difference between I, NI, or *E. coli* urine cultures. There was no change in urine pH with aging. Six individuals were prescribed antibiotics for which pH has not been shown to change efficacy, 10 in whom urine pH aligned with the reported best efficacy range for their prescribed antibiotic, and 7 whom urine pH was not in the ideal antibiotic pH range. Mean interval time between first and second positive urine culture was longer for those with the appropriate urine pH for the prescribed antibiotic (26 months, 2-63) compared to those with a mismatch between urine pH and optimal pH range for their antibiotic (18 months, 1-33).
Conclusion: This observational study explores the possible link between the urine pH of a woman with RUTIs and her response to antibiotic treatment administered without taking her urine pH into account. Future studies are needed to determine if an individual's urine pH needs to match the optimal pH range of a prescribed antibiotic to result in maximum therapeutic efficacy.

Reference

1. Brumfitt W. Adjustment of Urine pH in the Chemotherapy of Urinary-Tract Infections. *Lancet*. 1962 Jan;279(7222):186-190.

Achieving Balance between Resident Autonomy and Patient Safety: Analysis of Resident-led Microvascular Reconstruction Outcomes

Justin Davis

Mentor: Andrew Zhang MD, Department of Plastic Surgery

Background: With the advances in microsurgery, the published success rate of microsurgical reconstruction by experienced microsurgeon is greater than 95%. However, it is unknown whether the training residents can produce similar results. At our county hospital, while under direct supervision, residents perform and lead all aspects of microsurgical reconstruction with only as needed faculty assistance. In this study, we retrospectively reviewed the outcomes of 157 consecutive microsurgical cases to determine the efficacy and safety of resident-led reconstructions.

Methods: We performed a prospective review of patients who underwent microsurgical reconstruction at the county hospital from 2016 to 2018. Demographic, surgical procedure, flap data, resident levels, and complication data were collected.

Results: Of the 157 flaps performed, the most commonly performed reconstruction was breast(63.8%), followed by lower extremity(11.7%), upper extremity(6.7%), head and neck(6.1%), and genital(1.2%). The average procedure time was 525 minutes(210 – 990) and ischemia time for each flap was 67 minutes(18 – 300). The venous anastomoses were performed by PGY3(1.1%), PGY4(32.2%), PGY5(12.2%), and PGY6(46.7%) while the arterial anastomoses were performed by PGY4(10%), PGY5(18.9%), and PGY6(67.8%). The average number of anastomosis attempts was 1.4 with a range of 1 to 6. The total flap success rate was 95.7% with a takeback rate of 5.1%.

Conclusion: In conclusion, our analysis shows that resident-led reconstruction can achieve similar microsurgical success as the published rates. We believe resident-led microsurgical reconstruction can be safely performed with as needed faculty assistance in high-risk and complicated cases while allowing resident education and maturation of technical and decision-making skills.

Initial Outcomes of an Enhanced Recovery Protocol for Spinal Deformity

Luke Dosselman

Mentor: Carlos Bagley MD, Department of Neurosurgery
Collaborator: Jessica Moreno MS, BSN, RN

Introduction: Enhanced Recovery After Surgery (ERAS) pathways have been implemented since the early 2000s in an effort to minimize the surgical stress response and speed return to function. The result was a decrease in length of stay, better outcomes for the patient, and a decrease in the overall cost of the procedure and hospital stay. After the success of its original adoption in colorectal surgery, variations of ERAS pathways have been applied to many other surgical specialties in the following years, but data for neurosurgical procedures are lacking.

Hypothesis: It is hypothesized that by implementing an ERAS pathway, a cohort of patients undergoing elective spinal fusion for deformity will have a decreased ICU length of stay (LOS), decreased total length of stay, and a decreased inpatient opioid consumption, when compared to a similar control group.

Methods: The control group was selected from 573 patients with the diagnosis of scoliosis seen in clinic from October 2016 to October 2017. Of these, 334 were managed conservatively. This left 239 possibly undergoing surgery, of which 85 met the selection criterion of a fusion spanning four levels or greater. Chart review was performed for each of these patients and data were abstracted regarding ICU LOS, total LOS, and the amount of opioids consumed during hospitalization, converted to milligram oral morphine equivalents (OME). The finalized UTSW ERAS Spine protocol was implemented on August 1, 2018. Within the first 90 days, 14 qualifying patients underwent an operation for spinal deformity under the new ERAS protocol.

Results: We observed a decreased median total LOS (4.5 vs 6 days, $p = 0.016$), mean ICU LOS (0.857 vs 1.918 days, $p = 0.001$), and median inpatient opioid use (299.005 vs 610.9 mg OME, $p < 0.001$) compared to the control group. The median ICU LOS was unchanged at 1 day. One patient required readmission and reoperation due to imaging findings concerning for epidural compression.

Discussion: Despite the early nature of results after the program was implemented, the initial data show a significant decrease in ICU LOS, total LOS, and the amount of opioids consumed during admission. The decrease in opioid use during admission is partially attributable to the decreased total LOS; other likely causative factors include the emphasis on multimodal analgesia and preoperative pain expectation counseling. As compliance to the program becomes more routine, the authors expect LOS and opioid requirement to continue to decrease.

Improved Automated Liver Volumetry Using Spectral CT and Convolutional Neural Networks

Clayton Douglas

Mentor: Yee Seng Ng MD, Department of Abdominal Imaging
Collaborator: Yin Xi PhD, Yuxiao Qian MD,
Lakshmi Ananthakrishnan MD, Todd Soesbe PhD, Mathew Lewis PhD,
Robert Lenkinski PhD, Julia Fielding MD

Liver segmentation and volumetry have traditionally been performed using CT attenuation to discriminate liver from other tissues. Spectral detector CT (SDCT) allows for the separation of materials based on a two-material decomposition of their photoelectric and Compton components, producing an enriched dataset represented in a form of 2D histogram (MADplot). Previously, we have shown improvement in segmentation performance of two simple segmentation algorithms (region growing and GMM cluster analysis) when MADplot data is used for the segmentation over conventional CT. In this study, we aim to prove that the benefit is still present on more advanced algorithms such as one that uses convolutional neural networks. We designed two equivalent convolutional neural networks based on a UNETS architecture, one that uses SDCT MADplot data, while the other uses conventional CT data. The networks are then trained on 20 hand segmented livers over 800 epochs. The two networks are then evaluated on livers from 10 patients. DICE similarity coefficient (a statistical measurement of the similarity of two samples) to the reference standard (hand segmentation) for the CNN algorithm applied on SDCT MADplot is 0.91±0.01, significantly higher compared to the equivalent algorithm applied on conventional CT with DSC of 0.88±0.03 ($p=0.003$). In conclusion, we have demonstrated that segmentation of the liver on SDCT MADplot data results in improved segmentation quality over conventional CT, even on more advance algorithms that applies convolutional neural network.

Thirty-day Readmission, Reoperation, and Mortality in Surgical Management of Metastatic Bone Disease of the Extremeties

Kathryn Gallaway

Mentor: Alexandra Callan MD, Department of Orthpedic Surgery
Collaborator: Junho Ahn, BS

Background: Metastatic bone disease of the extremities is a significant cause of morbidity and mortality. Surgical management is not curative, rather it is intended to provide symptomatic relief to patients suffering debilitating bone pain or pathologic fracture. Risks and benefits of surgery must be carefully considered. However, previous studies are limited by small sample sizes due to the rare incidence of these procedures.

Purpose: The aim of this study is to use a large national registry to elucidate the incidence and risk factors for complications, readmission, reoperation, and mortality in the first thirty days following surgical treatment of metastatic bone disease of the femur or humerus.

Methods: A retrospective review of patients in the ACS-NSQIP database who underwent surgery between 2005 and 2016 was performed. Patient demographics, comorbidities, surgical factors, and thirty-day morbidity and mortality were recorded. The cohort was partitioned by surgical site and modality to determine if there were any differences in outcomes between the groups.

Results: One thousand fifty four patients were identified, and 40.7% of patients experienced at least one complication within 30 days of surgery. The most common complication was intra- or post-operative bleeding requiring transfusion, occurring in 32.9% of cases. 13.1% of patients experienced at least one post-operative complication other than bleeding. Unplanned readmission and reoperation occurred after 12.7% and 4.1% of cases respectively. The 30-day mortality rate was 7.1%. Femur and arthroplasty cases were associated with a higher risk of bleeding requiring transfusion. Prophylactic stabilization was associated with a lower risk of unplanned reoperation and had the lowest overall complication rate.

Conclusions: Surgical management of metastatic tumors of the femur or humerus carries substantial risks of complications, readmission, reoperation, and mortality in the first 30 days following surgery. Prophylactic stabilization of impending fractures may lower the overall risk of complications and unplanned reoperation in the first 30 days following surgery. Further study is needed to identify specific risk factors for poor outcomes.

Comparative Study of 68Ga-DOTATATE PET/CT Versus Conventional Imagine For Staging and Management of Neuroendocrine Tumors

Esteban Garcia

Mentor: Rathan Subramaniam MD, PhD, MPH, Department of Radiololgy

Introduction: Neuroendocrine tumors are a heterogeneous group of neoplasms that present in various parts of the body including the gastrointestinal tract, pancreas, lungs, adrenal glands, thyroid. While neuroendocrine tumors are rare, their yearly incidence has increased in the last three decades at a yearly rate of 6 percent. ^{68}Ga-DOTATATE PET/CT is reported to have the highest sensitivity for neuroendocrine tumors against other imaging modalities (CT, MRI).

Objective: This investigation seeks to compare staging of neuroendocrine tumors with ^{68}Ga-DOTATATE PET/CT and conventional imaging (CT and MRI) while characterizing the management change following the scans.

Methods: This is a retrospective study that analyzed patient's charts that had undergone staging for neuroendocrine tumors with both ^{68}Ga-DOTATATE PET/CT and conventional imaging. Staging was assessed at primary sites, local-regional lymph nodes and distal sites of metastasis for both conventional and ^{68}Ga-DOTATATE PET/CT. Differences in lymph node and distal metastatic involvement were compared between PET/CT and conventional imaging. Patients were categorized into 6 groups by the management change of the neuroendocrine tumors following the PET/CT to assess its impact.

Results: Imaging detected tumors in the GI system (45%), pancreas (14%), and lungs (14%) mostly. The median time between scans were 33.5 and 76 days for baseline and recurrent populations, respectively. Both lymph node and distant metastatic detection is increased with ^{68}Ga-DOTATATE PET/CT as opposed to conventional methods(LN: 81% vs 60%; Distant Mets: 85% vs 74%). Management of patient treatment was observed in half of baseline and 33 percent of recurrent populations. Nodal involvement difference between the scans was associated with a change in management for those in the recurrent population ($p<.02$).

Conclusion: Here we show that the ^{68}Ga-DOTATATE PET/CT leads to management change in more than a third of cases and hence has valuable clinical implications beyond those provided with CT and MRI.

Implementation of a Standardized Care Pathway for Patients Undergoing Total Knee Arthroplasty

Daniel Gelvez

Mentor: Michael Huo MD, Department of Orthopedic Surgery
Collaborators: Sean Shahrestani, MD; Paul Nakonezny, PhD; Girish P. Joshi, MD; Kenneth Estrera, MD

Background: Standardization of care pathways has demonstrated improvement in the outcomes of total knee arthroplasty (TKA). The purpose of this study is to evaluate the impact of standardization of the care pathways in TKA patients at a tertiary, safety-net hospital in a large metropolitan community. The hypothesis is that the care pathways would improve pain control, reduce length of stay, and reduce complications following unilateral primary TKA's.

Methods: The patient population included 2 cohorts of consecutive, unselected primary TKA patients. These two cohorts represent those cases before and after the implementation of a standardized care pathway. The pathway group included 185 patients. The non-pathway group included 146 patients. Outcomes measured included length of stay (LOS), PCA (patient controlled analgesic) usage, complication rates, and discharge disposition. The geometric means of LOS and PCA usage were estimated using a negative binomial model which considered age, sex, BMI, complications (yes/no), and blood transfusion (yes/no) as covariates.

Results: The two cohorts were similar in age (FDR=.195), male sex (.747), race distribution (Hispanic (.835), Black (.651), White (.834) Asian patients (.834)). They were also similar in the BMI (.267), and the pre-op hemoglobin (.256). In terms of disposition, the pathway group had more discharges to home (.027). The 95% CI for the length of stay of the pathway group was 2.469-2.832 days and 2.757-3.486 days for the non-pathway group. The 95% CI for days on PCA was .043-.0592 days for the pathway group and 1.735-2.004 for the non-pathway group. ***FDR=False Discovery Rate based on p value, (FDR): values in parentheses are FDR***

Conclusion: A negative binomial model showed that standardization of the care pathway for primary TKA's is an effective tool for improving pain control (decreased PCA use **p=.0001**) and the length of stay (decreased in pathway group **p=.0382**). The pathway group also showed improvement in the disposition to home (**p=.027**). Our data demonstrated that this strategy was effective and safe in this high-risk patient population, as these patients were cared for at a safety-net hospital with limited resources.

Laryngeal Cancer in Young- and Middle-aged Patients: An Evaluation of Risk Factors, HPV Status and Outcomes

Calvin Geng

Mentor: Andrew Day MD, MPH, Department of Head and Neck Surgery
Collaborators: Priscilla Tanamal MS, Ellen Wang MD, Simone Arvisais-Anhalt MD, Justin Bishop MD, Baran Sumer MD, John Truelso MD, Larry Myers MD, Brittny Tillman MD, Lenka Stankova MD, Eli Gordin MD, Kathleen Tibbetts MD, Ted Mau MD, Lesley Childs MD

Introduction: A growing proportion of patients with laryngeal squamous cell carcinoma are young- and middle-aged nonsmokers without a history of alcohol abuse. Human papillomavirus (HPV) is known to cause oropharyngeal cancer but has not been ascribed an etiologic role in laryngeal cancer. The objective of this study is twofold: 1) to characterize the natural history and outcomes of young-and middle-aged patients with and without traditional risk factors for laryngeal cancer and 2) to evaluate the associations between HPV status and risk factor profiles.
Methods: The study design was a single-institution retrospective cohort review. Seventy-eight young- and middle-aged patients (< 65 years) with primary laryngeal SCCa were identified. Patients with ≤ 5 pack-years tobacco use, ≤ 5 total years smoking, ≤ 14 drinks of alcohol per week and ≥ 15-year interval from last tobacco abuse or heavy alcohol use to diagnosis were classified as "non-traditional".
Results: Eighteen of 78 patients exhibited a non-traditional risk factor profile and 60 exhibited a "traditional" risk factor profile. Characteristics of non-traditional versus traditional patients, respectively, were: female sex - 22.2% vs 6.7%, p=0.20; median age – 50.7 vs 59.2, p<0.01; white, Hispanic, black race/ethnicity – 55.6%, 16.7%, 22.2% vs 66.7%, 5.0%, 8.3%, p<0.05; Adult Comorbidity Index-27 score of 0 to 1: 88.9% vs 91.7%, p=0.66; clinical stage I or II: 61.1% vs 57.9%, p=0.45; tumor HPV16/18/31/33 status: 57.1% vs 4.8% p<0.01. Multivariable analysis demonstrated a significant difference in adjusted overall mortality hazard ratios according to stage I-II (reference) and stage III-IV disease (HR 5.43, 95% confidence interval [CI] 1.44-20.45, p=0.01) but no significant difference according to traditional (reference) versus nontraditional patients (HR 0.24, 95% CI 0.03-2.16, p=0.20). There were no significant differences in adjusted recurrence-or-mortality hazard ratios for stage I-II (reference) vs stage III-IV patients (HR 1.81, 95% CI 0.80-4.09, p=0.16) or traditional (reference) versus nontraditional patients (HR 0.40, 95% CI 0.11-1.43, p=0.16)
Conclusion: Nearly one-quarter of young- and middle-aged patients *did not* exhibit characteristic risk factors for laryngeal SCC. HPV may be associated with laryngeal cancer risk, and this finding should be investigated further. Considering sample size limitations and inability to adjust for current smoking and heavy drinking, patients with advanced-stage disease, not a traditional risk profile, exhibit an increased risk of death.

Impact of Self-Perceived Risk and Trust in the Emergency Physician on Outpaitent Follow-up in Low-Risk Chest Pain Patients Discharged from the Emergency Department

Leon Gu

Mentor: Deborah Diercks MD, Department of Emergency Medicine
Collaborators: James Sutton, Mario Puente, Khushbakht Bakhshi

Study Objectives: Chest pain is one of the most common reasons why patients present to the Emergency Department (ED). However, if patients are determined to be at low-risk for Acute Coronary Syndrome (ACS) due to testing such as negative troponins and serial electrocardiograms, it is acceptable to discharge them with close outpatient follow-up. Follow-up compliance is low, and little is understood about associated factors and barriers. We hypothesize that self-perceived heart disease risk and trust in the discharging emergency physician impact follow-up compliance.

Methods: This is a study of patients who presented to the ED with chest pain, who were then discharged and given an appointment at an Acute Response Clinic for follow-up. In-person surveys were given to patients prior to discharge. Patients were asked to estimate their own risk for heart disease and about any barriers to follow-up and completed the Short Assessment of Health Literacy (SAHL-E) and the Trust in Physician Scale (TiPS).

Results: 74 patients were enrolled in this study with 41.9% follow-up rate. Patients with low self-perceived risk of heart disease (10% or less) were less likely to show to their follow-up appointment than those reporting high-risk, between 10 and 100% (17.5% vs. 50.6%, p=0.03). Other factors, such as health insurance, employment, and low trust in the emergency physician, may be predictive of high follow-up rates. However, these factors were not significant.

Conclusion: Self-perceived risk for heart disease, as well as general social and demographic factors, were correlated with higher follow-up attendance. Emphasizing true risks for cardiac disease as well as educating patients that a negative ED work-up for ACS is not proof that cardiac disease is not present could also improve follow-up.

Pain Catastrophizing, Anxiety, and Depression in Hip Pathology

Savannah Hampton

Mentor: Joel Wells MD, MPH, Department of Orthopedic Surgery
Collaborator: Paul A. Nakonezny PhD

Background*:* Psychological factors may play a critical role in patient satisfaction and outcomes following orthopedic surgery. Pain catastrophizing (PC), anxiety, and depression have been associated with negative outcomes and are potentially modifiable. We assessed the level of these psychological factors in patients with hip pathology and correlated these levels with patient-reported outcome measures.

Methods*:* Patients presenting to a comprehensive hip orthopedic clinic were prospectively evaluated for PC, anxiety and depression. Validated assessments were utilized that included The Pain Catastrophizing Scale (PCS), the Hospital Anxiety and Depression scale (HADS), and the Short-Form-12 and patients reported outcome measures. Rates of PC, anxiety, and depression were calculated. Multiple linear regression modelling was used to determine the relationship between outcome measures.

Results*:* A total of 328 patients were identified for inclusion, with diagnoses of hip dysplasia (DDH, n=50), femoroacetabular impingement (FAI, n=55), lateral trochanteric pain syndrome (LTP, n=23), hip osteoarthrosis (OA, n=184), and hip osteonecrosis (HON, n=16). Clinically significant levels of PC, anxiety, and depression were found in each subgroup (Table 1). HADS Anxiety and HOOS ADL predicted PCS total (Adjusted $R^2 = 0.4599$). Age, HADS Depression, and PCS total predicted HADS Anxiety (Adjusted $R^2 = 0.4985$). Age, HADS Anxiety, perceived function, PCS total, and HOOS Quality of Life predicted HADS Depression (Adjusted $R^2 = 0.5802$).

Conclusion*:* Patients that present with hip pathology also exhibit significant PC, anxiety, and depression and these factors are partially associated with quality of life and function. A multidisciplinary approach to identify and address these factors as part of comprehensive orthopedic care may contribute to improved postsurgical outcomes.

Table 1. Psychologic status by diagnosis

Characteristic	DDH	FAI	LTP	OA	HON
Age (years), mean (range)	30.96 (14-65)	38.53 (18-64)	63.74 (20-78)	63.47 (18-91)	39.38 (18-71)
Abnormal PCS (n, %)	11 (22%)	5 (9.1%)	3 (13%)	40 (21.7%)	4 (25%)
Abnormal HADS Anxiety (n, %)	8 (16%)	6 (10.9%)	1 (4.4%)	21 (11.4%)	7 (43.8%)
Abnormal HADS Depression (n, %)	6 (12%)	4 (7.3%)	1 (4.4%)	26 (14.1%)	1 (6.3%)

Examining the Association Between Platelet Count and Clinically Significant Events in TTP

Waqas Haque

Jenna Wiles

Mentor: Manasa Reddy MD, Department of Pathology

Background: TTP (thrombotic thrombocytopenic purpura) is a thrombotic disorder primarily of the microvasculature affecting 1 in 100,000 individuals. It is caused by a deficiency in ADAMST13, which is an enzyme that cleaves von Willebrand factor. This leads to a low platelet count and microangiopathic hemolytic anemia with associated renal, cardiac, and neurologic symptoms. Standard treatment includes PLEX (plasma exchange), along with immunosuppressants such as rituximab and prednisone. While some patients show a sustained response in platelet count with just plasma exchange and corticosteroids alone, historically approximately 40-60% of patients exhibit exacerbations and relapses. Anecdotally, we have observed that those patients whose platelet counts rise faster during treatment seem more likely to have a significant drop in platelet count in the following days and weeks.

Purpose and Methods: We wanted to examine the rates of exacerbation in patients who presented to one of two teaching institutions (Parkland or Clements University Hospital) with an initial episode of acute TTP, and to determine whether faster response to TTP treatment was a predictor of exacerbation. To accomplish this, we performed a retrospective chart review of 47 patients with descriptive analysis and logistic regressions.

Results: In our sample of patients, 87.2% of patients received PLEX therapy with a mean starting platelet count of 23 (minimum: 5, maximum 196). 22 (46.8%) patients were placed on rituximab, with 15 of these patients (68.2%) receiving 4 doses of treatment. No clear statistically-significant association was uncovered between platelet count response and risk of exacerbation. Also, no significant association was noted between starting platelet count and early exacerbation. Further statistical analysis is pending.

Discussion: This study is the first to investigate the potential association between the rise in platelet count during treatment for TTP and future exacerbations. While preliminary results indicate no significant association between platelet count response rate and exacerbation risk, larger studies are needed to confirm how trends in platelet count effect disease prognosis, with the goal of updated treatment regimens that will enhance patient response to therapy.

Albumin is Predictive of 1-Year Mortality After Transcatheter Aortic Valve Replacement

Katherine Hebeler

Mentor: Michael DiMao MD, Department of Cardiothoracic Surgery
Collaborators: Heike Baumgarten MD, John J. Squiers MD, Jordan Wooley BS, Benjamin D. Pollock PhD, MSPH, Cecile Mahoney BS, Giovanni Filardo PhD, MPH, Brian Lima MD

Background: A validated model for predicting 1-year outcomes after transcatheter aortic valve replacement (TAVR) does not exist. TAVR-specific risk models may benefit from frailty markers, and sarcopenia may represent an objective frailty marker. This study assessed the predictive ability of sarcopenia and frailty markers on 1-year mortality after TAVR.

Methods: We evaluated 470 patients undergoing TAVR at a single center. Frailty was assessed using 4 markers (gait speed, handgrip strength, serum albumin, and Katz activities of daily living). Sarcopenia was measured as the cross-sectional psoas muscle area on pre-TAVR computed tomography. Performance of four models incorporating Society of Thoracic Surgeons Predicted Risk of Mortality (STS-PROM), frailty, and/or sarcopenia metrics for predicting 1-year mortality was assessed with area under the curve, Hosmer-Lemeshow statistics, and calibration plots.

Results: A total of 63 (13.4%) deaths occurred by 1-year. STS-PROM alone was poorly predictive of 1-year mortality (AUC 0.52, 95%CI: 0.42, 0.68). Only the model including both sarcopenia and all frailty markers (AUC 0.61, 95%CI: 0.53, 0.68) significantly improved predictive ability compared to STS-PROM alone ($p = 0.05$). Albumin was the only frailty marker significantly associated with increased risk for 1-year mortality ($p=0.03$). Psoas muscle area, as a surrogate for sarcopenia, was not significantly associated with increased risk for 1-year mortality.

Conclusions: Most commonly used pre-TAVR risk assessments are poorly predictive of 1-year mortality. Albumin was the only frailty marker that was associated with higher mortality. Future studies should investigate whether optimization of nutritional status can improve outcomes following TAVR.

Myocardial Perfusion Reserve as a Marker for Transplant Coronary Vasculopathy

Tyler Huffaker

Mentor: Silvestre Duran MD, Department of Pediatric Cardiology
Collaborator: Silvestre Duran MD, Tyler Huffaker BSc, Bryant Dixon BSc, Ryan Butts MD, Tarique Hussain MD, PhD

Background: In pediatric heart transplant (PHT) patients, cardiac catheterization is used to monitor for coronary allograft vasculopathy (CAV) by angiography of epicardial vessels. Cardiac catheterization has no safe and consistent method for measuring microvascular disease burden. Cardiac MRI (CMR) with quantitative adenosine perfusion testing offers safe, non-invasive estimates of myocardial perfusion. We investigated the myocardial perfusion reserve index (MPR) in PHT patients with and without angiographic evidence of CAV.
Methods: All patients with CAV followed at our institution who received their transplant before age 18 were asked to participate. We also recruited age and sex matched PHT controls without angiographic CAV. Patients underwent CMR with adenosine stress perfusion testing. Global T1 (GT1) and extracellular volume (ECV), additional microvascular disease markers, were also obtained. Myocardial perfusion was evaluated by administering a gadolinium bolus and then quantifying signal intensity over time at both rest and stress. MPR is the ratio of estimated myocardial blood flow during stress to that during rest. Adequate stress was measured by changes in heart rate and blood pressure as well as monitoring for splenic switch off.
Results: 15 PHT patients, age 12-22, underwent CMR with adenosine stress perfusion testing. 8 had CAV previously seen by angiography and 7 had no CAV diagnosis. No heart block or other significant complications occurred during the study. Mean MPR for the full cohort was decreased at 1.645 (±0.505). Mean MPR for patients with CAV demonstrated a trend of being lower at 1.584 (±0.540) compared to 1.645 (±0.427) for control patients (p=0.34). The GT1 (1016 ± 84) and ECV (30.4% ± 4.4) for the cohort were also abnormal. Patients within six years of transplantation had trends towards higher MPR (1.662 ± 0.431) than those with transplants more than six years ago (1.569 ± 0.589;p=0.19). MPR and ECV showed strong correlation across the cohort (R=0.75;p=0.004). MPR and GT1 did not (R=0.09;p=0.4).
Conclusion: MPR is a safe and feasible method for estimating myocardial perfusion in PHT patients. Our results showed a diminished MPR in the whole cohort, indicating some degree of microvascular disease in most patients. There was a trend toward worse perfusion in patients with angiographic evidence of CAV, and in patients further out from heart transplant. ECV showed strong correlation with MPR, but GT1 did not. Currently there is no reliable way to monitor microvascular disease in pediatric patients, but MPR and ECV show potential and deserve investigation in a larger cohort.

Sugammadex versus Neostigmine for Reversal of Rocuronium-Induced Neuromusclar Blockade: A Study of Thoarcic Surgical Patients

Kathryn Jan

Mentor: Tiffany Moon MD, Department of Anesthesiology
Collaborators: Taylor Pak BS, Katelynn Smith BS, Alwin Somasundaram, BA

Background: Sugammadex is a novel agent for the reversal of neuromuscular paralysis. Neostigmine is more commonly used for reversal but is associated with side effects including bronchospasm, nausea/vomiting, hypotension, and bradycardia. While there has been anecdotal evidence that patients treated with sugammadex have better subjective measures of recovery compared to those treated with neostigmine, few studies have systematically evaluated this, especially in patients whose pre-existing pulmonary disease predisposes them to postoperative adverse respiratory events. The simultaneous evaluation of clinical outcomes, economic implications, and postoperative recovery quality could give evidence to support usage of a neuromuscular reversal agent with less side effects.
Hypothesis: In thoracic surgical patients, reversal with sugammadex as compared to neostigmine will result in less hypoxic episodes in the post-anesthesia care unit (PACU), improved postoperative recovery quality, and lower costs secondary to the faster reversal to extubation, reversal out of operating room (OR), and shorter PACU stay.
Methods: 100 adult patients undergoing thoracic surgery with general endotracheal anesthesia are enrolled into this double-blind study to evaluate three domains: physiological factors, nociceptive factors, and emotional factors. After obtaining baseline parameters, patients are randomized to one of two groups: one receiving 50mcg/kg, maximum 5mg of neostigmine mixed with 8mcg/kg, maximum of 1mg glycopyrrolate; the other receiving 2 mg/kg of sugammadex. Upon patient's PACU arrival, degree of neuromuscular function is assessed utilizing the TOF Watch accelerometer device, and parameters, including vitals, postoperative quality recovery scale (PQRS) assessment, adverse events, and drugs given, from the time the patient arrived in the PACU until discharge are observed and recorded.
Preliminary Results: While approximately 81 patients have been enrolled so far, statistical analysis is pending more data collection; however, there appears to be two distinct groups, one of which has a significantly shorter reversal time as well as a shorter duration in the PACU than the other. It is predicted that those who receive sugammadex will experience better outcomes related to these factors.
Conclusion: If there is a significant improvement as a result of sugammadex usage, a revision of current protocol for neuromuscular blockade reversal in thoracic surgical patients is recommended to improve patient outcomes and lower costs.

Youth isn't Always Queen: The Impact of Age on Trends in Breast Reconstruction

Avinash Jayaraman

Mentors: Sumeet Teotia MD;
Nicholas Haddock MD, Department of Plastic Surgery
Collaborators: Catherine E. Sobieski, Jeffrey N. Li, Connie Ma,
Austin A. Hembd MD

Introduction: In 2015, Butz *et al* described an association between advanced age and post-operative deep vein thrombosis (DVT) and pulmonary embolism (PE) in patients undergoing unilateral autologous breast reconstruction.[1] Advanced age was not found to be a predictor of other complications.[1] Literature is lacking in these age-associated descriptions of surgical trends in bilateral autologous reconstructions.

Methods: Retrospective chart review was performed on n=477 patients who had autologous breast reconstructions performed by two senior surgeons (NTH, SST). Patients were grouped by age: Group1 (<40 yr, n=54), Group2 (40-64 yr, n=379), and Group3 (>65 yr, n=44). Hospital stays, operative times, post-op complications, and revisions were tracked. Completion of the breast reconstruction process was tracked via patients who received either nipple reconstruction surgery, or nipple tattoo. ANOVA was run using SPSS.

Results: Comorbidities were equivalent between groups, except Group1 had the highest BMI (31.72, $p<.01$). Rates of post-flap donor & breast hematoma, donor & breast seroma, donor & breast wounds, infections, DVT, PE, pneumothorax, and unplanned returns to the O.R. were equivalent across groups. Flap procedure time (p=.437), length of post-op surgical ICU stay (p=.269), and length of overall post-op hospital stay (p=.644) were equivalent between groups. Number of revision surgeries was equivalent across groups (p=.277). Percentage of patients who completed the breast reconstruction process was also equivalent across groups (p=.774) – indeed, it is interesting to note that in our sample, even the oldest patients (group3, 39%) showed only a 5% decrease in completion of reconstruction when compared to group1 and group2 (both 44%).

Discussion: In line with most of the findings of *Butz et al*, we found that age is not a significant predictor for post-operative complications. Interestingly, we noted that the rate of DVT in older patients is not significantly higher at our institution, differing from the *Butz* study. Keeping in mind these trends in complications, unplanned returns to the OR, and completion of breast reconstruction, the pursuit of autologous reconstruction appears to be a safe option even for the medically healthy aging patient.

1) Butz, Daniel R. M.D.; Lapin, Brittany M.P.H.; Yao, Katharine M.D.; Wang, Edward Ph.D.; Song, David H. M.D., M.B.A.; Johnson, Donald M.D.; Sisco, Mark M.D. Advanced Age Is a Predictor of 30-Day Complications after Autologous but Not Implant-Based Postmastectomy Breast Reconstruction. Plastic and Reconstructive Surgery: Feb2015 - Vol135 - Issue 2 - p253e–261e.

Determining the Efficacy of Parenting Classes for Homeless Women with Children at Union Gospel Mission

Janice Jiang

Mentor: Patti Pagels PA-C, Department of Family Medicine
Collaborators: Christine Park, Nora Gimpel MD

Context: Union Gospel Mission homeless shelter in Dallas, Texas provides temporary housing for the homeless, including single women with children. Children in homeless centers are at risk for developing maladaptive tendencies owing to the nature of single-parent households, and the financial and emotional instability of the families.[1] In response, several parenting programs have emerged as preventive therapy at those sites, but efficacy of the sessions have not been evaluated.

Objective: To determine the efficacy of implementing positive parenting classes to homeless women with children.
Design: Pilot/exploratory prospective cohort study.
Setting/Participants: Women from the Union Gospel Mission who have completed at least one session of the seminar series.

Intervention/Instrument: Interested residents of Union Gospel Mission participated in the Triple P-Positive Parenting seminar series of three 60-minute lectures, conducted by trained individuals from Dallas Children's Advocacy Center. Topics included 1) Raising Confident, Competent Children, 2) Raising Resilient Children, and 3) Power of Positive Parenting.[1] Surveys were conducted prior to and after participation in the seminar series to assess the parents' perception of positive parenting, their confidence in carrying out parenting techniques, and their interest in further education.

Results: Preliminary results showed that 90% of women found the classes useful, 100% of women believed that "positive parenting" was the best way to parent a child, and 90% of women felt more equipped to use the techniques taught in the classes to parent their children after participating in the seminars. Additionally, 52% stated they would like to further the parenting education with in-depth and interactive small-group discussions offered as Phase III of the Triple P Program.
Conclusion: Our pilot study demonstrated that homeless women with children benefit from participating in an empirically supported positive parenting curriculum. At the Union Gospel Mission, the Triple P-Positive Parenting curriculum succeeded in equipping single mothers with positive parenting techniques and drawing their interest in further levels of intervention. Because of the relatively small number of participants and the targeted population in this study, the generalizability of data gathered may be limited. Future direction would be to implement Phase III of the Positive Parenting program at Union Gospel Mission.

The Effect of Mindfulness-based Intervention for Homeless Women in Dallas on Stress Reduction

Janice Jiang

Lakshmi Menon

Mentor: Patti Pagels PA-C, Department of Family Medicine
Collaborator: Nora Gimpel MD

Context: Mindfulness-based stress reduction (MBSR) interventions have been widely utilized and proven in the literature to be effective ways to reduce stress and anxiety in a large variety of patient populations. There is very little literature looking at the use of adapted mindfulness-based interventions in the homeless populations and in individuals of lower socioeconomic status.
Objective: To determine the efficacy of implementing an adapted mindfulness-based stress reduction class among homeless women
Setting/Participants: Women seeking temporary shelter from Union Gospel Mission Homeless Shelters in Dallas, TX
Intervention/Instrument: Participants were recruited via flyers and word of mouth from Union Gospel Mission homeless shelters to participate in the stress relaxation/mindfulness class. Weekly 1 hour sessions were implemented, during which participants were led through guided meditation, breathing exercises, and discussions about mindfulness. Pre- and post- intervention surveys were administered to participants who attend the class. The pre-survey assessed the stress levels of the participants prior to the class, while the post-survey assessed both the participants' stress level after the class and their satisfaction with the skills taught through the class.
Results: Our pilot study demonstrated a small reduction of acute stress among homeless women participating in a pilot version of mindfulness-based stress intervention (although no statistical significance was found). 51% of participants felt more relaxes after participating in the class, 56% found the class useful, 57% indicated wanting to participate in another class, and 56% stated they would use the techniques taught in the class outside of class time. Participants cited homelessness (13), finance (8), children (7), stressors regarding work including unemployment and dissatisfaction with current job (7), lack of transportation (2), their health (1), and their marriage (1) as being their biggest stressors at the time of taking the survey.
Conclusion: Our pilot study demonstrated a small reduction of acute stress among homeless women participating in a pilot version of mindfulness-based stress intervention (although no statistical significance was found). Because of the relatively small number of participants and the targeted population in this study, the generalizability of data gathered may be limited. Future direction would be to implement this program at Calvert Place men's shelter as well as to collect data regarding the long-term effects of participating in such a program.

Prescribing Medications that Impact Weight: Findings from Comprehensive Review of Two Drug Databases, Expert Input, and Consensus Development

Hannah Justice

Mentor: Christy Turer MD, Department of Pediatrics
Collaborators: Carlos Alvarez PhD, Sarah E. Barlow MD, MPH, Michael Bowen MD, MPH, Adriane M. dela Cruz MD, PhD, Olga Gupta MD, MPH, Una Makris MD, Ishak Mansi MD, David B. Sarwer PhD, Leandra Uribe MD, Karthika Venugopalan

Background: Specific medications impact weight and may contribute to the obesity epidemic. Yet, limited information is available regarding the scope of commonly used medications impacting weight/adiposity as a side effect.

Objective: To identify commonly used prescription medications with evidence of impact on weight.

Methods: Using the Center for Disease Control's (CDC) 28 most commonly prescribed medication classes, we identified medications within each class among the universe of prescription medications in a master electronic health record (EPIC Systems EHR) drug list for both children and adults. Each medication was referenced in two drug databases (Micromedex and Lexicomp) for impact on weight in duplicate by two independent reviewers. Conflicts were adjudicated by referencing FDA drug labels and consensus. Content experts (in psychiatry, endocrinology, rheumatology, obesity medicine, general internal medicine and pediatrics) reviewed the final medication list and suggested additional medications they believed to impact weight. Each expert-added medication was vetted using the methods described above, plus, by consulting a second content expert when no evidence on impact on weight was identified, and finally, by consensus.

Results: Eighteen of 28 CDC medication classes included medications that impact weight. Of 182 unique medications identified as impacting weight: 95% were identified through drug-database review and 5% from expert input. There were 129 medications associated with weight gain and 103 associated with weight loss. Among the CDC-reported most commonly prescribed medication classes to children, the top three classes with medications impacting weight were adrenal cortical steroids, analgesics, and antidepressants. Among the most commonly prescribed medication classes for adults, the top three classes were analgesics, anti-diabetic agents, and antidepressants.

Conclusions: Numerous medications have evidence of impact on weight as a side effect. Compiling this information is critical to supporting providers in clinical decision-making that maximizes prescription medication weight neutrality/loss for patients with overweight and obesity.

Altered Atrial Remodeling in the Muscular Dystrophies

Anishka Kappalayil

Mentor: Pradeep Mammen MD, Department of Internal Medicine
Collaborators: Vishal Patel MD, Daniel Cheeran MD, Vlad Zaha MD, PhD
Ronald Peshock, MD

Introduction: Muscular dystrophies (MD) are genetic disorders that cause progressive peripheral skeletal myopathies. The specific mutations lead to a cycle of muscle degeneration and regeneration in MD patients, ultimately producing progressive skeletal muscle wasting. Many of the MD patients also develop associated cardiomyopathies and in 2018 is the leading cause of death. Our group has demonstrated that MD patients have very small left ventricular (LV) masses as well as depressed LVEF. This data suggest that the mode of maladaptive cardiac remodeling may be different in MD vs NICM patients. However, it remains unknown the degree of atrial remodeling that occurs in MD patients. Therefore, the central hypothesis of this study is that atrial remodeling in MD patients is altered in comparison to non-ischemic cardiomyopathy patients.
Methods: Utilizing the UTSouthwestern Cardiomyopathy Clinic, MD and NICM patients were identified. Data was extracted from cardiac MRIs to measure left atrial (LA) volumes and function. The variables used were the LA end systolic volume (LA-ESV), LA end diastolic volume (LA-EDV), and LA ejection fraction (LAEF). These measures were normalized to the body surface area (BSA). We collected data on 78 MD patients (33 MD females, 45 MD males) and 80 NICM patients (28 NICM females, 52 NICM males). Utilizing unpaired two-sided T-test, LA data was analyzed between the matched MD and NICM patients.
Results: The MD and NICM patient cohorts showed significant differences in the LA structure and function.

	LA-EDV-I Male	LA-EDV-I Female	LA-ESV-I Male	LA-ESV-I Female	LAEF Male (%)	LAEF Female (%)
MD Pts						
Avg.	36.75	39.39	18.85	18.03	49	55
St. Dev	13.56	9.71	10.43	6.75	13	9
NICM Pts						
Avg.	48.58	46.00	28.25	31.15	40	35
St. Dev	30.26	19.00	16.01	18.85	19	19
P-Value	<0.005	<0.005	<0.01	0.08	<0.005	<0.005

Conclusion: Collectively, the data suggests alternative mode of maladaptive cardiac remodeling in MD vs NICM patients. Thus, further investigation into the mechanism that leads to MD-associated cardiomyopathy may ultimately identify novel therapeutic targets for the amelioration of this disease entity.

The Difficult Airway: Incidence and Predictors in Lean vs. Obese Patients in A Large Teaching Hospital

Sadia Karani

Mentor: Tiffany Moon MD, Department of Anesthesiology
Collaborator: Katie Smith BS, Kathryn Jan BS, Taylor Pak BS, Alwin Somasundaram BS

Introduction: Improper airway management is the most frequent cause of morbidity and mortality related to anesthesiology, and some authors report that the incidence of difficult intubation in obese patients is much higher compared to non-obese patients. There is dissension on which test or method of airway assessment is most predictive of difficult intubations in obese populations. Anatomic predictors of difficult intubation have a low sensitivity when used alone, but measuring multiple parameters of the airway in order to determine a multivariate composite risk index may better predict difficult intubations and ultimately identify patients requiring extra care.
Methods: About 3000 patients who were scheduled to undergo elective surgery under general endotracheal anesthesia (GETA) at Parkland Hospital have been enrolled. Subjects were excluded on the following criteria: age less than 18 or older than 80, inability to give informed consent, history of difficult intubations, or neck abnormalities/ pathologies**.** After consenting the patient, a research assistant or anesthesia provider measured their thyromental distance, sternomental distance, Mallampati score, interincisor distance, mandibular protrusion, and neck range of motion. Patients also answered the STOP BANG questionnaire to screen for obstructive sleep apnea. After the induction of general anesthesia per standard of care, a research assistant asked the anesthesia provider the difficulty of mask ventilation and if any adjunct equipment was used. The provider's level of training and years of experience and the type of laryngoscope blade used were recorded as well. Finally, the intubation difficulty scale (IDS) composed of 7 questions was recorded and the cumulative score was used to assess difficulty of intubation. Patients with an IDS score $\geq$5 were considered "difficult" intubations.
Results: BMI alone is a weak predictor of difficult intubations as determined by an IDS $\geq$5. Other factors are needed to best predict difficult intubations in obese patients. Statistical analysis is pending.
Discussion: This study demonstrates that obesity alone is not predictive of difficult tracheal intubations as determined by an IDS $\geq$5 and that additional bedside tests are more predictive for assessing difficult airways among patients. Previous studies have found an increased incidence of difficult intubation in morbidly obese patients compared to the general surgical population. However, there is a need for more effectively predicting difficult intubations in order to identify patients requiring extra care and prevent anesthesiology-related complications.

Three-Dimensional Characterization of the Cleft-Side Alar Deformity in Skeletally Mature Patients with Unilateral Cleft Lip

Laura Kenyon

Mentor: Christopher Derderian MD, Department of Plastic Surgery
Collaborators: Rami Hallac PhD, Aishwarya Ramamurthi BS, Christopher Derderian MD

Background/Aim: The nasal deformity observed in skeletally mature patients with unilateral cleft lip (UCL) is complicated by significant asymmetry, which includes the cleft-side ala. This study aims to quantitatively compare the cleft-side ala to the contralateral non-cleft ala in skeletally mature patients with UCL.

Methods: CT scans from skeletally mature patients with complete UCL were gathered and converted into 3D computerized models. 18 patients aged 15-19 years met inclusion criteria. The cleft-side and contralateral non-cleft alae were segmented based on reproducible anatomical landmarks. The volume and surface area of the alae were calculated from the 3D images of the segmented alae. The axes of the cleft-side and non-cleft alae were measured in relation to the midsagittal plane.

Results: The cleft-side and contralateral non-cleft alae were significantly different ($p < 0.001$) in volume, surface area, surface area to volume ratio, and axis. The cleft-side ala was lesser in volume by 27.3% (880.7 ± 331.7 vs. 1205.6 ± 370.4), lesser in surface area by 17.6% (634.0 ± 145.1 vs. 769.7 ± 147.8), and greater in surface area to volume ratio by 14.6% (0.76 vs. 0.66) compared to the contralateral non-cleft ala. The cleft-side ala had a greater axis in relation to the midsagittal plane by 43.1% (36.0° ± 6.9 vs. 25.2° ± 6.6) compared to the contralateral non-cleft ala (Table 1). The intra-rater reliability test indicated a consistent method of obtaining volume (R^2= 0.96) and surface area (R^2= 0.98).

	Non-cleft Ala	Cleft-side Ala
Volume (mm^3)*	1205.6 ± 370.4	880.7 ± 331.7
Surface Area (mm^2)*	769.7 ± 147.8	634.0 ± 145.1
SA:V Ratio*	0.66	0.76
Axis (°)*	25.2 ± 6.6	36.0 ± 6.9

Table 1. Non-cleft vs. cleft-side alar V, SA, SA:V Ratio, and Axis
*p-values < 0.001

Conclusion: Significant asymmetry exists between the cleft-side and contralateral non-cleft alae in patients with UCL. The cleft-side ala is significantly smaller in volume and surface area compared to the non-cleft ala. The orientation of the cleft-side ala is significantly different with a more horizontal axis than the non-cleft ala.

The Influence of Vitamin D in the Development of Keloids: A Cross-Sectional Comparison of Serum 25-Hydroxyvitamin D_3 Levels in African-Americans with and without Keloids

Jin Wan Kim

Mentor: Donald Glass II MD, PhD, Department of Dermatology
Collaborator: Hanseol Jeong MD

Recent investigations into the role of vitamin D receptors (VDR) in keloid pathogenesis have led several authors to hypothesize about the possible influence of low serum 25-hydroxyvitamin D_3 [$25(OH)D_3$] levels in keloid development. This study investigates whether significant differences in $25(OH)D_3$ levels exist in individuals with keloids versus matched controls. A cross-comparison study was undertaken measuring serum $25(OH)D_3$ levels in 40 African-Americans with keloids and compared them to levels from controls matched for age, race, gender and time of year collected. The keloid group ranged from age 28 – 65 with a mean age of 46.9 years, was predominantly female (62.5%), with anywhere from 1 to 9 keloid lesions per person. The mean $25(OH)D_3$ concentration in individuals with keloids was 17.24 ± 6.74 ng/mL versus 15.68 ± 4.31 ng/mL in controls, which did not result in a statistically significant difference. Sub-group analysis for seasonal considerations also failed to demonstrate statistically significant differences in $25(OH)D_3$ levels. This study was unable to find an association between serum $25(OH)D_3$ levels and the development of keloids in African-Americans.

Energizing Compliance One Conversation at a Time

Sandy Kim

Mentor: Karanjit Kooner MD, PhD, Department of Ophthalmology
Collaborators: Jessica Lee, Ferzana Hossain, Betty Tong, Darara Borodge, Beverley Adams-Huet, MS

Purpose: To analyze compliance before and after counseling in patients with ocular hypertension (OHT), and those with mild, moderate, or severe primary open-angle glaucoma (POAG).

Methods: In this IRB approved prospective, comparative study, consecutive eligible patients were interviewed on compliance, educated on the importance of compliance and lifestyle changes, and sent home with supportive materials. Of 116 patients, 33 had OHT, 28 mild POAG, 39 moderate POAG, and 16 severe POAG. Inclusion criteria included a diagnosis of OHT or mild/moderate/severe POAG and the prescription of at least one glaucoma medication. Exclusion criteria included age less than 18 years, secondary glaucoma, acute angle closure glaucoma, recent glaucoma or cataract surgeries, significantly impaired mobility, and memory/cognitive impairment.

One eye was randomly selected per patient. Contingency tables were calculated for Fisher's Exact Test and McNemar's tests to analyze disease group differences in compliance and compliance following counseling, respectively. A Cochrane Armitage Trend Test was performed to analyze the positive trend in compliance across glaucoma disease groups. Predictive factors of compliance were analyzed using multivariate logistic regression.

Results: Of 116 patients, 69 (59.5%) were found to be compliant with their medication regimen. No significant differences in demographics (age, sex, education, employment, BMI) were found between compliant and non-compliant populations. Additionally, an increasing trend in compliance across disease severity was found ($p=0.05$). Moderate and severe POAG patients were respectively 4 and 6 times more likely to be compliant than patients with OHT. Of the 76 (65.5%) patients reached by phone call, 17 (22.4%) patients became compliant following an educational discussion ($p=0.02$).

Discussion: Counseling patients on compliance yielded a significant result with almost a quarter of the patient population becoming compliant. This finding was in part supported by the positive trend between compliance and disease progression and the probability of patients with greater disease severity being more compliant. It is possible that patients with greater disease duration and more frequent clinic visits are counseled more frequently and thus more compliant.

Conclusion: Our study confirmed that glaucoma education and lifestyle changes improved medication compliance.

Differences in Clinical Presentation of Chronic Rhinosinusitis in Pediatric Patients with Cystic Fibrosis Based on Severity of Disease

Ramya Krothapally

Mentor: Gopi Shah MD, MPH, Department of Otolaryngology

Background: Cystic fibrosis (CF) pediatric patients are more likely to develop chronic rhinosinusitis (CRS) than the general population. CRS in these patients can negatively affect their pulmonary function. While symptoms can be managed with medications and nasal sprays, CRS can become severe enough to require functional endoscopic sinus surgery (FESS). To date, no study has looked into the differences in CRS presentation with regards to patient's CF disease severity in children. The purpose of this study was to analyze the clinical presentation of CRS and outcomes after FESS in children with mild versus severe CF.

Methods: Pediatric CF patients who underwent FESS between 2002-2018 were retrospectively reviewed. Patient genotype, age at CF diagnosis, and pancreatic sufficiency status were used to group patients into severe and mild CF groups. Data including demographics, sinus symptoms, incidence of nasal polyposis, BMI-for-age, and pulmonary function testing were collected pre- and post-operatively.

Results: 39 patients met inclusion criteria. There were 22 males and 17 females. Four (10.3%) patients had mild CF and thirty-five (89.7%) patients had severe CF. Average age at FESS for the mild CF group and severe CF group was 7.28 years and 7.95 years respectively with no significant difference. The overall cohort did not show significant improvement in ppFEV1 at one year postoperatively ($p=0.84$) or in BMI-for-age ($p=0.77$). The severe group was significantly more likely to have nasal polyps (74.3% vs 25.0%, $p=0.0195$, 95% CI 16.38 to 85.17) that were reduced postoperatively ($p=0.0001$, 95% CI 22.49 to 62.55). They also presented with reduced symptoms of nasal congestion ($p<0.0001$, 95% CI 26.20 to 64.69) and rhinorrhea ($p=0.00073$, 95% CI 8.62 to 50.11)

Conclusion: In this preliminary study of cystic fibrosis severity in relation with chronic rhinosinusitis in the pediatric population, not as many differences between the two groups were found as expected. Despite having a mild genotype, this patient group still requires FESS to treat CRS around the same age as the severe group. While FESS does not seem to improve PFTS or BMI-for-age, the surgery is still helpful for reducing some of the more common symptoms of CRS as well as nasal polyposis.

Medical Management of the Peritonsillar Abscess in Children- A Case-Control Study

Ramya Krothapally

Mentor: Romaine Johnson MD, MPH, FACS, Department of Pediatric Otolaryngology- Head and Neck Surgery

Background: Peritonsillar abscess (PTA), a common deep neck abscess in the pediatric population, must be treated appropriately to avoid serious complications like the spreading of the infection into other deep neck spaces, abscess rupture, or airway compromise. Central treatment plans have been surgical (needle aspiration, incision, and drainage, tonsillectomy, or a combination) paired with antibiotics and other supportive care. However, nonsurgical treatment may be superior to surgical treatment in certain pediatric patients, especially if there hasn't been any airway compromise. More evidence is still needed showing that some patients with PTA can be treated medically if surgery cannot be performed or is incomplete. The objective of this study was to study a cohort of children with a peritonsillar abscess and examine whether the rates of abscess resolution and revisit rates are similar among patients treated initially medically versus surgically.

Methods: We analyzed a cohort of children, ages less or equal to 21 years with a peritonsillar abscess. Our primary hypothesis was that the resolution and revisit rates would be similar among children managed medically or surgically. Our secondary hypothesized was that surgical drainage was more common among older children. Chi-squared test was used to test for homogeneity. Significance was set $p<.05$, two-tailed.

Results: 226 met the inclusion criteria. The mean (SD) age was 12(4.4), there were 129/226 females (57%), and the predominant group was Hispanic 43% (97/226). A total of 85/226 (38%) were treated medically, and the remainder were treated surgically at presentation. Patients were more likely to be treated with surgery as they aged (OR = 1.2, 95% CI = 1.1 to 1.3). The treatment failure rate was 12% for the medical group and 6% for the surgical group. The odds of treatment failure was equal in both groups ($X^2=2.7$, $p=.10$) even after controlling for age. The surgical group was less likely to be admitted (OR=0.50, 95% CI = 0.28 - 0.90) but 39/226 (17%) had a tonsillectomy as an outpatient.

Conclusion: Treatment failure for PTA is similar between medical and surgical therapy, but older children are more likely to be offered a surgical option. Treating PTA with initial medical treatment appears is a safe and successful option for children.

Follow-up of E-Sister Participants at One Site to Evaluate the Very Long-term Results of Burch vs. Autologous Sling Procedure For Stress Urinary Incontinence

Inkkaruch Kuprasertkul

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Alana L. Christie MS, Gary E. Lemack MD

Introduction: To report the very long-term outcomes of the E-SISTEr participants who underwent Burch (B) or Fascia sling (S) procedures for stress urinary incontinence (SUI).

Methods: Following IRB and UITN approval, participants in SISTEr (1) and E-SISTEr (2) at one center who returned for a mid-term office evaluation in 2010 were further reviewed for longer term follow-up. This follow-up included office visits with EMR documentation on their continence status. For those not seen in the last 2 years, structured telephone interviews were conducted by a third party investigator (AK) not involved in patient care. Both groups received same validated questionnaires, including Urogenital Distress Inventory-Short Form (UDI-6), Incontinence Impact Questionnaire-Short Form (IIQ-7), and visual analog quality of life score (QoL). Failure was measured by a Kaplan-Meier curve using time to reoperation for SUI at the most recent patient encounter.

Results: Of 29 eligible patients (B=14, S=15), 21 had long-term information (B=11, S=10). Of the 8 lost to follow-up, 1 was deceased and 7 were unreachable by phone. Median follow-up was 15.1 years (range: 11.2-16.0). UDI-6 Q#3 score was lower for those followed up by phone (n=13, mean=0.3 ± 0.6) compared to those seen in clinics (n=8, mean=1.3 ± 1.1) (p=0.0208). Outcome measures for Burch vs. Sling are presented in the table. Reoperation for SUI/prolapse was required in 5 patients (B=4, S=1), with sacrocolpopexy (B=1), cystocele repair (B=1), fascial sling placement (B=1) or injectable agents (B=1, S=1). The Kaplan-Meier 10-year reoperation free survival rate was 95.2% (95% CI: 70.7-99.3).

Conclusion: In this well characterized small cohort, there was a sustained improvement in continence scores and quality of life related to SUI in both study arms, with a low reoperation rate over time.

Very Long-term Follow-up of the Anterior Vaginal Wall Suspension Procedure for Incontinence and/or Prolapse Repair

Inkkaruch Kuprasertkul

Mentor: Phillippe Zimmern MD, Department of Urology
Collaborators: Alana L. Christie MS, Feras Alhalabi

Introduction: To report the outcomes of the anterior vaginal wall suspension (AVWS) procedure for stress urinary incontinence (SUI) and/or anterior compartment prolapse (POP), with minimum 10 years follow-up.

Methods: Following institutional review board (IRB) approval, a long-term database of non-neurogenic patients who underwent AVWS for bothersome SUI with early stage anterior compartment prolapse (stage ≤ 2) "Small C" or symptomatic anterior compartment prolapse (stage > 2) "Large C" was reviewed. Any patient with less than 10-year follow-up was excluded. Preoperative evaluation included detailed history, uterine status, pad use, and 3 validated questionnaires [Urogenital Distress Inventory-Short Form (UDI-6), Incontinence Impact Questionnaire-Short Form (IIQ-7), visual analog quality of life score (QoL)]. Follow-up data was based on office visits in EMR or structured telephone interviews for patients not seen in the past 2 years. Telephone interviews used similar validated questionnaires and were conducted by a third party not involved in patient care. Failure was defined as any reoperation for SUI or POP at the last patient encounter (Kaplan-Meier).

Results: Between 1996 and 2008, 161 of 328 patients met study criteria, with follow-up from phone interviews (103) or office visits (58). The 167 lost to follow-up patients were deceased (52), mentally disabled (5), or unreachable by telephone (110). Median follow-up was 13.5 years (range: 10-22.1). Type of follow-up (office vs. phone) and uterine status (concomitant/prior/no hysterectomy) did not impact main outcome measures. Comparative baseline and outcome measures ("Small C" vs. "Large C") are presented in the table. The "Large C" group was older at the time of surgery and had a non-statistically significant higher reoperation rate. Reoperation occurred in 23 women (14%), with sacrocolpopexy (8), anterior colporrhaphy (5), injectable agents (8), or fascial sling placement (2). The Kaplan-Meier 10-year reoperation free survival rate was 87% (95% CI: 80.7-91.3).

Conclusion: The AVWS procedure to restore anterior vaginal support to the bladder neck and bladder base to correct SUI and/or POP can provide satisfactory and durable results.

The Impact of Ptosis, Breast Size, and Surgical History on Complications in Autologous Breast Reconstruction

Jeffrey Li

Mentor: Nicholas Haddock MD, Department of Plastic Surgery
Collaborators: Avinash P. Jayaraman BA, Connie Ma BA,
Catherine E. Sobieski MS, Austin A. Hembd MD, Sumeet S. Teotia, MD

Introduction: Previous studies have attempted to elucidate risk factors in autologous breast reconstruction associated with wound complications and outcome with varying results. BMI is a risk factor clearly associated with a variety of reconstructive complications. Pre-operative breast size has also been independently associated with infection and skin flap necrosis in expander-implant based reconstruction. However, there are few examinations of pre-operative breast dimensions and other comorbidities as a prognostic indicator of complications in free flap-based autologous reconstruction.
Methods: Retrospective chart review was performed on free-flap autologous breast reconstructions performed by two senior surgeons at UTSW (NTH, SST). Patients were divided into 2 groups:

1. No Complications (n=755) or No Serious Complications (non-operative or outpatient treatment)
2. Serious Complications (n=111) (requiring OR treatment or IV antibiotics)

t-tests, χ^2 tests, and box fisher tests were run for continuous, binary, and <5 samples variables using R. Logistic multi-variate regression was performed to control for BMI.
Results: Even after controlling for BMI: age, smaller cup size, patients with grade 0 ptosis, and narrower breasts (base diameter, cm) were significantly different between groups (p=0.01, 0.04, 0.02, 0.02, respectively). Patients with prior surgical history of breast implant or tissue expander, breast reconstruction, or lumpectomy were also significantly more likely to have serious complications (p=0.05, 0.02, <0.001, respectively). Smoking status, DM, HTN, hypercoagulability, autoimmunity, and history of abdominal, oncologic, or cosmetic surgery were not significantly different.
Conclusions: This study provides clinical evidence that larger breast size is correlated with increasing serious complications, independent of BMI, in free-flap autologous breast reconstruction after breast cancer. These complications required an extra return to OR or readmission, a clinically significant decision. Extra precautions should be taken in patients of advanced age, larger cup size, greater ptosis, and wider breasts to minimize risk of serious complications. Patients with previous breast surgical history should also be counseled of their greater risk for serious complications.

1. Moran SL, Serletti JM. Outcome comparison between free and pedicled TRAM flap breast reconstruction in the obese patient. Plast Reconstr Surg. 2001;108:1954Y1960

Predicting Response to Epidural Steriod Injections for Lumbar Spinal Stenosis with Biomarkers

Chung-Kuang Lin

Mentor: Thiru Annaswamy MD
Department of Physical Medicine & Rehabilitation
Collaborators: Aleks Borresen MD, Mitchell Kroll MS, Charles Taylor MD

Objectives: Epidural steroid injections (ESI) are frequently given to alleviate symptoms in patients with lumbar spinal stenosis (LSS) presenting with low back and leg pain, and neurogenic claudication symptoms despite several studies that have found no attributable benefit of epidural steroids in this population. However, wide variability in outcomes have been reported, suggesting room for improving ESI selection criteria. The objective of this pilot study was to explore biomarkers that may predict LSS patients' response to ESI. Based on previous studies, we aimed to identify some elevated inflammatory biomarkers, or EMG indicating nerve root injury that may favorably correlate with outcomes.

Methods: Eleven patients with LSS were recruited who provided pain, and patient reported outcome (PRO) data at baseline, and at 1 and 2 months post-ESI. Independent variables data obtained prior to ESI administration were: serum and epidural (lavage performed by administering and immediately aspirating 2-3 ml of preservative free normal saline) cytokine levels and standard diagnostic needle electromyography (EMG). Pearson correlational coefficients were calculated between independent variables and outcome measures.

Results: The following statistically significant correlations were noted. Serum monocyte chemoattractant protein-1 (MCP-1) levels were found to positively correlate ($r^2>0.92$; $p<0.01$) with improvement on 2-month satisfaction sub-score and total scores on the Swiss Spinal Stenosis Questionnaire (SSSQ). Abnormal EMG borderline correlated ($r^2=0.79$; $p=0.06$) with >2-point drop in pain score at 1-month, and negatively correlated with pain disability questionnaire (PDQ) scores at 1-month ($r^2=-0.83$; $p<0.05$). Epidural cytokine levels were not detectable in most samples, except for scattered marginally elevated levels in a few cytokines such as MCP-1, RANTES and IL-1b.

Conclusions: This exploratory pilot study revealed that some biomarkers indicative of inflammation and nerve root injury may be predictive of improvement following ESI in patients with LSS. The results of this study will be used to inform a fully powered study to evaluate these relationships more thoroughly.

The Impact of Race on Autologous Breast Reconconstruction: Trends, and Rates of Completion

Connie Ma

Mentor: Sumeet Teotia MD,
Nicholas Haddock MD, Department of Plastic Surgery
Collaborators: Catherine Sobieski, Jeffery Li, Avinash Jayaraman, Austin Hembd, MD

Background: Patients of lower socioeconomic status tend to have worse outcomes across various surgical specialties and across other measures of health. This study seeks to determine whether patient race impacts the complications experienced following breast reconstruction.

Methods: Retrospective chart review was performed on 541 patients. Reconstructions were performed by two senior surgeons (SST, NTH) from 2012 to 2018 at a county safety net and non-safety net academic practice. Patients were grouped by race: Group1 (White, n=362), Group2 (Black, n=86), Group3 (Hispanic, n=61), Group4 (Other, n=32). Parameters such as operative time, hospital length of stay, surgical complications, and revisionary procedures were followed. Completion of breast reconstruction was measured via patients who received either nipple reconstruction surgery or areolar tattoo. ANOVA was run with SPSS.

Results: Age at time of flap procedure was greatest for Group1 (53), which was significantly greater than for Group3 (47), $p<.01$. Group2 had the highest overall BMI (31.5), followed by Group3 (30.4). The significance across groups was $p<.01$. Group2 had the highest rate of diabetes (17%), which was significantly greater than Group1 (7%), $p=.01$. Other comorbidities (hypertension and history of autoimmune disease) were equivalent across all groups. Group3 had a significantly longer flap procedure time (536min) than Group1 (475min), $p=.04$. Group3 also had a significantly longer length of stay (4.61days) than Group1 (3.84days), $p<.01$. Other complications were equivalent across groups. There was no significant difference in rate of completion of reconstruction among groups, $p=.08$.

Conclusions: Patients of races traditionally considered socioeconomically disadvantaged (Black, Hispanic) had generally higher rates of comorbidities. Despite having more comorbidities, the rates of complications were equivalent across all groups. However, Hispanic and Black patients had a longer average procedure time and length of stay than other groups. Providers should be aware of these particular risks when operating on minority patients.

Reinnervation of the Orbicularis Oculi Muscle in Addition to Static Lid Support Confers Corneal Protective Advantages over Static Interventions Alone in the Subacute Facial Palsy Patient

Ahneesh Mohanty

Mentor: Shai Rozen MD, Department of Plastic Surgery
Collaborators: Justin Lee Perez MD, Austin Hembd MD, Nikhitha Thrikutam BS, Jeremy Bartley MD, Shai Rozen MD,

Corneal protection is crucial in flaccid facial palsy patients. Prolonged orbicularis oculi muscle (OOM) denervation without effective oculo-protective measures results in exposure keratopathy and in severe cases, vision loss. While traditional protective measures include periorbital static procedures, a small group of patients with subacute palsy may benefit from combining reinnervation of the OOM via several methods with static interventions. Therefore, the goal of this study is to objectively compare the extent of corneal protection between solely static and combined static and dynamic approaches.

Two patient groups of complete facial palsy patients with detailed available ophthalmologic exams were retrospectively identified: 1) chronic palsy patients who underwent solely static support procedures of the lower and upper eyelid, and 2) subacute palsy patients who underwent OOM reinnervation and static lid procedures. In addition to review of patient history and demographics, statistical analysis of mean corneal punctate epithelial erosion (PEE) scores was performed using GraphPad Prism software. Static and dynamic palpebral measurements were objectively assessed using MEEI Emotrics and frame-by-frame video analysis.

15 patients who underwent solely static procedures, while 9 patients who underwent combined OOM reinnervation and static procedures, were identified. Corneal analysis at 9-11+ months post-operatively revealed a 28.3% mean reduction in PEE scores in the OOM reinnervated group compared to the static only group ($p<.05$). Furthermore, among all OOM reinnervated patients, a significant global negative correlation between mean PEE score and post-operative duration ($R^2=0.24$, $\beta=-0.081$) was observed, while no such correlation was found among all static patients ($R^2=0.026$, $\beta=0.023$). This was consistent with improvements in eye closure dynamics: reinnervated patients were found to have 25.3% greater palpebral aperture closure ($p<.05$) and 32.8% higher closure velocity ($p<.01$) when compared to patients with solely static interventions.

In patients with subacute paralysis where OOM reinnervation is feasible, restoration of voluntary eye closure combined with static procedures proves advantageous over static procedures alone in conferring effective corneal protection, while improving dynamic and static palpebral closure outcomes.

Conversion From Referral to Surgery: What Factors Are Associated with Completion of Adolescent Weight Loss Surgery?

Neha Mulpuri

Mentor: Faisal Qureshi MD, Department of Pediatric Surgery
Collaborators: Elizabeth Victor PhD, Mark Lott PhD,
Lorrie Burkhalter, Gentry Wools

Introduction: Bariatric surgery has been used to treat severe obesity in adolescents. However, only a limited number of adolescents referred to surgery successfully complete the surgical program. Better identification of pre-surgical factors associated with completing bariatric surgery may determine successful referrals to surgical programs versus alternative behavioral health interventions.

Methods: A retrospective chart review of all patients referred from 2015 to 2018 to an adolescent surgical weight loss program was performed. Pre-operative factors, weight loss, and resolution of premorbid conditions among surgery completers (n=47) was compared to surgery non-completers (n=149) using backward stepwise logistic regression. Choice of procedure was laparoscopic sleeve gastrectomy. IRB approval was obtained.

Results: 196 adolescents were identified (17.1±1.61 yrs, body mass index (BMI) 50.2±8.8kg/m^2, 66% female). 47 (24%) underwent sleeve gastrectomy age (17.6±1.16 yrs, BMI 50.71±7.50kg/m^2, 78% female) and 149 (16.2±1.51 yrs, body mass index (BMI) 49.98±9.19kg/m^2, 62% female) did not complete the surgical program. There was no difference between completers and non completers in terms of age, race, ethnicity, BMI, premorbid medical conditions (hypertension, fatty liver disease, type 2 diabetes, hyperlipidemia), current or past mental health diagnosis, insurance type, referral source, or family history of weight loss surgery at surgical referral. Regression analyses revealed that boys (p=.045), patients with sleep apnea (OSA p=.009), and those that spent shorter time in the preoperative phase of the bariatric program (p<.001) were significantly more likely to have surgery. Surgery completers lost weight successfully p<0.05.

Conclusion: The conversion rate from adolescent referral to weight loss surgery is 24%. Male patients, and patients with OSA are more likely to undergo weight loss surgery. Patients who make significant changes upon surgical referral spend less time in the preoperative phase and more likely to complete surgery. Laparoscopic sleeve gastrectomy is successful in helping completers lose significant weight. These factors may help streamline referrals to adolescent surgical weight loss programs.

Factors Associated with Excess Weight Loss Percent Among Adolescent Bariatric Surgery Patients

Neha Mulpuri

Mentor: Faisal Qureshi MD, Department of Pediatric Surgery
Collaborators: Elizabeth Victor PhD, Mark Lott PhD, Lorrie Burkhalter, Gentry Wools

Introduction: Adolescent bariatric surgery is associated with significant weight loss with a reduction in medical comorbidities and improved psychological functioning. To date, there has been limited research exploring individual medical, demographic, and family factors associated with excess weight loss percent (EWL%) postoperatively in adolescents.

Methods: A retrospective chart review of adolescents who underwent sleeve gastrectomy between 2015 and 2018 was performed. A series of forward stepwise linear regressions at 6 weeks, 3 and 6 months postop were conducted to examine medical, family, and demographic factors associated with EWL%. IRB approval was obtained.

Results: 47 patients were identified (age 17.6±1.16, body mass index(BMI) 50.71±7.50kg/m^2). At 6 weeks, males (*M* EWL% = 17.68, *p*=.017) had a greater EWL% than females (*M* EWL% = 16.52). Patients with lower BMIs at first surgical appointment ($p < .001$) also had a greater EWL%. Patients referred from primary care providers and/or a pediatric high-risk obesity clinic (*M* EWL% = 17.72, *p*= .003) had a greater EWL% compared to patients referred from a specialty care clinic (*M* EWL% = 12.30*).* EWL% at 6 weeks was the greatest predictor of EWL% at 3 months (*p*<.001) and 6 months (*p*<.001) post-op. Interestingly, patients with higher BMIs at first surgical appointment, had higher EWL% at 6 months (*p*<.001) At all post-operative time points, there were no differences in EWL% outcomes with regard to race, ethnicity, age at surgery intake appointment, medical diagnoses (obstructive sleep apnea, hypertension, hyperlipidemia, non-alcoholic fatty liver disease, or type 2 diabetes), mental health diagnosis, insurance type, family history of weight loss surgery, or family members' successful weight loss maintenance post-op.

Conclusion: For adolescents undergoing bariatric surgery, greatest EWL% at 3 and 6 months post-op was most associated with the amount of weight a patient is able to lose in their first 6 weeks following surgery. Boys also had greater EWL% and BMI at first surgical appointment impacted EWL% differently at 6 weeks and 6 months, perhaps reflecting different rates of weight loss. Additional longitudinal data will be required to validate these findings.

Effect of Regional Anesthesia on Hospital Length of Stay After Ankle Fracture Fixation in Patients with and without Diabetes Mellitus

Chideraa Nwafor

Mentor: George Liu DPM, Department of Orthopedic Surgery
Collaborators: Junho Ahn BS, Dane Wukich MD, Michael VanPelt DPM, Katherine Raspovic DPM

Background: Diabetes mellitus (DM) is a risk factor for higher rates of in-hospital mortality, post-operative complications, and increased hospital length of stay after ankle fracture fixation. The use of regional anesthesia has been explored as a method of decreasing hospital length of stay to improve patient outcomes. The purpose of this study was to assess the relationship between regional anesthesia and hospital stay in patients with ankle fracture fixation with a focus on DM.
Methods: A retrospective review of the American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP) database was conducted. A total of 4,289 patients with ankle fracture treated in the inpatient setting non-electively were identified between 2014 and 2017. Patients were grouped by general, regional and general + regional anesthesia.
Results: The overall average time from operation to discharge was 2.8±4.0 days. The regional only group had significantly higher time to discharge than the regional + general anesthesia group (3.7±6.1 days vs. 2.6±3.2 days $p = 0.046$). However, no significant differences were appreciated between general and the regional + general anesthesia groups (2.8±4.1 days vs. 2.6±3.2 days, $p = 0.106$) or general only and regional only groups (2.8±4.1 days vs. 3.7±6.1 days, $p = 0.244$). Total hospital stay was also significantly longer in regional only vs regional + general anesthesia groups (5.5±6.9 days vs. 3.9±3.7 days, $p = 0.016$) and the regional only vs general only groups (5.5±6.9 days vs. 4.1±5.1 days, $p = 0.007$), but no difference was found with general only vs regional + general anesthesia (4.1±5.1 days vs. 3.9±3.7 days, $p = .571$). In the multivariate linear regression, older age ($p < 0.0001$), greater body mass index ($p < 0.0001$), insulin control (no diabetes vs. insulin, $p = 0.003$; non-insulin vs. insulin, $p = 0.018$), steroid use ($p = 0.040$), and American Society of Anesthesiologists class ≥ 3 ($p < 0.0001$) were significantly associated with increased time to discharge. Conversely, independent pre-operative function ($p=0.0025$) was associated with decreased time to discharge. However, anesthesia method was not a significantly predictive factor.
Conclusion: Regional anesthesia alone was associated with increased time to discharge after ankle fracture fixation compared to regional + general anesthesia. However, anesthesia was not an independent factor. These findings may reflect that patients who receive regional only anesthesia have higher general anesthesia risk and may subsequently require longer stay for closer observation. Further study is needed to confirm this hypothesis.

Does Pain Catastrophizing Predict Age of Onset in Symptomatic Hip Dysplasia and Femoroacetabular Impingement

Shawn Okpara

Mentor: Joel Wells MD, MPH, Department of Orthopedic Surgery
Collaborator: Paul Nakonezny PhD

Introduction: Age of onset in symptomatic hip dysplasia and femoroacetabular impingement can vary based on different factors including BMI, activity level, and severity. The purpose of this study was to investigate if pain catastrophizing, anxiety, and depression can predict the age of onset of hip pain in hip dysplasia (DDH) and femoroacetabular impingement (FAI).

Methods: We prospectively collected demographic, clinical, and radiographic data on 56 DDH and 84 FAI patients with FAI and 56 patients with DDH. Each was diagnosed based on radiographic findings and clinical history. Pain catastrophizing, anxiety and depression were assessed with the pain catastrophizing scale and hospital anxiety and depression scale, respectively. It was hypothesized that higher scale scores would predict younger ages of DDH and FAI onset. In addition to pain catastrophizing, anxiety, and depression, other potential predictors of age of onset were assessed: Sex, BMI (>30 kg/m2 vs. ≤30 kg/m2), history of hip surgery, laterality, Tonnis grade, Tonnis angle, Anterior Center Edge Angle, Lateral Center Edge Angle, Alpha Dunn angle, Alpha Frog angle. Patient reported outcome measures were also utilized, International Hip Outcome Tool, Hip Outcome Score, UCLA activity score, SF12 and WOMAC.

Results: Pain catastrophizing, anxiety and depression did not predict the age of DDH or FAI onset in DDH or FAI. The LASSO-penalized least squares multiple linear regression revealed that alpha Dunn angle, tonnis grade (1 vs 0), prior hip surgery, WOMAC pain score, and iHOT total score (quality of life) predicted age of onset in FAI (Adjusted R2 = 0.3099). Lateral center edge angle (LCEA), alpha Frog angle, Tonnis grade, (1 vs. 0), SF12 physical functioning, and BMI group (>30 kg/m2 vs. ≤30 kg/m2) predicted age of DDH onset. in DDH. (Adjusted R2 = 0.3578).

Conclusion: Pain catastrophizing, anxiety and depression were not associated with an earlier age of onset in DDH and FAI. Severity of disease, and higher BMI were associated with younger age of onset in DDH. Severity of disease was also associated with an earlier age of onset in FAI. More severe disease predicts earlier age of onset in DDH and FAI, whereas a patient's perception of pain may not influence the age of onset in hip preservation patients.

Use of the Montreal Cognitive Assessment (MoCA) in Pre-transplant Evaluation

Franklin Olumba

Mentors: Bekir Tanriover MD, MPH, Department of Nephrology
Malcom MacConmara MD, Surgical Transplantation
Collaborators: Yun Liang BA, Christine Hwang MD, Swee-Ling Levea MD, Parsia Vagefi MD

Introduction: Decreased cognitive function is associated with higher mortality in end stage renal disease (ESRD) and kidney transplant recipients, but unlike other aspects of pre-transplant evaluation, there is little data quantifying the level of impairment bearing greatest risk. Using the Montreal Cognitive Assessment (MoCA) to screen for cognitive impairment, we aimed to assess the MOCA score that could best predict which patients would be patients listed for kidney transplantation.

Methods: A single center retrospective analysis was performed including all adult patients (age ≥18 years) with either CKD 5 or ESRD, who were evaluated for kidney transplantation between January 1, 2016 and January 1, 2018. Non-parametric comparison tests were executed to assess differences in MoCA scores between subjects successfully listed for transplant and those not listed during the study period. Regression analysis was done to determine the relationship of MoCA scores to listing outcome.

Results: The mean MoCA score for the non-listed group vs. listed groups was 23.52 vs 24.3, P = 0.0248. Univariate regression showed a score ≥ 23 resulted in an OR of 1.88 (95% CI 1.18 to 2.99, p= 0.0078) for being placed on the transplant list. Multiple regression showed a MoCA score of ≥ 23 resulted in an OR of 1.03 (95% CI 0.23 to 4.52, p= 0.97).

Conclusion: A MoCA score < 23 can serve as a useful quantitative value for level of cognitive impairment to determining a candidates' suitability for kidney transplantation.

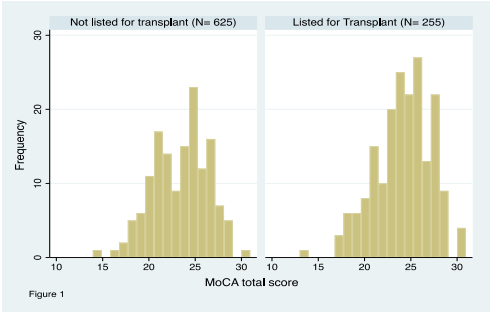

Figure 1

The Relationship Between Drusen Volume and Low-Luminance Visual Acuity Deficit in Intermediate Age-Related Macular Degeneration

William Ou

Mentor: Karl Csaky MD, PhD, Department of Ophthalmology
Collaborator: Renee A. Denlar, BS

Background: Age-related macular degeneration (AMD) is a progressive, degenerative disease that remains a leading cause of vision loss in the US. Because visual acuity (VA) is often unaffected in early and intermediate stage disease, there is a need to identify additional markers for AMD progression that may be used to help better stratify disease severity and risk of progression to advanced stages. Drusen volume measured on optical coherence tomography (OCT) and low-luminance visual acuity deficit (LLD) have both been suggested as candidate measures for this purpose. However, the precise relationship between these two measures is not completely understood.

Methods: In this prospective cross-sectional study, 40 patients with intermediate AMD underwent testing at the Retina Foundation of the Southwest (Dallas, TX). Patients were at least 55 years of age and had VA of 20/63 or better. Study participants underwent testing for visual acuity (VA) and low-luminance visual acuity (LLVA), as well as spectral-domain OCT. LLVA was measured by performing the VA assessment with a 2.0-log unit neutral density filter placed over the study eye. LLD was calculated as the difference between VA and LLVA. Drusen volume was measured in the central 3 mm of the macula and was defined as the volume between the inner border of the retinal pigment epithelium and Bruch's membrane. The main outcome measure was the coefficient of determination (R^2) for the relationship between drusen volume and LLD.

Results: Mean ± standard deviation (SD) LLD was 15.5 ± 5.7 letters (0.31 ± 0.11 logMAR) and mean ± SD drusen volume was 0.18 ± 0.09 mm^3. No significant linear relationship was identified between drusen volume and LLD ($p = 0.323$). R^2 for the bivariate linear model was 0.026 (95% confidence interval 0 to 0.206). Incorporation of lens status (phakic vs pseudophakic) into the model did not impact results ($R^2 = 0.123$), nor did censoring of patients with non-foveal reticular pseudodrusen ($R^2 = 0.055$).

Conclusion: The amount of drusen within the central 3 mm of the macula does not appear to be related to low-luminance visual dysfunction in intermediate AMD. These measures may be manifestations of different underlying pathophysiological mechanisms.

Hispanic Ethnicity is Associated with Early Presentation and Advanced Stage of Gastric Adenocarcinoma

Subhadeep Paul

Mentor: Matthew Porembka MD, Department of Surgery
Collaborators: Caitlin Hester MD, Sam Wang MD, Patricio Polanco MD, Adam Yopp MD, Mathew Augustine MD, John Mansour MD, Herbert Zeh MD, Matthew Porembka MD

Introduction: Gastric adenocarcinoma (GA) is a heterogeneous disease with variable presentation and progression between ethnic groups. We aimed to assess factors related to the early age of GA presentation (< 45 years) between racial and ethnic groups.

Methods: Using the National Cancer Database, patients with GA and upfront surgery were selected. Those receiving neoadjuvant therapy were excluded to ensure accurate pathologic stage. Clinicopathologic data was correlated to factors associated with age at diagnosis. Ethnicity was classified into Non-Hispanic White (NHW), Hispanic (HS), African American (AA) and Asian (AS). Univariate and multivariate linear regression models were used to determine factors associated with age of presentation. Overall survival was estimated using the Kaplan–Meier method and compared using log-rank tests.

Results: Between 2006 and 2013, 13392 patients with GA and upfront surgery were identified. Median age was 67 years (IQR: 57-76) and 61% were male. Mean age at diagnosis was variable between ethnicity (NHW: 7609, 57%, 68 years, HS: 1720, 13%, 61 years, AA: 2727, 20%, 64 years and AS: 1336, 10%, 64 years; $p<0.01$). HS and AA presented with more advanced stage (Stage 4: HS 20.8%, AA 19.2%, NHW 17.8%, AS 16.2%; $p<0.05$). On univariate analysis, female gender, HS race, uninsured status, Medicaid, advanced pathologic stage, and poorly differentiated tumor grade were associated with young presentation ($p<0.01$). On multivariate analysis, factors associated with young presentation included female gender (1.52, 95%CI: 1.31-1.76), minority race compared to NHW (HS: 2.30 95%CI: 1.92-2.86; AA: 1.37 95%CI: 1.24-1.67), and poorly (2.40, 95%CI: 1.34-4.29) or undifferentiated grade (3.56, 95%CI: 1.84-6.99). Median survival was significantly different between races (NHW 23 months, HS 41 months, AA 26 months, AS 50 months, $p<0.001$).

Conclusion: Young presentation of GA is associated with HS race, female gender, and advanced tumors. Despite HS presenting at a young age with more advanced disease, median survival was prolonged compared to AA/NHW. Further research is necessary to determine underlying biologic basis of ethnic variation observed in GA.

Disparities Associated with the Receipt of Palliative Care in Patients with Metastatic Gastric Cancer

Subhadeep Paul

Mentor: Matthew Porembka MD, Department of Surgery
Collaborator: Caitlin Hester MD, Sam Wang MD, Patricio Polanco MD, Adam Yopp MD, Mathew Augustine MD, John Mansour MD, Herbert Zeh MD, Matthew Porembka MD

Introduction: Metastatic gastric adenocarcinoma (mGA) is frequently associated with debilitating symptoms that negatively impact quality of life. We aim to determine the rate of palliative care (PC) use in mGA and the factors which are associated with receipt of PC.

Methods: Using the National Cancer Database, mGA patients were selected. Receipt of PC as defined by the NCDB participant use file was correlated to demographic and clinicopathologic factors. As defined according to NCDB, PC treatment included surgery, radiation, systemic therapy, and pain management to alleviate symptoms. Logistic regression was performed to assess the impact of factors on the likelihood of receiving PC. Overall survival was estimated using the Kaplan-Meier method and compared using log-rank tests.

Results: Between 2004 and 2013, 45519 patients with mGA and reported PC status were identified. Median age was 66 years (IQR: 55-76 years) and 64% were male. 7365 (16.2%) patients received PC. PC utilization increased over time (2004-6 13.4%, 2007-10 15.8%, 2011-13 19.1%; $p<0.001$). Factors associated with PC on univariate analysis included insurance status, education level, income, sex, race, Charlson/Deyo comorbidity score, and year of diagnosis (all $p<0.001$). On multivariate analysis, female sex (0.87, 95%CI: 0.83-0.92) and minority race were associated with less receipt of PC (Hispanic 0.73, 95%CI: 0.66-0.80, Black 0.87, 95%CI: 0.80-0.95, Asian 0.89, 95%CI: 0.77-0.98 compared to non-Hispanic White patients). Higher education level was associated with greater receipt of PC (1.46, 95%CI: 1.31-1.62). Receipt of PC was associated with decreased overall survival (PC 4.8 months vs no PC 6.0 months; $p<0.001$).

Conclusion: Although use of PC has increased over time, PC is underutilized in mGA. Disparities exist in receipt of PC in regard to race, gender, and education. Additional research is necessary to better optimize PC use in mGA and mitigate potential disparities.

Physician Estimated Depth: Can it Reduce Unnecessary CT Scan Evaluation of Pectus Excavatum?

Heather Postma

Mentor: Samir Pandya MD, Department of Pediatric Surgery
Collaborators: Ali Mokdad MD, Frankie Fike MD, Adam Alder MD, Barry Hicks MD, David Schindel MD, Faisal Qureshi MD, Lorrie Burkhalter MPH,

Background: The severity of pectus excavatum is determined by computed tomography (CT) derived indices such as the Haller Index (HI) and the Correction Index (CI). Physician estimated depth (PED) as an alternative measurement may preclude for CT. We retrospectively evaluated PED as a screening tool to identify surgical candidates.
Methods: Patients with a diagnosis of pectus excavatum between 1/1/2009 and 3/30/2018 were extracted from the electronic health record for review. Patients without available imaging were excluded. HI and CI were calculated from CT images. CT derived measurements acted as an approximation of PED. Using ROC analysis, we estimated the optimal PED cut-off for identifying surgical candidates according to an HI ≥ 3.25.
Results: A total of 94 patients were identified and all met inclusion criteria. Patients were predominantly males (82%) with a median age of 15 (IQR=14–16). Almost half (46%) were underweight (BMI < 18.5). The median HI was 4.1 (IQR=3.7–5.1) with 89% ≥ 3.25. The median CI was 39 (IQR=29–47). CI was highly correlated with HI (*r*=0.77, area under the curve, AUC=0.88). A CI of 27 was best at correctly classifying HI above/below 3.25 (sensitivity, Se=89%, specificity, Sp=90%). Median PED was 2.5 (IQR=2.1–3.0). Overall, a PED of 2cm correctly classified 86% of HI above/below 3.25 (Se=88%, Sp=70%, AUC=0.84). Among underweight patients, ROC parameters improved (93% correctly classified, Se=95%, Sp=75%, AUC=0.92). PED was highly correlated with CI (*r*=0.77, AUC=0.94). Among underweight patients, a PED of 2cm correctly classified 95% of CI above/below 27 (Se=97%, Sp=80%, AUC=95%).
Conclusion: PED over 2cm can accurately identify patients who require CT imaging and pectus correction. Our findings show that PED may be employed easily in the clinic as a screening tool, thereby minimizing unnecessary CT scans. A prospective evaluation of PED is underway at our center.

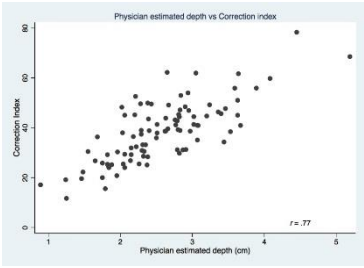

Table 1. Receiver operator characteristics

		AUC		Sensitivity	Specificity	Correctly classified
HI = 3.25 vs PED	All patients	0.84	PED = 2cm	88%	70%	86%
HI = 3.25 vs PED	BMI < 18.5	0.92	PED = 2cm	95%	75%	93%
	BMI > 18.5	0.75	PED = 2cm	82%	67%	80%
HI = 3.25 vs CI	All patients	0.91	CI = 27	89%	90%	89%
CI = 27 vs PED	All patients	0.94	PED = 2cm	96%	73%	91%
CI = 27 vs PED	BMI < 18.5	0.95	PED = 2cm	97%	80%	95%
	BMI > 18.5	0.93	PED = 2cm	95%	71%	88%

HI = Haller Index, CI = Correction index, PED = physician estimated depth, AUC = area under the curve

Factor Analysis of The Cutaneous Lupus Erythematosus (CLE) Registry

Smriti Prasad

Mentor: Benjamin Chong MD, Department of Dermatology
Collaborators: Motolani Ogunsanya MS, PhD, Justin Raman

The factor analysis is a dimension reducing test that seeks to describe variability seen amongst observed, correlated variables through a set of latent, or unobserved, variables called factors.[1] It has never before been applied to CLE, and we believe an analysis of this type will better characterize the disease in an objective way, particularly with regards to clinical lesions and their locations. Thus, we first created a cross-sectional query of initial study visits for patients enrolled in the Cutaneous Lupus Registry at the University of Texas Southwestern Medical Center from November 2008 to July 2018. The query focused on clinical variables such as SLE diagnosis, Cutaneous Lupus Erythematosus Disease Area and Severity Index (CLASI) components of activity and damage and patient demographics, such as age, sex, and race. We then ran a factor analysis on 303 patients using IBM SPSS Statistics. Results showed that around half of the variance was explained in the first 5 factors alone (F1 through F5). F1 delineated patients with high CLASI Activity scores in the neck, chest, and back. F2 described patients with high CLASI activity and damage scores on the scalp, ears and face. F3 described patients with high damage in the extremities, back and buttocks, while F4 characterized high activity predominately in the hands and feet. F5 described high activity, measured as recent hair loss, as well as a co-diagnosis of SLE. The factor analysis helps characterize where on the body lesions of CLE tend to occur, in terms of activity and damage, in certain patient demographics. These results further clinical knowledge about the nature of CLE lesions, and may help guide clinical decisions in the future.

Association of Megestrol use with the Development of New Psychiatric Diagnoses

Swetha Ramamurthy

Mentor: E. Sherwood Brown MD, PhD, Department of Psychiatry
Collaborators: Erin Van Enkevort PhD, Donglu Xie MS

Introduction: The objective of this study is to analyze the effect of taking megestrol on developing a new psychiatric diagnosis. Megestrol acetate is a glucocorticoid and progesterone receptor agonist commonly used for appetite stimulation in cancer, cachexic, and other high-risk patients. Glucocorticoids have been associated with psychiatric side effects, however the literature contains very little on the association between psychiatric effects and megestrol specifically. We hypothesize that megestrol is associated with developing new psychiatric diagnoses just as glucocorticoids have various psychiatric side effects.

Patients and Methods: De-identified data of megestrol patients (n = 734) and control patients (n = 2198) seen from January 1, 2001 to June 30, 2018 were obtained from the UT Southwestern patient database. Three control patients were matched to every megestrol patient based on age, BMI, race, and gender. Data were analyzed through multiple logistic regression models that controlled for comorbidity of illness and preexisting psychiatric disorders using the SPSS 24.0 software.

Results: The regression model showed that megestrol was significantly associated with developing a new psychiatric diagnosis (OR 3.96, CI 3.08-5.10, p < .001). In subgroup analysis, development of cognitive disorders (OR 4.31, CI 2.04-9.09, p < .001), delirium (OR 7.40, CI 2.30-23.8, p = .001), as well as mood (OR 4.81, CI 3.35-6.91, p < .001) and anxiety (OR 4.69, CI 3.19-6.90, *P*<.001) were also associated with megestrol use.

Discussion: Patients taking megestrol were nearly four times more likely to develop a new psychiatric diagnosis than matched controls. Highest risks were associated with those developing delirium diagnoses. The findings suggest that megestrol, like other glucocorticoid agonists, is associated with an increased risk of developing a psychiatric disorder. This risk should be considered when determining the risk-to-benefit ratio of megestrol use in patients.

A Longitudinal Analysis of Tracheostomy Patients, Two Years Old and Younger

Jordan Salley

Mentor: Romaine Johnson MD, MPH, FACS, Department of Pediatric Otolaryngology- Head and Neck Surgery
Collaborators: Yann-Fuu Kou MD, Charles Sadeeh MD, Gopi B. Shah MD, MPH, Ron B. Mitchell, MD

Objective: To estimate the probability of tracheostomy decannulation in infants based on time with tracheostomy and ventilator status upon initial discharge.

Methods: A retrospective review was conducted of a single-institution longitudinal database of tracheostomy patients (age <3 years). Information was collected on demographics, indication for tracheostomy, and ventilator dependence. The endpoints were decannulation or death. The Kaplan-Meier method estimated five-year survival and decannulation rates. A Cox regression analysis controlled for associated comorbidities.

Results: This study included 305 infants. The indications for tracheotomy in patients were respiratory failure (70%), airway obstruction (48%), and pulmonary toilet (3.3%). 79% of patients were ventilator-dependent at discharge. At five years, 55% of patients were alive with tracheostomy, 30% patients were decannulated (median time =2.5 years), and 16% patients were deceased (median time =0.5 years). The log-rank test revealed that ventilator-dependent patients were more likely to be decannulated ($X2 = 6.2$, $p = 0.03$) but equally likely to die compared to non-ventilated infants ($X2 = 0.15$, $p = .70$). The Cox Proportional Hazards Regression model showed short gestation (HR 2.9, $p < .001$), bronchopulmonary dysplasia (HR 1.7, $p = .02$), and airway obstruction (HR 1.8, $p = .01$) were associated with higher chance of decannulation; Hispanic patients had a lower chance of decannulation (HR 0.58, $p = .03$).

Conclusions: Infant tracheostomies are increasingly common, but longitudinal data are lacking. Our single-institution database showed about one-third of our population was decannulated by five years (median time= 2.5 years). Further longitudinal studies are needed for better understanding of predictors for decannulation or death.

Prevalence of Esophageal Fibrosis in Eosinophilic GI Diseases

Layla Samandi

Mentor: Edaire Cheng MD, Department of Pediatric Gastroenterology
Collaborators: Diana Montoya Melo MD, Jason Park MD, PhD, Ameet Thaker MD

Introduction: Eosinophilic gastrointestinal diseases (EGID) are a group of immune-mediated diseases characterized by gastrointestinal eosinophilia accompanied with gastrointestinal symptoms. The clinical significance of EGID has only become recognized recently, and the pathoetiologies of these diseases are not yet well understood. Eosinophilic esophagitis (EoE), the most common type of EGID, is characterized by significant esophageal eosinophilia (≥15 eos/hpf). This chronic esophageal inflammation is associated with esophageal remodeling and lamina propria (LP) fibrosis, which may underlie esophageal dysfunction. The relationship of EoE to the other extra-esophageal EGID (i.e. eosinophilic gastroenteritis) is still unclear. Clinically, pediatric extra-esophageal EGID is often observed with concurrent esophageal eosinophilia. The purpose of this study was to compare the prevalence of esophageal lamina propria fibrosis in children with EGID and concurrent esophageal eosinophilia to children with *only* EoE.

Methods: We reviewed cases of EoE (N=38) and compared clinical and esophageal histopathologic findings to cases of EGID with: 1) significant esophageal eosinophilia (≥15 eos/hpf) (N=38), 2) mild esophageal eosinophilia (1–15 eos/hpf) (N=12), and 3) no esophageal eosinophilia (N=12) who received their index endoscopy at Children's Medical Center between 2009-2017. H&E slides were reviewed by 2 pediatric GI pathologists. For each case, any LP without crush artifact (elongated and distorted fibroblast nuclei) was considered adequate for fibrosis evaluation. Fibrosis was determined by a consensus approach.

Results: EGID cases w/ significant esophageal eosinophilia were more likely to have biopsies taken from ≥2 esophageal levels than those w/ mild or no eosinophilia. A majority of EGID cases w/ significant esophageal eosinophilia (71%) had adequate esophageal LP for evaluation of fibrosis, similar to EoE cases (87%). Esophageal fibrosis was present in the majority of EGID cases w/ significant esophageal eosinophilia (55%), as well as EoE cases (79%). In cases with esophageal fibrosis, the fibrosis was patchy and more often detected in the distal esophagus. EoE and EGID w/ significant esophageal eosinophilia cases share similar demographics, esophageal endoscopic features, and symptoms (except constipation seen predominantly in the EGID group).

Conclusion: Cases of other EGID w/ significant esophageal eosinophilia have overlapping clinical, endoscopic, and histologic esophageal features with EoE *only* cases, suggesting that all EGID make up a disease spectrum and might occur together.

Evaluation of Dehydroepiandrosterone Sulfate (DHEAS) Levels in Cystic Fibrosis

Lauren Shaffer

Mentor: Raksha Jain MD, Department of Pulmonary

Rationale: Dehydroepiandrosterone (DHEA) is an endogenous steroid hormone and a precursor in the biosynthetic pathway of androgens and estrogens. It circulates predominantly in its sulfated metabolite form, DHEAS. DHEAS is an important immunomodulating and anti-inflammatory hormone that inversely correlates with disease severity in inflammatory diseases such as asthma and inflammatory bowel disease. However, no current studies have investigated the relationship between DHEAS levels in patients with cystic fibrosis (CF), a multi-system inflammatory disease due to Cystic Fibrosis Transmembrane conductance Regulator (CFTR) gene mutations. Females with CF have a shorter life expectancy than males, and are more susceptible to earlier infections with CF pathogens. Studies of other pulmonary diseases (i.e. asthma and pulmonary hypertension) show that variations in endogenous sex hormones between genders affect clinical outcomes. This study aimed to determine whether DHEAS levels were lower in patients with CF than in healthy controls, and to further compare levels between genders, age groups, gene mutations, and clinical outcomes. Methods: We assessed the levels of DHEAS in the serum of CF patients (n=188) and age and gender matched healthy controls (n=189) using the enzyme-linked immunosorbent assay (ELISA) with sub-analysis based on gender and age. Results: Mean serum DHEAS levels were lower in patients with CF (2.63± 1.93 µg/mL) compared to healthy controls (9.63 ± 14.99 µg/mL, $p<0.0001$). Sub-analysis compared DHEAS levels of CF males (n=93) with CF females (n=95), and healthy control males (n=105) with healthy control females (n=84). There was no statistically significant difference in the healthy control population (males = 9.08 ± 17.90 µg/mL; females = 10.08 ± 10.31 µg/mL; $p=0.66$), but there was a decrease in DHEAS levels among CF females (2.30 ± 1.77 µg/mL) compared to CF males (2.80 ± 1.91 µg/mL, $p=0.03$). Conclusion: We show for the first time that patients with CF have lower DHEAS levels relative to healthy controls, which are disproportionately low in the females. Further analysis will evaluate correlations of DHEAS with FEV1, bone density, inflammatory cytokines, genotype, and other sex hormone levels. The ultimate goal of this work is to determine if DHEAS supplementation is beneficial to patients with CF and its impact on inflammation. Acknowledgements: Cystic Fibrosis Foundation Biorepository and the Dallas Heart Study (supported in part by grant UL1TR000451 from the National Center for Advancing Translational Sciences, National Institutes of Health)

Glenoid Bone Stock and Rotator Cuff Pathology: Correlation and Inter-rater Analysis

Matthew Siebert

Mentor: Majid Chalian MD, Department of Radiology
Collaborators: Avneesh Chhabra MD, Michael Khazzam MD

Background: Glenoid bone stock and morphology and rotator cuff muscle quality and tendon integrity are all important factors affecting the outcome of total shoulder arthroplasty. We hypothesize that the severity of glenoid bone loss correlates with rotator cuff tendon pathologies and severity of fatty infiltration of the rotator cuff musculature.
Methods: We retrospectively reviewed 45 CT scans of 44 patients (mean age 62 years; range 22 to 77 years) who underwent shoulder CT for primary shoulder pain. Measurements of glenoid bone loss, bone stock, version and joint line medialization were assessed on a 2-dimensional CT image in the axial plane after correction in the scapular plane. Measurements were defined by use of the Friedman line to approximate the surface of the paleoglenoid. Glenoid version was measured by Friedman technique. Glenoid morphology was assigned by modified Walch classification. Rotator cuff muscle fatty infiltration was assessed by MRI and each muscle assigned a Goutallier score. MRI was used to assess rotator cuff tendon tears.
Results: There was a statistical difference in the Goutallier score for the supraspinatus and infraspinatus muscle fatty infiltration between Walch subtypes ($p < 0.05$). There was statistical difference in the severity of subscapularis tendon tear between different Walch subtypes ($p < 0.05$). Degree of anteversion, anterior glenoid and medial glenoid bone loss correlate to subscapularis tendon tear severity ($p<0.05$). Anterior bone loss and joint-line medialization correlate to increased fatty infiltration of the subscapularis muscle ($p<0.05$).
Degree of retroversion correlates to glenoid bone loss at all points and glenohumeral joint-line medialization ($p<0.05$). B2, B3 glenoids have significantly greater bone loss at all points (anterior, middle and posterior), whereas D type glenoids exhibited greater anterior and middle bone loss compared to other Walch classes.
Conclusions: B2, B3 and D type glenoids are correlated with greater bone loss compared to other Walch sub-types. High-grade tears of the subscapularis tendon correlated to greater pathologic anteversion, and anterior and posterior glenoid bone loss. Anterior bone loss and joint-line medialization was correlated to increased fatty infiltration of the subscapularis muscle. Pathologic retroversion correlates to global increase in bone loss and humeral head medialization. Further studies are required to determine the casual relationships between glenoid bone loss and subscapularis tendon tears.

Validation of an Evidence-Based Educational Smartphone Application for Atopic Dermatitis

Matthew Siebert

Mentor: Heather Goff MD, MPH, Department of Dermatology
Collaborators: Yousuf Qureshi MD, Tina Chu BS

Background: With a lifetime prevalence of 20% in the United States, atopic dermatitis (AD) is the most burdensome skin condition in the US. Mean adherence to recommended treatments is estimated at 32%. Incomplete use of mainstay therapy may contribute to the high morbidity. We wanted to understand the role for evidence-based smartphone apps in patient education on AD. We hypothesized that patients would prefer educational material for atopic dermatitis in app form rather than in traditional paper format.

Methods: Our application, EczemaDoc was with content sourced from the National Eczema Association and educational handouts currently used at the pediatric dermatology clinic at Childrens Medical Center in Dallas Texas (CMC). The app contained with an internal tracker to monitor usage. English speaking patients or parents of patients aged 0-18 with a new diagnosis of atopic dermatitis and a smartphone able to download the app were included in the study. A follow up survey was administered at four weeks after patient enrollment. Demographics were obtained at study onset.

Results: Of 13 study participants, 8 were African-American, 2 Hispanic, and 3 Caucasian. 54% were female; 46% were male. 15% of study participants were aged 0-1 years, 39% 1-2 years, 23% 2-4 years, and 23% 4-8 years. Given the young age of patients, parents used the app for their children. 39% of patients had mild AD, 45% moderate, and 15% severe. 100% of patients preferred the app to paper materials, and 100% felt the app helped them learn about and manage eczema. 23%, 46% and 31% of the patients reported using the app “sometimes,” “often” and “very often,” respectively. Objective data supported these subjective ratings, showing that 23% opened the app 0-1 times, 23% 2-3 times and 54% 4 times or more.

Conclusions: Our results suggest that parents of young patients (<8 years of age) with AD prefer receiving educational materials in a smartphone application over paper format. Although a small study, these results indicate a cultural shift in preference for instant, portable access to medical information. Smartphone apps are one method of supplying information and aid physicians in providing patients with quick access to up-to-date educational materials and therapeutic recommendations.

Airway Management in the Morbidly Obese: An Ongoing Prospective Cohort Study

Katelynn Smith

Mentor: Tiffany Moon MD, Department of Anesthesiology and Pain Management
Collaborators: Sadia Karani BS, Kathryn Jan BA, Taylor Pak BS, Alwin Somasundaram BA

As obesity rates continue to rise in the United States, the question of whether morbidly obese patients are more difficult to intubate is a growing concern. However, no strong predictors of difficult intubation have been established for the obese and morbidly obese populations. Previous studies examining the predictive value of BMI are complicated by varying definitions of intubation difficulty with conflicting results. This study aims to examine the frequency of difficult intubation in the morbidly obese and determine the efficacy of various preoperative measures as predictive factors for difficult intubation. An effective bedside test for predicting a difficult airway assessment could help to identity which patients need adjunct airway equipment or more experienced providers. A cohort of 2,013 patients were recruited at a large, tertiary, public hospital in a 21-month period. Study participants were organized into three groups based on BMI: lean (BMI<30, n=736), obese (30≤BMI<40, n=685), and morbidly obese (BMI≥40, n=592). After obtaining consent, patient demographic data and preoperative measures were obtained. Difficult intubation was determined using the intubation difficulty scale (IDS), a validated 7-item questionnaire administered to anesthesia providers after intubation, which includes both objective and subjective contributors to difficult intubation. The IDS scores correlate with easy (IDS=0), moderately difficult (1≤IDS≤5), and severely difficult (IDS≥6) intubation. Of the study population, 39.7% of intubations were moderately difficult and 4.1% were severely difficult. Moderately difficult intubations occurred in 39% of the obese cohort and in 44.4% of the morbidly obese. Severely difficult intubations had an incidence of 5.1% of the obese cohort and 3.2%in the morbidly obese. When compared to the lean cohort, the morbidly obese group had an increased incidence of moderately difficult intubation. However, there was no statistically significant difference in the rates of severely difficult intubations between the groups. In a multivariate regression model, increasing age was a statistically significant risk factor for difficult intubation. Every yearly increase in age amplified the risk of moderately difficult and severely difficult intubation by 2% and 3%, respectively. Similarly, male gender and higher Mallampati scores were independent predictive factors for both moderately and severely difficult intubation. In conclusion, the morbidly obese do not have an increased rate of severely difficult intubation. Factors such as age, male gender, and Mallampati score are better predictors of intubation difficulty than BMI.

Autologous Breast Reconstruction: Outcomes in a Saftey-net vs. Non-Safety-Net Hospital: A Single Surgeon Experience

Catherine Sobieski

Mentor: Sumeet Teotia MD
Nicholas Haddock MD, Department of Plastic Surgery
Collaborators: Connie Ma BS, Avinash Jayaraman BS, Jeffrey Li BA, Austin Hembd MD, Nicholas T. Haddock, MD

Introduction: Many studies seeking to assess disparities in breast cancer treatment outcome and breast reconstruction success have used information from large national databases. One limitation to this approach is the confounding factor of variable treatment patterns between institutions and individual surgeons. We sought to compare patients from a private hospital and a safety-net hospital, all treated by the same surgeon and hence subjected to the same treatment quality, to determine whether a patient's socioeconomic status impacts their breast reconstruction surgery outcome.
Methods: A retrospective chart review was performed on N=420 (autologous breast reconstruction patients) performed by the same senior surgeon (NTH) at either a private (UTSW affiliated hospitals) or safety-net hospital (Parkland Hospital) between 2012 and 2017. Patients were grouped by hospital: Group1 (non-Parkland, n=380) and Group2 (Parkland, n=40). Length of hospital stay, complications, number of revision surgeries, and completion of the breast reconstruction process were tracked. Independent sample t-tests were run.
Results: BMI and comorbidities were equivalent between groups. Patients in Group2 (47.5 years) were significantly younger than patients in Group1 (52.2 years), $p=0.001$. Length of hospital stay after surgery was significantly longer for patients in Group2 (5.23 days) than Group1 (3.89 days), $p<0.001$. There was also a higher rate of unplanned return to the OR for Group2 patients (30%) vs Group1 patients (16%), $p=0.026$. Rates of the following post-flap surgical complications were significantly higher in Group2 than Group1: breast hematoma requiring OR drainage ($p=0.006$), breast wounds ($p<0.001$), breast infections requiring IV antibiotics ($p<0.001$), breast fat necrosis ($p<0.001$), donor site wounds ($p<0.05$), donor site infections requiring IV antibiotics ($p<0.001$), and donor site fat necrosis ($p<0.05$). Rates of flap loss and post-flap DVT, PE, and pneumothorax were equivalent across groups. Overall, the number of patients completing the breast reconstruction process was significantly less in Group2 (42%) than Group1 (64%), $p=0.014$. In addition, the number of revision surgeries per patient was significantly lower in Group2 (.74) than Group1 (1.34), $p<.001$.
Conclusion: Despite higher rates of post-operative complications at the county safety-net hospital, flap loss rate, the ultimate indicator of surgical success, was similar between cohorts. Therefore, plastic surgeons practicing at safety-net hospitals can be cautiously optimistic when recommending breast reconstruction to their patients.

Morbid Obesity Increases the Incidence of Difficult Mask Ventilation, but not Difficult Intubation

Alwin Somasundaram

Mentor: Tiffany Moon MD, Department of Anesthesiology
Collaborators: Michael X. Gonzalez MS, Pamela E. Fox MD, Abu Minhajuddin PhD, Babatunde Ogunnaike MD

Study Objective: Determine if morbid obesity increases the incidence of difficult mask ventilation and difficult intubation.

Design: Retrospective study

Setting: Operating room

Patients: 45,447 patients undergoing general endotracheal anesthesia for elective surgical procedures

Measurements: Over a six-year period, all intubations meeting our specified criteria in the operating room of a large tertiary teaching hospital were analyzed. A modified version of the intubation difficulty scale (mIDS) was used to define easy versus difficult intubation. Difficult mask ventilation was defined as the use of two or more adjuncts to achieve successful mask ventilation.

Results: Of 45,447 analyzed cases, 4.2% were difficult intubations. Morbidly obese patients did not have a greater incidence of difficult intubation. Factors associated with difficult intubation included patient age >46 years, male gender, high ASA status (3-5), high Mallampati score (III-IV), thyromental distance <6 cm, limited neck range of motion, the presence of intact dentition, and a history of sleep apnea. Of 37,016 cases in which mask ventilation was attempted, 2.9% were difficult. Morbidly obese patients did have a nearly 3-fold incidence of difficult mask ventilation. Other factors associated with difficult mask ventilation included patient age >46 years, male gender, high ASA status (3-5), high Mallampati score (III-IV), thyromental distance <6 cm, limited neck range of motion, and a history of sleep apnea.

Conclusions: Morbid obesity increases the incidence of difficult mask ventilation but does not increase the incidence of difficult intubation. Other demographic and anthropometric factors are more predictive of difficult intubation and mask ventilation including age >46 years, male gender, Mallampati 3-4, short thyromental distance, limited neck range of motion, and a history of obstructive sleep apnea.

A Retrospective Review of 26 SJS/TEN Patients Treated with Cyclosporine

Tiffany Son

Mentor: Melissa Mauskar MD, Department of Dermatology
Collaborator: Arturo Dominguez MD

Background: Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are rare, potentially life-threatening mucocutaneous reactions to drugs. Recent reports highlight the benefit of cyclosporine (CsA) in slowing the progression of SJS/TEN and promoting re-epithelialization. Due to the potential for CsA to decrease glomerular filtration rate (GFR), patients with prior diagnosis of renal impairment are often excluded from CsA treatment. In February 2016, our consult service began using CsA as first-line therapy for SJS/TEN. We use high average doses of CsA (~5 mg/kg PO compared to 3-5 mg/kg PO used at other institutions), and we do not exclude renal patients from treatment if their baseline eGFR is greater than 30 mL/min/1.73m^2.

Objective: The aim of our project was to study the treatment and outcomes of 26 SJS/TEN patients on CsA at Parkland Memorial Hospital. We predicted that SJS/TEN patients can safely be treated with high dose CsA (5 mg/kg or greater) without severe adverse outcomes, and that patients with eGFR >30 can safely be treated with CsA without significant permanent, long-term renal sequelae.

Methods: We obtained MRNs of Parkland patients that had dermatology consults from January 2016 to May 2018. Only those diagnosed with SJS/TEN and treated with cyclosporine were included; all other patients were excluded. We then gathered information from their medical charts, including CsA dosage, CsA duration, eGFR, oral/genital/ocular mucosal involvement, and notes from follow-up appointments.

Results: The average starting dose of CsA was 2.5 mg/kg IV (≈7.5 mg/kg PO), while the average duration of treatment was 7 days. After discharge, follow-up appointments with dermatology, gynecology, urology, and ophthalmology noted significant healing without new or active lesions. There were 4 patients with a baseline eGFR below 60 and above 30 mL/min/1.73m^2. One week after stopping CsA, all 4 patients had their eGFR return to baseline or higher.

Conclusion: Despite the limited sample size, our SJS/TEN patients with low baseline eGFR did not have long-term renal sequelae after CsA treatment, suggesting that patients with renal disease should be considered for treatment with CsA. Patients treated with high dose CsA (>5 mg/kg PO or IV equivalent) also did not suffer from significant long-term ocular, renal, or genital sequelae. Large prospective studies are needed to determine the ideal dose and treatment duration of CsA in patients with SJS/TEN.

Analysis of the Pediatric Appendicitis Score as a Clinical Adjunct

Jacob Stevens

Mentor: Adam Alder MD, Department of Pediatric Surgery
Collaborators: Nathan Vaughan MD, MPH, Lorrie Burkhalter MPH, Gentry Wools BA

Introduction: Acute appendicitis is the most common cause for urgent surgical intervention in children. Accurate and timely diagnosis of pediatric appendicitis is thought to minimize complications. The pediatric appendicitis score (PAS) was developed by Samuel in 2002 and has been refined to help guide decision-making for diagnosing appendicitis with a goal to limit unnecessary imaging or procedures and to lower hospital costs. PAS is the core of a practice guideline that was implemented at our institution in September 2012 with intent to minimize unnecessary imaging and lower negative appendectomy rates. The purpose of this study was to evaluate the integration of the PAS into our appendicitis pathway to determine appropriateness of utilization.

Methods: This is a retrospective review of all patients at an urban, referral children's hospital whose evaluation for appendicitis included a PAS from July 2017 to December 2017. Data analyzed included imaging rates, appendectomy rates and pathology reports.

Results: 1741 patients were evaluated with 503 undergoing appendectomy. 423(24.3%) patients had a complete PAS with the remaining missing portions of the PAS, most commonly lab results. 1501(92%) patients had an ultrasound and 339(20.8%) had a CT with 66(4%) having imaging done before the PAS was filled out. 109 patients had conclusive imaging from an outside hospital and were excluded from these results. Overall compliance with the PAS protocol was 11.3% with 96.6% of patients with a completed PAS >7 having imaging.

Conclusions: The PAS has not become a valuable tool as part of our appendicitis pathway to reduce over-imaging of children and lower negative appendectomy rates. Compliance with the guideline (PAS >7) would have resulted in a reduction of ultrasound and CT utilization of 243(16.2%) and 78(23%), respectively. In contrast, compliance would have doubled the negative appendectomy rate from 4 to 8%. Often, imaging is ordered prior to completion of the PAS. The default approach to any patient with possible appendicitis appears to be an ultrasound first and possibly a CT if it is still inconclusive. The PAS has not proven to be an important component of an acute appendicitis practice guideline at a busy tertiary children's facility with a high volume of patients with appendicitis. A practice guideline that reflects our current practice potentially would save time, money and prevent patients from unnecessary radiation exposure from CT scans.

Nodal Metastases in Primary Squamous Cell Carcinoma of the Auricle and External Auditory Canal

Priscilla Tanamal

Mentor: Andrew Day MD, MPH, Department of Head and Neck Surgery
Collaborator: Calvin Geng MS, Erin Wynings MD, Rajiv Nijhawan MD, Divya Srivastava MD, Baran Sumer MD, John Truelson MD, Larry L Myers MD, Brittny Tillman MD, L Stankova MD, Eli Gordin MD, Jacob Hunter MD, Walter Kutz MD, Brandon Isaacson, MD

Introduction: Nonmelanoma skin cancer is the most common cancer worldwide and afflicts 2.5 million people in the US annually. Approximately 20-25% are comprised of squamous cell carcinoma (SCC) and 80-90% involve the head and neck. Cutaneous SCC involving the external ear and external auditory canal (EAC) represent a unique subset of disease for which patterns of nodal metastasis and other oncologic outcomes have been inadequately characterized.
Objective: To evaluate oncologic outcomes of patients with primary cutaneous SCC of the external ear or EAC. Secondarily, to explore the validity of the AJCC 8th edition staging guidelines in these patients. **Methods:** The study design was a single institution retrospective cohort review from 1/2007 to 12/2016. 188 patients with primary cutaneous SCC of the external ear or EAC were identified. **Results:** Mean follow-up was 39.8 months. Patient distribution according to site, clinical stage, treatment, and primary surgery type was: pinna – 94.7% (178/188), EAC – 3.7% (7/188), overlapping 1.6% (3/188); stage I - 90.4% (170/188), stage II – 5.9% (11/188), stage III – 1.1% (2/188), stage IV - 2.7% (5/188); primary surgery alone - 97.3% (182/188), surgery + radiation – 1.6% (3/188), surgery + chemoradiation – 1.1% (2/188), definitive radiation – 0.5% (1/188); Mohs – 93.1% (174/187), temporal bone resection - 4.8% (9/187), other 2.1% (4/187). Four percent (8/188) of patients underwent parotidectomies and 3.7% (7/188) underwent neck dissections. Less than 5% of patients developed a locoregional recurrence (Mohs: 5/174, non-Mohs: 3/13). Only 1.1% (2/188) of patients presented with primary nodal metastases; 25% (1/4) and 100% (2/2) of patients with perineural invasion and lymphovascular invasion exhibited primary nodal metastases, respectively. Only 0.5% (1/188) developed a nodal recurrence. Only 1.1% (2/188) patients were alive with disease and 0 were dead with disease at last follow-up. Among 67 patients requiring greater than 1 stage of Mohs surgery, 10 were upstaged to pT3 disease. These patients exhibited a mean follow-up of 29.2 months and none recurred locoregionally. **Conclusions:** Given the superb regional control in the cohort, this data supports observation of the nodal basins in patients with clinical stage I-II cutaneous SCC of the pinna in the absence of other adverse risk features. More highly powered studies are needed to evaluate regional management of cutaneous SCC of the EAC. The absence of recurrence among Mohs patients upstaged to pT3 disease suggests the application of the updated staging guidelines to cutaneous SCC of the pinna should be investigated further.

IOP, BP, and Choroid

Betty Tong

Mentor: Karanjit Kooner MD, PhD, Department of Ophthalmology
Collaborators: Sandy Kim MPH, Jessica Lee BA, Darara Borodge BA, Ferzana Hossain BS, Beverly Huet MSc, Xilong Li MPH

Purpose: To analyze the long-term fluctuations in intraocular pressure (IOP) and blood pressure (BP) as well as the role of choroidal thickness in controls, glaucoma suspects, and patients with mild, moderate and severe primary open angle glaucoma (POAG).

Methods: In an IRB approved retrospective age-matched consecutive study, 69 controls, 47 glaucoma suspects, 41 mild glaucoma, 46 moderate glaucoma, and 17 severe glaucoma patients were reviewed. One eye was randomly selected per patient. Patients were excluded if they had secondary glaucoma or <2 BP or IOP measurements. One-way ANOVA, Chi squared tests, and the Jonckheere-Terpstra test were used to determine any significant differences. Pearson r correlation was used to measure the association strength between variables of interest.

Results: We defined fluctuation as the coefficient of variation (CV=std dev divided by the mean). There was a significant difference in the CV of the IOP between the different glaucoma groups ($p=0.004$) as IOP fluctuation increased with glaucoma severity ($p<0.001$). Average IOP increased with glaucoma severity, but this observed trend was not statistically significant ($p=0.528$). We did not find a significant difference in average mean arterial pressure (MAP), MAP fluctuation, or sub-foveal choroidal thickness between the different groups. A correlation matrix (Table 2) revealed that average IOP was positively correlated to MAP average ($r=0.221$, $p=0.026$), systolic blood pressure (SBP), and diastolic blood pressure (DBP). IOP fluctuation negatively correlated to systolic perfusion pressure (SPP) fluctuation ($r=-0.142$, $p=0.036$).

Discussion: Our results indicate that IOP fluctuation increases with glaucoma severity. Fluctuating IOP may contribute towards further optic nerve damage and disease progression. While average MAP was not statistically significant between the glaucoma groups, a positive correlation between average IOP and average MAP suggests an underlying relationship between the two variables. Similar to other studies, sub-foveal choroidal thickness was not significant between the different POAG groups. However, we also acknowledge the subjective nature and potential human error in measuring choroidal thickness.

Conclusion: We noticed that IOP fluctuations are highest in the severe glaucoma group. There is no significant difference in BP fluctuations and choroidal thickness between the different glaucoma groups.

Electrophysiology Study and Ablation of Atrial Arrhythmias in Patients with Pulmonary Hypertension

Wei Shan Tsui

Mentor: Richard Wu MD, Department of Internal Medicine- Cardiology
Collaborators: Nimesh Patel MD, Nitin Kulkarni MD, Curtiss Moore MD

Background: Pulmonary hypertension (PH) is a debilitating disease that results in right ventricular dysfunction and right atrial enlargement. This disruption in cardiac architecture can lead to various supraventricular tachycardias (SVTs) – including atrial tachycardia, atrial flutter, and AVNRT. Tachyarrhythmias are poorly tolerated by patients with PH, and these patients are often referred for electrophysiology study (EPS) and ablation. There is a scarcity of data on the types of SVT identified by EPS in patients with PH and efficacy of catheter ablation in this patient population.

Methods: We performed a retrospective review of all patients diagnosed with pulmonary hypertension patients that underwent EPS and ablation at UT Southwestern University Hospital from January 1,2011 to July 1,2015. Eligible patients' charts were reviewed to abstract demographic, baseline clinical data, arrhythmia characteristics, and EPS procedural characteristics. Lastly, the procedural outcomes were determined by identifying arrhythmia recurrence at three months and mortality rate in 6-month and 1 year.

Results: We identified a total of 83 arrhythmias in 63 EP studies procedures that were perfomed in 59 patients with PH. The most common SVT identified in patients with PH who underwent EPS was typical atrial flutter (43%), followed by atrial tachycardia (18%), atrial fibrillation (16%), atypical atrial flutter (13%), and AVNRT (10%). Immediate procedure success was 93.7%. Freedom from arrhythmia recurrence at 3 months was 71.4%. 87.9% of patients survived at 6 months post-procedure.

Conclusion: There is a high rate of immediate procedural success for catheter ablation in patients who under EPS for SVT in patients with PH, however recurrence rates are higher than in the general population. The relatively high frequency of atrial arrhythmias (typical and atypical atrial flutter, atrial tachycardia, and atrial fibrillation) as the cause of SVT in the population studied is consistent with distortions in right atrial remodeling due to right atrial pressure overload.

Microbiological Culture Methods for Musculoskeletal Infections in Adults

Brian Wahlig

Mentor: Brigham Au MD, Department of Orthopedic Surgery

Background: Currently, patients who present with symptoms and signs of septic arthritis to Parkland Hospital have their joints aspirated and sent for pan-cultures (aerobic, anaerobic, acid fast bacilli (AFB), and fungal cultures) as part of the diagnostic workup. However, the yield of AFB and fungal cultures is incredibly low as the majority of septic joints are due to aerobic organism such as Staphylococcus Aureus. Additionally, each of these cultures can cost over $200. In a study performed by Section et. al at Children's Hospital in Dallas last year, the rate of positive anaerobic, AFB, and fungal cultures in children with suspected musculoskeletal infections was found to be 2.5%, 2%, and 0.9% respectively, while aerobic cultures were positive in 64.5% of cases. These results let to Children's changing their protocol on which cultures were collected for suspected musculoskeletal infections. However, a similar inquiry into the adult population has never been completed. Additionally, another test one orders when attempting to diagnose a septic joint are a variety of inflammatory markers such as CRP, ESR, and WBC count. However, there are currently no specified ranges that directly correlate these values with the likelihood the patient has a septic joint. The purpose of this project was to determine the role of inflammatory markers and their predictive ability in diagnosing septic arthritis and which cultures should be obtained in the adult population.

Objective/Methods: IRB approval was obtained. Utilizing a RedCap Repository of patients treated at Parkland for suspected septic joint from January 2009 to December 2016, we collected demographic data, medical data, laboratory data including inflammatory markers, antibiotic history, and culture results.

Results: Of the 600 patients whose files were evaluated, only 1 had a positive AFB culture and 5 had positive fungal cultures. Additionally, while full data analysis is still ongoing for other joints, the average and standard deviation for CRP, ESR, and WBC values for all those with upper extremity septic joints was found to be: 14.5±7.1, 20.0±14.3, and 73.4±38.5 respectively.

Conclusion: AFB and fungal cultures are rarely useful and their collection is low yield, clinically. By comparing a patient's inflammatory markers to these established values, one can more confidently determine if a patient likely has a septic joint.

Reactivation of Varicella Zoster Virus in Solid Organ Transplant Recipients: Identification of Risk Factors Using Data Mining Tools

Ashley Wallace

Mentor: Ricardo La Hoz MD, Department of Internal Medicine
Collaborators: Nicolas Barros MD, Donglu Xie MS, Christina Yek MD, Terrence Liu BS, Xilong Li PhD, Beverley Adams-Huet MS, Robert W. Haley MD, FSHEA, David Greenberg MD, Ricardo La Hoz MD FACP, FAST

Background: We created a retrospective database of solid organ transplant (SOT) recipients using innovative data mining tools. This study describing the epidemiology of Varicella Zoster Virus (VZV) reactivation in SOT serves as a proof of concept of such techniques in clinical research.

Methods: The study design was a retrospective single center cohort study. Using data mining tools, information was extracted from the electronic medical record and merged with data from the Scientific Registry of Transplant Recipients. First SOT from 1/1/2010-12/31/2016 were included. Charts of subjects with ICD9/10 codes related to VZV/Herpes infections; positive VZV PCR, DFA or cultures; and recipients of acyclovir, valacyclovir or famciclovir were manually reviewed. The cumulative incidence was calculated using the Kaplan-Meier method. Cox proportional hazards models were used to identify risk factors for VZV reactivation among heart transplant (HT) recipients.

Results: 1076 SOT recipients met inclusion criteria (203 Heart, 395 Lung, 280 Kidney, 198 Liver). 49 patients experienced at least 1 episode of VZV reactivation; median time post-transplant was 2.25 years (IQR 1.44-4.20 years). The cumulative incidence was 11.9% at 8 years post-transplant. Heart transplant (HT) recipients were at highest risk, with an 8-year cumulative incidence of 26.3%. 39/49 (80%) patients presented with localized disease and 4/49 (8%) with disseminated disease. In multivariable analysis, the risk of VZV reactivation in HT recipients after 12 months (47 patients) was associated with CMV infection before 12 months (HR [95%CI] = 4.74 [1.67-13.47]). Postherpetic neuralgia (PHN) occurred in 23/49 (47%), recurrence in 3/49 (6%), and other complications in 11/49 (22%). In univariable analysis, no risk factors for PHN were identified.

Conclusion: HT recipients are at highest risk for VZV reactivation. CMV infection before 1 year is associated with increased risk of VZV reactivation after 1 year in HT. This information may help design clinical trials of the recombinant zoster vaccine.

Immune-Related Adverse Events in Metastatic RCC Patients Treated with Immune Checkpoint Inhibitors

Flora Yan

Mentor: Isaac Bowman MD, Department of Internal Medicine

Purpose: We examined immune-checkpoint inhibitor (ICI) therapy in metastatic renal cell carcinoma (mRCC) patients at UTSW and Parkland, with a focus on predictors of immune-related adverse events (irAE) and the implication of irAE on treatment response.

Experimental Design: A retrospective review of 90 mRCC patients treated with ICI therapy between 1/1/2013 to 1/31/18 was performed. The effect of irAEs on overall survival (OS) and progression free survival (PFS) was analyzed. Peripheral blood markers, such as absolute neutrophil count (ANC), absolute lymphocyte count (ALC), and neutrophil-lymphocyte ratio (NLR) were assessed as predictors of irAEs. All analysis was performed using MedCalc, v15.8. Toxicity grading of irAE followed CTCAE v4 guidelines.

Results: Of 90 patients treated with ICI, 38 patients developed irAEs, with 15 patients developing grade ≥3 irAEs. IrAE occurrence was associated with greater median OS at 90.1 (95% CI: 66.0, 118.3) vs. 73.9 weeks (95% CI: 55.0, 90.7) ($p = 0.0215$). NLR 2 weeks post-treatment initiation, inversely correlated with grade 3/4 irAEs vs. no or grade 1/2 AEs (OR = 1.04; $p = 0.04$). ALC at 8 weeks post-treatment initiation, correlated with irAEs vs. no irAEs (OR = 2.43; $p = 0.0008$). Patients with ALC4 > 1.07 had a OR of 4.9605 ($p = 0.0014$) of developing an irAE. Median PFS of patients with ALC4 < and > 1.07 were 13.00 (95% CI: 10.00, 19.00) and 57.0 (95% CI: 22.71, 69.00) respectively. Patients with NLR > 3 (vs. NLR < 3) were more likely to have an increase in ANC respective to change in ALC; this was seen by median ANC changes of +12.71% versus +0.97%, and ALC changes at -10.08% versus -1.89%, in NLR <3 and >3 respectively

Discussion: irAE development was negatively correlated with NLR levels post-ICI initiation, and positively correlated with ALC levels post-4^{th} ICI infusion. In melanoma patients, ICI therapy efficacy has been associated with high absolute eosinophil count (AEC), high ALC and low NLR. Similarly, increased ALC after 4^{th} infusion correlated with improved PFS and development of irAE – potentially due to B-cell dependent immune activation. The greater change of ANC respective to ALC suggest that patients with higher NLR may have had a neutrophil-predominant inflammatory response. IrAEs are a result of immune overactivity and may prognosticate efficacy of ICIs. NLR and ALC at different time points than those reported here had non-significant association with irAE. These data suggest that NLR and ALC may be useful in predicting irAEs and treatment response, and further study and validation is warranted.

Risk Factors for Fistula Formation After Interstitial Brachytherapy for Locally Advanced Gynecological Cancers Involving the Vagina

Allen Yen

Mentor: Kevin Albuquerque MD, Department of Radiation Oncology
Collaborators: Brian Hrycushko PhD, Zhen Tian PhD

Purpose: To determine risk factors for fistula formation after interstitial brachytherapy (ISBT) in patients with advanced gynecologic cancers.

Materials and Methods: We performed an IRB approved retrospective review of 44 patients treated with trans-perineal template based ISBT from 2011 to 2017 at a major metropolitan county and university health system. All patients were treated with image-guided high-dose rate ISBT. Statistical analysis was performed using the $\chi 2$ test to identify factors correlated with fistula formation. Survival and tumor control outcomes were calculated using Kaplan Meier analyses. With the assistance of the physics department of Radiation Oncology, we also utilized a support vector machine to create a prediction model.

Results: Patients had a mean age of 53 years (range, 28-81 years), a mean external beam dose of 43.1 Gy (range, 42.5-51.3 Gy), and a mean brachytherapy dose of 22.8 Gy (range, 21.3-30 Gy). 2 of 44 patients had fistulas that could be definitively attributed to therapy for a fistula rate of 4.5%. 6 additional patients (13.6%) developed fistula after treatment with associated recurrent disease but were included in the causality analysis. We analyzed patient tumor and treatment factors and on univariate analyses we found that age ≥ 60 years, Hispanic ethnicity, bladder involvement, rectal D2cc ≥ 70 Gy, and whether patients had post-radiation biopsies were predictors for fistula formation. Our prediction model found that age, ethnicity, volume of CTV, rectosigmoid involvement (either radiologic or biopsy-proven), rectosigmoid D2cc EQD dose, D1cc EQD dose, D0.1cc EQD dose, and whether a patient had previous radiation and post-treatment biopsies were predictors for fistula formation. The 1-year overall survival (OS), progression-free survival (PFS), and local control (LC) were 85%, 58.5%, and 76.9%, respectively, with a mean follow-up time 23 months (range, 4.0-68.8 months).

Conclusion: We identified factors that predict fistula formation in patients with advanced gyencologic tumors treated with ISBT. These factors can be used to stratify patients into a high-risk group, with potential for modification of brachytherapy planning to reduce their risk of fistula formation.

Asthma and Obesity as Predictors of Severe Obstructive Sleep Apnea in a Pediatric Population

Ahana Yogesh

Mentor: Romaine Johnson MD, MPH, FACS,
Department of Pediatric Otolaryngology- Head and Neck Surgery
Collaborator: Ajay Narayanan BS, Ron B. Mitchell MD

Objectives: Obstructive sleep apnea (OSA) is a well-known condition that affects up to 3% of children. Severe OSA, diagnosed via an Apnea-Hypopnea Index (AHI) >= 10, can lead to serious cardiorespiratory symptoms such as cor pulmonale. Little is known about the risk for developing OSA when diseases such as asthma and obesity are comorbid within the same patient, as is commonly the case. We sought to further characterize these relationships in the pediatric population using a retrospective chart review. We hypothesized that the presence of asthma would have a positive synergistic effect with obesity in causing severe OSA.

Methods: We reviewed the electronic medical record (EMR) of 367 children aged 9-17 referred for polysomnography, and categorized patients based on their diagnosis of asthma and/or obesity. The primary outcome was to determine the relationship between asthma, obesity, and severe OSA (apnea-hypopnea index ≥ 10). We used multiple logistic regression analysis to estimate these associations after controlling for commonly associated conditions. A *p*-value of ≤ .05 was considered significant.

Results: The study included 367 children (mean (SD) age 14 years (1.7), 56% male, 43% Hispanic). The prevalence of asthma was 188/367 (52%), obesity was 197/367 (54%), and severe OSA was 109/367 (30%). Severe OSA was less likely in asthmatics (coefficient = -0.59; standard error = 0.23; $p = .01$; odds ratio = 0.55; 95% confidence interval = 0.34 to 0.88) and more likely with obesity (coefficient = 0.89; standard error = 0.24; $p < .001$; odds ratio = 2.4; 95% confidence interval = 1.5 to 3.9). The presence of asthma reduced the likelihood of severe OSA by an average of 14% among obese patients and 9% among non-obese patients. These relationships held even after controlling for age, gender, race, income, and tonsillar hypertrophy.

Conclusion: The presence of asthma reduced while obesity increased the likelihood of severe OSA among a large cohort of older children referred for polysomnography. Further research is indicated regarding these relationships.

Impact of Point Spread Function Reconstruction on ^{68}Ga DOTATATE PET/CT Quantitative Imaging Parameters

Helena You

Mentor: Rathan Subramaniam MD, PhD, MPH, Department of Radiology
Collaborator: Yasemin Sanli MD

Objective: ^{68}Ga DOTATATE PET/CT has been increasingly used for diagnosis and therapy response assessment of patients with neuroendocrine tumors (NETs). We investigated the impact of point spread function (PSF) reconstruction and lesion size on ^{68}Ga DOTATATE PET/CT quantitative parameters.

Methods: A total of 38 patients with 42 ^{68}Ga DOTATATE PET/CT scans and 125 lesions were included. Scans were reconstructed with and without PSF modulation. For each lesion, one reader measured the maximum and peak standardized uptake value (SUVmax and SUVpeak), metabolic tumor volume (MTV), total lesion somatostatin avidity (TLS), and tumor somatostatin receptor expression heterogeneity (TH). Intraclass correlation coefficient (ICC) and Bland-Altman analyses were used to compare PSF and non-PSF values. Subgroup analysis was performed to determine the impact of lesion size.

Results: Mean age of the patients was 55 ± 15 years. 21 patients were male and 17 were female. Of the 125 lesions, 51 were located in the liver, 31 in lymph nodes, 17 in bone, 8 in pancreas, 4 in lung, and 14 in other sites. Correlation coefficients between PSF and non-PSF values were excellent for SUVmax (ICC=0.97), SUVpeak (ICC=0.99), MTV (ICC=0.98), and TLS (ICC=0.99), and was good for TH (ICC=0.81). Comparison of PSF with non-PSF values showed a bias (mean percent change ± SD) of +27.5 ± 14.7% for SUVmax, +15.5 ± 9.5% for SUVpeak, -18.6 ± 37.6% for MTV, +0.8 ± 28.1% for TLS, and -7.1 ± 11.0% for TH.
For lesions less than 2 cm in size (n=75), comparison of PSF with non-PSF values showed a bias of +32.7 ± 15.8% for SUVmax, +19.3 ± 9.3% for SUVpeak, -27.9 ± 45.4% for MTV, -1.7 ± 35.4% for TLS, and -5.0 ± 12.2% for TH. For lesions 2 cm or more in size (n=50), comparison of PSF with non-PSF values showed a bias of +19.7 ± 8.0% for SUVmax, +9.8 ± 6.2% for SUVpeak, +0.01 ± 23.1% for MTV, +4.6 ± 8.8% for TLS, and -10.4 ± 7.9% for TH.

Conclusion: PSF and non-PSF values for ^{68}Ga DOTATATE PET/CT quantitative parameters were highly correlated. PSF reconstruction increased SUVmax and SUVpeak, decreased TH, and had a variable effect on MTV and TLS depending on lesion size.

Three-Dimensional Analysis of the Skeletal Platform of the Ear in Patients with Hemifacial Microsomia

Chong Zhou

Mentor: Christopher Derderian MD, Department of Plastic Surgery
Collaborator: Rami Hallac PhD

Introduction: Treatment of microtia in the setting of hemifacial microsomia (HFM) may be variably affected by the quality of the local soft tissue and the morphology of the skeletal platform at the site for ear reconstruction. The skeletal platform of the ear plays an important role in the projection and appearance of the ear. The goal of this study is to quantify the asymmetry in the skeletal platform of the external ear in patients with HFM.

Methods: This is a retrospective study at the Children's Health Dallas of twenty-three patients with HFM that had undergone full face CT scans. Three-dimensional images were generated from CT dicom data using MIMICS and landmarked using 3DMD software. The skeletal platform of the ear was determined using manually-placed landmarks that follows the posterior sulcus of the external ear. Soft tissue landmarks were then projected onto the skull using closest point matching and corresponding skeletal landmarks were attained. Lateral projection of skeletal platform was calculated as the distance between the chosen point and the basion of the skull. The axis of the skeletal platform of the ear was calculated using the skeletal landmarks corresponding to the most superior and inferior points of the posterior sulcus. Each patient's unaffected side served as paired controls.

Results: The skeletal platform of the ear on the affected side had significantly increased lateral projection as compared to the unaffected side. Landmarks at the superior aspect of the platform had the most significant increase in lateral projection, ranging from 4.23-4.81 mm ($P<0.001$). Landmarks at the posterior aspect of the platform were modestly increased, ranging from 2.99-3.74 mm ($P<.01$). Landmarks at the inferior aspect of the platform were not significantly increased. Due to the increase in the lateral projection at the superior aspect of the platform, the axis of the platform in relation to the mid-sagittal plane was significantly increased on the affected side. The axis on the affected side was 17.15° as compared to 13.10° on the unaffected side ($P<.001$).

Conclusion: There are measurable and significant differences in the skeletal platform of the external ear in patients with HFM. Understanding the variable asymmetry of the skeletal platform may potentially improve the quality of ear reconstruction in patients with HFM.

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

KEY

Ω Oral Presenter - UT Southwestern Medical Student Research Forum
Δ Dean's Research Scholar, τ T35 NHLBI Training Grant Funded
∗ Poster Presenter

The Surgical Learning Curve of Orthopaedice Spine Surgeons

Isabel Alvarez

Mentor: Michael Van Hal MD, Department of Orthopaedic Surgery
Collaborator: Paul Nakonezny PhD

Background: Surgical experience is extremely important for successful outcomes and minimizing complications. Longer surgeries have been associated with more blood loss and complications. Posterior lumbar laminectomies and anterior cervical discectomies with fusion (ACDF) are two common procedures used by orthopaedic spine surgeons to treat compressive pathologies of neurological structures in the lumbar and cervical spine, respectively. This study is aimed at understanding the orthopaedic spine surgeon learning curve by analyzing various intraoperative and postoperative factors associated with lumbar laminectomies and ACDFs in an early career.
Objective: As surgeon experience increases with each successive case, operative time will decrease for that type of case.
Methods: A retrospective review of the posterior lumbar laminectomy and anterior cervical discectomy with fusion (ACDF) cases of an orthopaedic spine surgeon within the first year and a half as an attending was completed. Operations were performed by a single surgeon in a single academic institution. Patients undergoing one-to-two level posterior laminectomies and ACDFs for degenerative pathology were identified and analyzed in chronological order. Exclusion criteria included three or more level laminectomy or discectomy and concurrent procedures. Confounding factors such as smoking, diabetes, existing systemic disease, and age were accounted for through the ASA physical status classification system. Operative time, in-hospital and post-operative complications, and estimated blood loss (EBL) were analyzed as indicators of operative success. The operative time learning curves for posterior laminectomies and ACDFs were each characterized using a local weighted regression with a fitted Loess curve. Although EBL was analyzed in the same manner, there was no correlation with surgeon experience.
Results: There was an inverse linear relationship between surgeon experience and operative time for 1 and 2 level ACDFs, as well as 2 level lumbar laminectomies. Total surgery time appears to be constant across 1 level lumbar laminectomies. Our sample size was too small to draw conclusions from the infrequent events such as complications.
Conclusion: Proficiency at even common operations takes time. However, these cases can be done safely. The time to complete these surgeries is longer on multilevel cases. In the early course of a surgical career, there appears to be a trend toward longer operative times until the surgeon experience grows. Of note, simpler cases did not follow this trend, which means shorter cases may be less susceptible to the new surgeon phenomenon.

An Analysis of the Inconsistency between Physician and Patient Beliefs Regarding Diabetes Self-Care: An RRNet Study

Naveen Balakrishnan

Mentor: Neelima Kale MD, PhD, Department of Family Medicine
Collaborators: Thanos Rossopoulos, MS; Philip Day, PhD; David Schneider, MD, MSPH; John T Menchaca, BA

Context: Type II diabetes, a chronic disease that currently affects 27.3 million people in the United States, necessitates continuous care that requires constant vigilance of both the patient and provider. As a proxy for communication between patient and provider, we tested whether or not the patient and provider's perceptions of the patient's self-care were congruent through a quantitative, in-clinic survey-based cohort study. Following this, we analyzed the relationship between different demographic variables, social determinants of health, and indicators of health status with any inconsistencies found between these opinions.

Methods: Patients with diabetes and their caregivers were recruited from primary care clinics in 12 sites across Texas to complete an extensive survey addressing demographics, socioeconomic status, and perception of care quality and physician characteristics. The survey was a three-part survey containing a 65-item questionnaire completed by the patient, a 10–item survey completed by the patient's provider, and an objective EMR survey completed by study personnel. Patient survey consisted mostly of variations of Likert-scale questions. We analyzed the dependent variable, the "Consistency" between patient and provider opinions on patient diabetic self-care, by first simplifying the Likert-Scale answers and then utilizing a logistic and linear regression wherever appropriate given continuous or binomial independent variables.

Results: Patient and provider opinions on patient diabetic self-care were inconsistent 46.9% of the time. Inconsistencies in perceptions were more likely in patients who lack transportation (p=0.03) and in Hispanic patients (p=0.02). Consistency in perceptions was more likely in patients with a complete high school education and above (p=0.02; p=0.04) and in patients with Spanish as their first language (p=0.03).

Conclusions: Patients and providers reported inconsistent interpretations of patient self-care in nearly half of the patient population. This was associated with preferred language, race/ethnicity. ability to attend appointments, and having a high school education or above. Of note, transportation issues and sub-high school education levels were associated with greater likelihood of inconsistency between patient and provider.

The Effect of Decision Fatigue on Opioid Prescribing

Jordan Bland-Hughes

Mentor: Enas Kandil MD, Department of Anesthesiology
Collaborators: Jerzy Lysikowski PhD, Rabina Acharya MPH, Gary Reed MD, Eleanor Phelps RN, Patty Brown RN

Background: Decision fatigue—the phenomenon in which a person's mental resources are progressively depleted as they engage in making a series of choices—has documented influence on physician prescribing behavior and causes prescription rate variation throughout the clinical day. Given the current opioid crisis in the United States, understanding the effect of decision fatigue on the prescription of opioid analgesics specifically is imperative. Furthermore, it is important to establish how national interventions to combat the crisis have altered this effect.

Objectives: This project seeks to determine the role of decision fatigue in primary care physicians' opioid prescribing behavior, using increasing hourly prescription rates as a surrogate for decision fatigue. Because many of the opioid crisis interventions were implemented in 2016, this project draws data from 2014 and 2017, representing pre- and post-interventions.

Methods: Analysis of Variation was used as this project's primary method of data analysis, in order to understand significant prescription rate comparisons between patient populations, appointment times, physician specialties, etc.

Results: In 2014, there was significant opioid prescription rate variation throughout the clinical day, with physicians prescribing at appreciably higher rates toward the end of the day. Following the implementation of the national interventions to combat the crisis, this rate variation became statistically insignificant in 2017. Additionally, there was a significant difference in prescribing rates for patients who were age 18-64 vs >65, as well as a difference in prescribing rates between Internal Medicine and Family Medicine physicians.

Conclusions and Implications: There is clear evidence of decision fatigue influencing opioid prescribing behavior in 2014, while no effect could be found in 2017. Though causality cannot be determined, the fact that significant variation existed in 2014 and was eliminated by 2017 suggests a correlation between the interventions and decreased opioid prescription rate variation, and thus, more equitable healthcare delivery.

Designing abd Acceptable and Feasible Audit and Feedback System to Drive Handoff Redesign and Implementation

Anthony Dao

Mentor: Philip Greilich MD, MSc, Department of Anesthesiology
Collaborators: Ranveer Salvi, BSc; Eleanor Phelps, MA, RN; Trenton Bryson, MD

Description: Information loss during care transfers, or "handoffs," can disrupt care coordination and lead to adverse events, especially in high risk, error prone environments like the perioperative setting. Clements University Hospital piloted the redesign and implementation of a structured handoff process to Enhance Communication for Handoffs from the Operating room to the Intensive Care Unit (ECHO-ICU) to improve team-based communication and care. Because of this successful pilot, an implementation science-based approach is being taken to prepare for widespread adoption of inpatient handoff redesign. This requires the development of an acceptable and feasible audit and feedback system to support the work led by an inter-professional, unit-based change team guided by institutional subject matter experts.
Aim: This project aims to increase the feasibility of providing an acceptable report for Audit and Feedback by reducing the time required to generate it by 50% by December 2018.
Actions Taken: Initial literature review was performed to identify essential outcome measures related to successful handoffs. Primary stakeholders were surveyed to assess acceptability regarding their thoughts on the most important outcome measures related to handoffs. Feasibility was assessed by determining end users' motivation level for entering critical data into the electronic medical record and the complexity of generating an automated report by data specialists from EPIC, enterprise, and clinical data registries. Data were collected using multiple methods, including a REDCap survey, small group discussions, and individual interviews.
Summary of Results: The stakeholders included 55% nurses, 42% physicians, and 3% medical informaticists. The outcomes deemed most important by the survey were "the receiving team feeling capable of meeting patient needs," "all team members present during handoff," and "unanticipated postoperative events." Compared to physicians, nurses were more likely to be motivated to enter data into EPIC (2.6 vs. 4.0; $p<0.0005$ (t-test); $n=35$; on 5-point Likert scale). An automated report is likely limited to EPIC but could include enterprise data if financial data were required. Clinical registries are not likely a feasible option.
Next Steps: Clinical implementation in the 4^{th} step in a 5-stage translational research model. The next steps for this project will be to create a handoff dashboard within EPIC using an iterative process to incorporate stakeholder feedback into an automated report. Although acceptability and feasibility are leading indicators of successful widespread adoption, penetration and sustainability are the implementation-based measures that will be tested in future work by this research team.

Understanding Current Physician Practices for Chronic Pain Treatment at UTSW

Sonal Gagrani

Mentor: Enas Kandil MD, Department of Anesthesiology
Collaborator: Harsh Patel, Eleanor Phelps RN

Background: Opioid overdose has become a significant issue in the United States over the past few decades. Opioids are used regularly for chronic pain, often without proper regulation. The Texas Medical Board (TMB) recently instituted a rule change mandating a set of requirements for the treatment of chronic pain with opioids. Preliminary chart review by our group at University of Texas Southwestern Medical Center (UTSW) showed that physician policy adherence has significant room for improvement, but there is little qualitative data on current practices.

Methods: A 29-question survey was developed to subjectively measure physician attitudes toward the policy, barriers to adherence and current adherence rates. This survey was administered via email to any physician treating at least one patient with chronic opioids.

Results: The survey showed that physicians are currently most likely to use and value the state prescription monitoring program and pain management agreements, but are willing to improve their use of all other assessment tools if they were made more accessible. Free response data identified lack of time, accessibility, and questionable benefit to patients as the main barriers to adherence to the policy.

Planned interventions: A registry for chronic opioid treated patients as well as an electronic medical record (EMR) navigator tool have been developed at UTSW, but not yet introduced to physicians. The next part of the roll out includes a go-live and physician education regarding the policy and use of the new tools. Our results provide baseline quantitative data for UTSW and will be used to guide implementation strategies in the next phase of the project.

Watching the Watchers: Conflicts of Interest Among Oncology Journal Editors

Waqas Haque

Mentor: Deepak Agrawal MD, MPH, Department of Internal Medicine
Collaborator: Kadam Patel MBBS, MPH

Background: Almost all medical journals now require authors to publicly disclose conflicts of interests (COI). The same standard and scrutiny is rarely employed for the editors of the journals although COI may affect editorial decisions. Due to lack of past available data and transparency, there has been very little research on COI of physician editors in the medical literature. Previous studies in the literature have uncovered significant COI among oncologists in general practice and those on social media platforms such as Twitter.

Methods: We conducted a retrospective observational study to determine the prevalence and magnitude of financial relationships among editors of 10 influential US medical oncology journals as judged by impact factor and journal reputation. The Centers for Medicare & Medicaid Services Payments database was reviewed to determine the percentage of physician editors receiving payments and the nature and amount of these payments in the year 2016. We also compared the data in 2016 with data in years 2014 and 2015 to confirm our findings.

Findings: 89 unique physician editors were included in our analysis. 89/152 (59%) received 1118 general payments totaling $868,314. The median number of payments per editor was 6 (IQR 2-9). Over half of total payments made to editors ($459,867) were in the form of consulting fees (53%). The median total payment received by each editor in one year was $79,240 (IQR $410-25,175). 26 (29%) editors received payments of more than $5,000 in a year, a threshold considered significant by the National Institutes of Health. While Associate editors did not appear to have more COI than Chief editors, Chief editors received more funding in faculty fees ($65,525 for Chief editors compared to $35,706 for Associate editors) despite being vastly outnumbered. COI policies for editors were available for 3/10 (30%) journals but 0/10 (0%) of them publicly reported the disclosures.

Interpretation: A significant number of editors of oncology medical journals have financial COI and very few are publicly disclosed. Associate journal editors have more COI compared to Chief journal editors. Current policies for disclosing COI for editors are inconsistent and do not comply with the recommended standards. We recommend that journals strictly adhere to the International Committee

Key Attributes of a Medical Learning Community Mentor at One Medical School

Waqas Haque

Troy Gurney

Mentor: Jim Wagner MD, Department of OME
Collaborator: Gary Reed MD, Carol S. North MD, MPE, David E. Pollio PhD, MSW, E. Whitney Pollio EdD, MSN, James M. Wagner MD, MSc

Introduction: One of the major responses to the growing demand for small group learning in medical education has been the introduction of Learning Communities (LCs), which are now present in over half of medical schools and being actively considered in many of the others. These LCs differ from traditional classroom lectures in that learners are engaged in reciprocal interactions with their mentors, and enhanced student learning can be accomplished by adopting different teaching methods based on individual student needs. Given the emerging importance of these relationships to medical education, the paucity of research examining these roles in formalized small group interactions, such as in LCs, represents an important gap in knowledge.
Purpose. The purpose of this study was to discover the elements required for a successful learning community (LC) faculty member educator of medical students.
Method. The authors in this qualitative study evaluated six 90-minute focus groups of faculty members. The groups included 31 experienced and 19 inexperienced LC faculty members at University of Texas Southwestern Medical School. After achieving excellent interrater reliability (mean kappa value of .93 and kappa values for individual categories ranging from 0.85 to 1.00), transcriptions of the discussions were subjected to thematic analysis using ATLAS.ti software.
Results. Five major themes emerged: 1) LC Faculty Characteristics/Competency, 2) Suggested Faculty Development Methods, 3) Factors Outside the LC Environment Influencing Student Relationships, 4) Student Attributes Influencing Teaching Techniques, and 5) Measuring and Improving History and Physical Skills. Faculty Characteristics/Competency subthemes included Role-Modeling, Mentoring, and Teaching Competence. Suggested Faculty Development Methods subthemes included Assessing and Giving Feedback to Faculty, Peer Development, and Learning from Experts. Experienced LC faculty focused more attention on Teaching Competence and Mentoring Competence than inexperienced LC faculty.
Conclusions. The themes with the most extensive discussion among the experienced LC faculty groups may represent qualities to be sought in future mentor recruitment and faculty development. Future studies could build on this study by similarly investigating student perceptions.

The Art of Observation: A Qualitative Analysis of Medical Students' Experiences

Bowen He

Mentor: Heather Goff MD, MPH, Department of Dermatology
Collaborator: Smriti Prasad, Robin Higashi PhD

Context: Although the inclusion of arts in medical school curricula has garnered much attention, little is known about the effect of arts-based interventions on the behaviors, attitudes, and technical skills of students. The Art of Observation is an optional elective at UT Southwestern Medical Center in collaboration with educators from the Dallas Museum of Art. We utilized a qualitative approach to describe in-depth how engaging with art influences the development of medical students' observation skills and empathy.

Methods: We analyzed evaluations from 65 medical students who completed the course between 2015-2017. Evaluations contained open-ended questions that asked students to reflect upon their experiences and describe their perceptions, thoughts, and feelings after guided museum visits. Two investigators independently read all evaluations line-by-line and used open coding to generate a codebook, which was refined by consensus and discussed with a third investigator experienced in qualitative methodology. We then employed axial coding to identify sub-themes and discover relationships between the major themes.

Results: We report three main findings and several subthemes from the data: (1) Enhanced observation skills: by engaging with art and completing relevant activities, students developed the ability to synthesize a compelling narrative in addition to learning technical skills; (2) Improved physician socialization: students reported enhanced self-awareness, increased tolerance of ambiguity, and development of a humanistic view of medicine, key components of physician socialization; and (3) Reduction in burnout symptoms: students reported an enhanced sense of well-being after each session, which mitigates the process of burnout.

Conclusions: Fine arts can be used to teach technical skills, stimulate personal reflection, and prevent burnout. A meaningful engagement with the arts can play an important role in developing physicians who are observant, empathetic, and more well-rounded.

Establishing a Multidisciplinary Difficult Airway Response Team (DART) for Patients with "Difficult Airways"

Natasha Houshmand

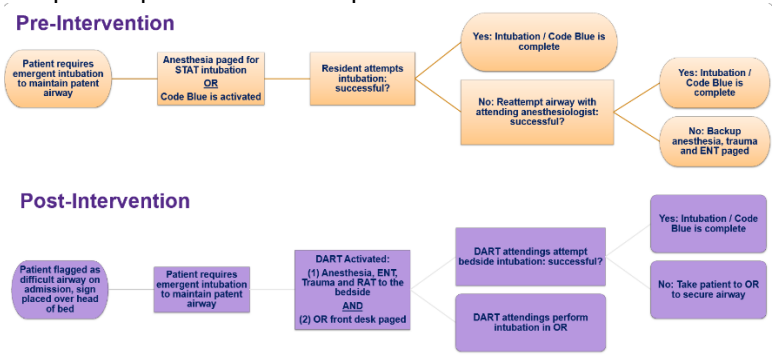
Mentor: Linda Dultz MD, MPH, Department of Surgery
Collaborators: Pamela Fox MD, Teresa V. Chan-Leveno MD, Christina Riccio MD

Situation: Patients with "difficult airways" present a unique challenge to providers during emergent intubations. This statement is supported by the incidence of difficult intubations ranging from 9 to 12%[1-4] with a complication rate between 4.2 to 28%.[1-3] Prior institutions have created a Difficult Airway Response Team (DART) to combat this problem[5].

Background: Parkland does not currently have a system in place to identify patients with difficult airways on admission. Additionally, its respiratory code response team only includes Anesthesiology. The current process mapping to emergently secure an airway on these patients works in series rather than parallel. Anesthesiology receives the first call, followed by ENT or Trauma depending on the airway emergency.

Assessment: The implementation of a standardized protocol for Anesthesiology, ENT and Trauma to work in parallel to intubate those with "difficult airways" could reduce the number of adverse events in this patient population.

Recommendation: We have developed a multidisciplinary team composed of Anesthesia, ENT and Trauma to respond to codes for "difficult airways." Patients will be identified as difficult airways on admission and a banner will appear on their EPIC charts. Medical staff will be educated on this new team and how to utilize the team effectively to improve patient care. Additionally, a standardized paging system, airway registry, documentation template and education materials have been developed as part of DART's implementation.



Assessing Abortion Patients' Access to Contraception and Attitudes Towards Contraceptive Counseling

Aishwarya Iyer

Mentor: Robin Wallace MD,
Nora Gimpel MD, Department of Family Medicine
Collaborators: Robin Wallace MD, Amanda Bennett
Tiffany Kindratt PhD, MPH, Nora Gimpel MD

Background: Abortion rates are disproportionately higher among those who are poor and lack access to quality health care, including effective contraception. Abortion clinics frequently offer contraceptive counseling, but it is unclear if this service is in line with patient preferences or satisfies an unmet need. A better understanding of access to contraception and attitudes towards contraceptive counseling during abortion care may inform more patient-centered practices by both abortion providers and primary care providers for the patients they serve.
Objectives: To identify the preferred avenues through which patients access contraception and to assess their attitudes towards receiving contraceptive counseling at their abortion visit.
Methods: A cross-sectional survey was created and administered to a random sample of 181 patients at Southwestern Women's Surgery Center, a privately owned abortion clinic in Dallas. The main outcome measures were access to contraception and attitudes towards receiving contraceptive counseling during the abortion visit. This study was deemed non-regulated research by the UT Southwestern IRB. Survey responses were coded in Microsoft Excel. Descriptive statistics, chi-square analysis, and a logistic regression (odds ratio and 95% confidence interval) were performed using STATA.
Results: The overall survey response rate was 69%. 32.6% of participants were African-American, 19.3% Caucasian, and 24.3% Hispanic. 58.3% of respondents were not using any form of birth control. 36.8% stated the most convenient place for them to obtain birth control would be somewhere close to their home, while 32.5% stated it would be the same physician from whom they receive all their other care. 81.8% of participants were not interested in receiving contraceptive counseling at their abortion visit. Chi-square analysis and logistical regression on this variable showed no statistically significant differences by age.
Conclusions: The majority of our study participants were not using any form of birth control prior to seeking abortions at this clinic. Additionally, most were not interested in contraceptive counseling for a variety of reasons and one-third explicitly stated they would prefer this counseling from their primary care provider. Next steps include a ZIP code analysis to develop a comprehensive resource that includes educational and referral information to other health centers, including primary care practices, offering contraceptive services.

Understanding the Scope and Causes of Unnecessary Proton Pump Inhibitor Prescribing in non-ICU Patients Admitted to Parkland Hospital

Shailavi Jain

Mentor: Deepak Agrawal MD, Department of Internal Medicine
Collaborators: Jessica Garza PharmD, BCPS, Subhasri Kannan MD, Thomas Tsai MD, Eugene Chu MD, Deepak Agrawal MD, MBA

Background: Proton pump inhibitors (PPIs) are one of the most widely prescribed classes of drugs in the United States. Their efficacy and relatively low adverse event profile has led to their significant overuse. Long-term PPI use is increasingly associated with many health issues and unnecessary prescribing leads to unnecessary expenditures.
Objectives: This study aimed to determine the degree of inappropriate PPI prescribing in patients admitted to non-ICU beds and discharged from Parkland Hospital. Additionally, we aimed to identify the reasons for inappropriate PPI prescribing, in order to design and implement targeted interventions to deprescribe unnecessary inpatient PPIs.
Methods: A retrospective analysis of patients admitted to a hospitalist service and prescribed an inpatient PPI during June 2017 was performed. Detailed chart review determined the indications for the prescribed PPIs and the prescription was deemed appropriate if it was consistent with published guidelines on the use of PPIs. Hospitalists were surveyed to understand their perspectives on unnecessary PPI use. Interventions addressing the identified causes of inappropriate PPI prescribing were chosen using a prioritization matrix and implemented.
Results: A total of 319 patients were prescribed PPIs as inpatients by hospitalists in June 2017. 58% of these prescriptions were deemed inappropriate –37% were new prescriptions of PPIs and 21% were continuations of unnecessary outpatient PPIs. Per chart review, the major indications for these inappropriate PPI prescriptions were stress ulcer prophylaxis, concern for bleeding due to concomitant steroid use, and continuation of outpatient PPIs. Of all 319 patients prescribed PPIs inpatient, 67% were discharged on a PPI. Of those, 52% did not have indications for outpatient PPI use. Six months later, 47% of the patients inappropriately discharged on a PPI were still taking one.
Providers believed the main reasons for inappropriate PPI prescriptions included automatic continuation of outpatient PPIs, ordered as a part of order sets, and low perceived risks. Therefore, the study's interventions included educating providers about PPI indications and adverse effects, providing individualized feedback on PPI use to hospitalists, placing restrictions in the electronic health records system, and improving communication between outpatient physicians and hospitalists.
Conclusion: Inappropriate prescription of PPIs in hospitalized patients is common and these patients are often discharged and continued on a PPI for many months. This is concerning as it exposes patients to the adverse long-term effects of PPIs. Our findings have helped develop a multi-modal approach to deprescribing inappropriate PPIs at Parkland.

Fetal Coarctation: Refining a Diagnosis

Lorraine James

Mentor: Anita Moon-Grady MD, Department of Pediatric Cardiology
Collaborator: Whitnee Hogan MD

Objectives: Suspicion of coarctation of the aorta (CoA) on fetal echocardiogram may lead to improved outcomes by promoting early postnatal stabilization and intervention, but diagnostic uncertainty may lead to inappropriate interventions. Our objective was to define the rates of certain and uncertain prenatal CoA diagnosis and the effectiveness of communication regarding suspicion of fetal CoA as related to postnatal interventions and diagnostic outcome in our institution.

Methods: Retrospective review of pregnancies with fetal diagnosis of isolated CoA or suspected CoA 2015-2018. Prenatal data included gestational age at echo and prenatal prediction of need for prostaglandin (PGE1). Postnatal data included PGE1 initiation at birth, postnatal surveillance without PGE1, and CoA confirmation after birth.

Results: Of 41 fetuses with concern for possible CoA, 12 fetuses had a prediction of PGE1 dependence of which 9 had CoA, and 12 had a prediction of a lesion that was not PGE1 dependent, of which only 3 had CoA; for 17 fetuses where prediction was unmentioned or equivocal, 4 newborns had CoA. PGE1 initiation data were available for 39 newborns—PGE1 was started immediately in 10/12 newborns for whom it was recommended (8 had CoA) and was not started initially in all 11 for whom it was explicitly not recommended (3 had CoA). PGE1 was started at birth in 1/16 for whom recommendation was vague or unmentioned (4 had CoA).

Conclusions: Newborns suspected of having CoA on prenatal evaluation had a postnatal CoA only 39% of the time, though 67% of those started on PGE1 did have CoA. While a definitive diagnosis of CoA was more likely to lead to appropriate PGE1 administration, recommendations were vague in over half, and a fair number of these babies ultimately had CoA. Investigation of physician certainty versus equivocation is a novel approach and one that deserves attention because this messaging is potentially modifiable.

A Comparative Analysis of Dextromethorphan Abuse in Thailand and the United States from 2010-2017

Taylore King

Mentor: James Cao MD, Department of Emergency Medicine
Collaborators: Christian Davidson BA, Sahaphume Srisuma MD, James Dazhe Cao MD, Panee Rittilert, Aimon Pradoo

Objective: To describe and compare characteristics, co-abuse substances, clinical effects, treatments, and outcomes of reported dextromethorphan (DXM) abuse exposures in the United States and Thailand. DXM abuse by adolescents has been a public health concern in both countries.

Methods: This is a retrospective study of DXM abuse exposures reported to the National Poison Data System (NPDS) of the United States and the Ramathibodi Poison Center (RPC) of Thailand from 2010 to 2017. Characteristics, co-abuse substances, clinical effects, treatments, and outcomes of intentional abuse were described, and compared between cases reported to RPC and NPDS. NPDS was used as reference in comparative analyses and multivariate analyses.

Results: There were 34,357 (74% single-substance) DXM abuse cases reported to NPDS and 98 (49% single-substances) cases reported to RPC. The most common age group in both countries were 6-19 years (56.9% in the U.S.; 70.4% in Thailand). Common co-ingested substances were ethanol (7.8%), a second medication containing DXM (4.4%), and marijuana (4.1%). In Thailand, there were more reports of co-abuse with opioids (OR 10.83, 95% CI 5.98-18.55) and stimulants (26.37, 16.00-42.42). Common clinical effects were tachycardia (53.2%), drowsiness/lethargy (31.1%), and hypertension (25.7%). In Thailand, there were more reports of seizures (14.83, 8.64-24.28), coma (6.35, 1.97-15.3), and fever/hyperthermia (3.09, 1.12-6.67). Tachycardia (0.35, 0.21-0.55) and mydriasis (0.12, 0.01-0.43) were more commonly reported in the U.S. than Thailand. The majority of medical outcomes were minor (97.6% in U.S.; 89.8% in Thailand). There were 30 deaths total: 29 deaths (0.1%) in the U.S. and 1 death (1.0%) in Thailand. Co-abuse substances associated with death were opioids (21.85, 9.14-52.25), serotonin reuptake inhibitors (18.69, 5.36-65.25), and stimulants (7.63, 2.76-21.11).

Conclusion: U.S. individuals are far more likely to abuse DXM; however, Thai individuals are more likely to abuse multiple-substances with DXM, which may explain the more severe clinical effects and medical outcomes observed in Thai DXM abusers than in U.S. abusers. These results call the current unscheduled status of DXM in the U.S. into question.

Study Design of the Accelerated Development of Additive Pharmacotherapy Treatment for Methamphetamine Use Disorder (ADAPT-2) Trial

Keith Liu

Mentor: Adriane dela Cruz MD, PhD, Department of Psychiatry
Collaborators: Robrina Walker PhD, Mora Kim MPH, Madhukar Trivedi MD

Background: No medication has demonstrated efficacy for the treatment of methamphetamine use disorder, leading to the investigation of combinations of existing medications. In a pilot, open-label trial, 11 of 49 severe methamphetamine users achieved a good clinical outcome with treatment with daily bupropion XL and long acting injectable naltrexone (XR-NTX) every 4 weeks for 8 weeks. In the current study, we are assessing the efficacy combination of naltrexone and bupropion for treatment of methamphetamine use disorder, measured via urine drug screen (UDS) results, in a large, multisite, double-blind study.

Methods: Four hundred adults with DSM-5 moderate or severe methamphetamine use disorder who self-report methamphetamine use in at least 18 of the past 30 days are being recruited at eight study sites.
Potential participants first undergo a screening phase to determine study eligibility, which includes establishing a physical and mental health baseline and production of two methamphetamine-positive urine drug screen (UDS) samples within a ten-day period. The screening phase introduces the Timeline Follow Back (TLFB), a log of the screening participant's alcohol, tobacco, and illicit drug use in the 30 days prior to screening. The TLFB continues through the follow-up phase visits.
Participants who are determined to be eligible in screening phase are randomly assigned to either the active medication combination (AMC) arm consisting of injectable naltrexone (XR-NTX 380 mg q3weeks) and daily, oral bupropion (BUP-XL 450 mg) or the matched placebos (PLB arm) for a 12-week medication phase. The study utilizes a confidential sequential parallel comparison design (SPCD), such that participants not responding to initial treatment assignment are eligible for re-randomization. Naltrexone or the placebo injection is administered in weeks 1, 4, 7, and 10. Participants are seen twice weekly for assessments and urine collection; in addition, they are seen weekly by a clinician for medical management. To accurately track oral medication adherence, participants use a smartphone application on non-clinic days that records the ingestion of the medication. The follow-up phase that involves medication tapering and clinic visits during weeks 13 and 16.

Conclusion: The ongoing ADAPT-2 trial will be a definitive test of the efficacy of the combination of BUP-XL and XR-NTX for the treatment of methamphetamine use disorder.

Developing a Robust Measurement System to Improve the Effectiveness of Event Reporting at an Academic Medical Center

Harris Majeed

Mentor: Isaac Lynch MD, Department of Anesthesiology
Collaborator: Eleanor Phelps, BSN

Background: An optimal event reporting system maintains an effective response regardless of high event report volume. The goal of event reporting is to potentiate a preventative response to future adverse incidents. As voluntary event reporting in hospital units increases, there is a growing concern that event reporting systems cannot process a high report volume.
Objective: This project aims to develop a novel measurement system to quantify the fidelity of event reporting processes.
Methods: We evaluated the reporting process in the Medical Intensive Care Unit (MICU) at UT Southwestern Clements University Hospital, academic medical center, beginning with the staff entering an event report, through follow-up and closure, using a time metric, the “Report-to-Action Time” (RAT). RAT is the number of days between event report submission and the Office of Clinical Safety marking the report as "closed”, after required follow up. We assessed three months of MICU event reporting data and calculated the RAT for each closed report. This was used to develop a second metric, the “Event Reporting Fidelity Quotient” (ERFQ). We define ERFQ as a ratio of the number of closed event reports to the mean RAT in a month.
Results: MICU report counts in March (n=56) and May (n=55) are similar. However, the ERFQ for March is 2.28 and in May is 4.49, a 96% difference that is accounted for by changes in RAT.
Conclusions: The RAT metric assesses efficiency of response processes within an event reporting system. The ERFQ reflects variations in event reporting performance, which cannot be detected from event count or RAT alone.

MONTH	REPORT COUNT	MEAN RAT (DAYS)	EVENT REPORTING FIDELITY QUOTIENT
MARCH	56	25	2.28
APRIL	118	22	5.43
MAY	55	12	4.49

Table 1: MICU event reporting data for the months of March, April, and May of 2018. The Event Reporting Fidelity Quotient is calculated by dividing the report count by the mean RAT.

Productivity and Efficiency of Fourth-Year Medical Students in a Diganostic Radiology Subintership Course

Trung Nguyen

Mentor: Kristen Bishop MD, Department of Diagnostic Radiology
Collaborator: Julie Champine MD, FACR

Purpose: The purpose of the project is to ascertain the clinical productivity of medical students in our radiology subinternship. The numbers of draft reports dictated by the students with an assigned faculty mentor will be examined to determine a benchmark goal for future students enrolled in the subinternship to achieve by the end of the rotation.

Method and Materials: This UTSW diagnostic radiology subinternship course was available to fourth-year UTSW medical students August and September 2017 and July and August 2018. The fourth-year medical students were given access to the PACS and voice dictation systems and dictated draft reports under the supervision of a faculty mentor. The students spent 2 weeks on abdominal CT service and 2 weeks on ultrasound service and were not given a target number of studies to dictate. We obtained an IRB waiver for our project and then retrospectively extracted the number of cases dictated by each student with his/her faculty mentor from the RIS and recorded data points for each day for each student. We excluded days when the assigned faculty mentor was off service, and the student was dictating cases with various other faculty.

Results: Students were able to dictate up to 8 CT cases per day or up to 13 ultrasound cases per day with a faculty mentor by the end of the rotation. Given these numbers, we will begin giving students a goal of 5 CT exams per day or 10 ultrasound cases per day. The t-test comparing the first five days and the last five days of the selective for each modality showed a statistically significant increase in each modality.

Conclusion: Our radiology subinternship course is unique among diagnostic radiology electives in that we allow the student to practice dictating draft reports under the guidance of a faculty mentor. By studying the number of exams dictated by these advanced medical students, we can provide a benchmark goal to which future students can strive and measure their own progress. Additionally, we can also use this data to look at the productivity of faculty members when they do have students versus when they do not to further the understanding of how efficient this subinternship is.

Predictive Factors Associated with Superior Performance on USMLE Step 1

William Ou

Chong Zhou

Mentor: Angela Mihalic MD, Department of Pediatrics
Collaborators: Dorothy M. Sendelbach MD, Arlene Sachs PhD

Introduction: The aim of this study was to examine patterns and efficacy of self-initiated, self-directed strategies and resources used by medical students to prepare for the United States Medical Licensing Examination (USMLE) Step 1 examination.

Methods: A survey was administered to a cohort of medical students at a single institution who had taken the USMLE Step 1 between January and June 2018. All students were provided with at least 6 weeks of dedicated study time prior to taking the exam. Data collected included review resources utilized, number of boards-style multiple choice questions (MCQ) completed, self-reported board preparation initiation time, clerkship schedule, number of practice exams taken, and score on a National Board of Medical Examiners Comprehensive Basic Science Self-Assessment (NBME CBSSA) provided by the school in December 2017. Step 1 scores and pre-clerkship course grade averages were retrieved from institutional records and matched to survey responses, after which all data were de-identified for analysis. A multiple linear regression model was constructed to identify explanatory variables associated with performance on Step 1.

Results: There were a total of 161 respondents, with USMLE Step 1 scores ranging from 198 to 270. All students were required to undergo the NBME CSSA and reported using practice MCQs (mean 3293, SD 1097). Sixty-nine (43%) respondents reported use of Anki, a flash card application based on the principle of spaced repetition. In a multivariate regression model, significant independent predictors of Step 1 score included cumulative preclinical class average (unstandardized beta coefficient $\beta = 1.41 \times 10^{-3}$, $p < 0.001$), NBME CBSSA score ($B = 0.229$, $p < 0.001$), the total number of MCQ completed ($\beta = 2.0 \times 10^{-3}$, $p = 0.017$), and utilization of spaced repetition software (Anki; $\beta = 3.82$, $p = 0.034$). Each additional 505 MCQ was associated with an additional point on Step 1. Use of SketchyMedical resources, the initiation time of board preparation, and taking the exam in the first available block were not found to impact Step 1 scores.

Conclusions: Medical students regularly engage in self-initiated, self-directed preparation for USMLE Step 1. Behaviors associated with improved performance on Step 1 included completion of more board-style MCQ and use of spaced repetition software (Anki). These strategies should be explored in further studies.

Outcomes of Inguinal Hernia Repair in a County Hospital in Guatemala

Corey Timmerman

Mentor: Sergio Huerta MD, Department of Surgery

Background: Groin hernia repair is a common general surgical procedure in developing countries, however, how patients with inguinal hernias present and their complications in many parts of the world are not currently known. This study characterizes the patient demographics, presentation, and outcomes of hernia repair in a referral hospital in northern Guatemala.

Materials and Methods: A retrospective chart review of inguinal hernia repairs performed between 2007 and 2017 at the Hospital Nacional de San Benito (HNSB), Guatemala was performed. Issues related to poor outcomes were explored.

Results: A majority of patients were male in their fifth decade of life with indirect hernias, but 10% of hernias were femoral. Over 95% of repairs were performed under regional anesthesia. Twenty-five percent (1/4) of hernias presented with incarceration requiring and emergent operation, with bowel resection in one case. Only half of the patients returned for follow-up visit. The rates of readmission, inguinodynia, and wound infection were 1.2% each. Recurrence rate was 2.4%.

Conclusions: There is a large number of patients presenting emergently for groin hernia repair. Outcomes were difficult to capture due to poor compliance and unavailable documentation, but recurrence was high. Most patients undergo regional anesthesia at HNSB. Our data show that emergent hernias are likely the result of patient related issues rather than system problems.

Integrated Model for Hepatities C Screening and Linkage to Care in Homeless Population

Amy Xia

Mentor: Patti Pagels PA-C, Department of Family Medicine
Collaborators: Naveen Balakrishnan, Minh Tran

Background: Hepatitis C is a major cause of morbidity and mortality as up to 46% of people infected with Hepatitis C develop cirrhosis and up to 20% develop hepatocellular carcinoma. Over the past year, a new initiative through the DFW Hep B Free organization at the University of Texas Southwestern (UTSW) was formed to target Hepatitis C among the homeless population, starting with screening at the Union Gospel Mission's Calvert Place homeless shelter. This underserved population is vulnerable because of inadequate healthcare access and resources, in addition to other risk factors such as former incarceration and injection drug usage. The main barriers to care for a transient, homeless population are 1) their lack of access to regular healthcare and screenings, 2) their inability to receive screening results via phone or mail, and 3) the difficulty of linking patients to affordable, accessible healthcare and treatment.

Methods: Our model integrates a student-run screening program, an on-site clinic at the shelter, and specialized hepatology services at Parkland Health Hospital System (PHHS), a local safety-net provider, to maximize the strengths that each component offers. Using OraQuick Rapid Hepatitis C Virus (HCV) tests, which screen for HCV antibodies and produce results in 20 minutes, we can deliver test results and provide counseling on the screening day. Under an IRB through a faculty hepatologist, patients that test positive are registered into Parkland Hospital's hepatitis surveillance program. The program then provides patient navigation, financial support, and treatment.

Results: On average, the HCV antibody positive rate from screenings at Calvert Place is 12.7% (N=126). 100% of positive patients were contacted with their result. For patients who tested positive (n=16), 2 (12.5%) did not need care (resolved HCV). From the 14 of 16 that had active HCV infections, 50% were lost to follow up and 50% were linked to care at Parkland hepatology clinic.

Conclusion: Through our integrated model, we have created the foundations for a sustainable system to break down barriers to care while ultimately connecting HCV-positive homeless patients to treatment.

Improving Adherence to Texas Medical Board Rule 170.3 Concerning the Prescribing of Opioids to Patients for Chronic Non-Cancer Pain Relief

Aemen Zamir

Mentor: Enas Kandil MD, Department of Anesthesiology
Collaborator: Madhav Shukla, Christopher Bender, Opioid Task Force Team

Background: Treatment guidelines for chronic pain care are making their way into law as concerns about opioid overuse and abuse increase. The Texas Medical Board has outlined their policy for the use of medication for non-malignant chronic pain purposes in Rule 170.3 of the Texas Administrative Code. Some of the requirements include a signed pain management agreement, regular review of the Prescription Monitoring Database, a urine drug screen, and documentation of completion of requirements in patient's medical records.

Local Problem: There is an absence of both institutional policy that aligns with the TMB policy for prescribing opioids and institutional baseline data on current physician opioid prescribing practices amongst the target population.

Methods: A preliminary chart review of patients on the opioid registry, an intervention in early phase of implementation meant to easily identify patients receiving opioids for chronic pain, was conducted to determine baseline adherence amongst the target population. A driver diagram was generated to determine possible causes for lack of adherence amongst physicians.

Planned interventions: An opioid registry and electronic health record tools meant to facilitate completion of requirements are in the early phases of implementation.

Results: Of the 206 patients studied, 6% had all three TMB mandated elements in their charts.

Pain Management Agreement	Completed	Mentioned but not Completed/Uploaded		Not Mentioned or Completed
	41%	10%		49%
Urine Drug Screen	Completed	Mentioned but not Completed	Outdated	Not Mentioned or Completed
	20%	11%	20%	53%
Review of Texas Prescription Monitoring Program	Completed		Not Completed	
	21%		79%	

Conclusions: Poor compliance in the UTSW system necessitates tools that will streamline the process for completing and documenting the requirements. This baseline data will be compared to data collected following the implementation of the EHR tools and the opioid registry best practice alerts as they are rolled out by the Opioid Task Force.