ABSTRACT BOOK

Medical Student Research Forum & Poster Day

April 4, 2017

Presented by:
Required Scholarly Project (RSP) Program Steering Committee
Dean's Research Scholar Program
Office of Educational Affairs

Keck School of Medicine of USC

Keck School of Medicine of USC

DEPARTMENT OF MEDICAL EDUCATION
Keck School of Medicine
Keith Administration Building, Room 218

Henri R. Ford, M.D., M.H.A.
Chair

MEDICAL STUDENT RESEARCH FORUM & POSTER DAY

April 4, 2017

The Keck School of Medicine of the University of Southern California is committed to training the future leaders of academic medicine. To this end, all KSOM medical students are required to participate in hypothesis-driven research during their tenure at Keck. This week's Forum represents an important milestone for the research activities of all 2nd year students. Many of their contributions have been widely recognized at regional and national meetings as evidenced by the fact that Keck students have won numerous honors and prizes over the years.

The Dean's Research Scholars program was established for students interested in pursuing a fifth year of research during medical school. Since its inception, the program has grown exponentially. Some of our current Dean's Research Scholars are presenting at this Forum.

As you read these abstracts, I am confident you will appreciate and enjoy the remarkable accomplishments of our talented students. These research projects also represent a considerable effort on the part of the faculty mentors for each of the students. Such efforts are deeply appreciated by all of us.

Sincerely,

Henri R. Ford, MD, MHA
Vice Dean for Medical Education

University of Southern California
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MEDICAL STUDENT RESEARCH FORUM & POSTER DAY 2017

April 4, 2017

KECK SCHOOL OF MEDICINE
UNIVERSITY OF SOUTHERN CALIFORNIA

The 2017 Medical Student Research Forum and Poster Day is an annual event which allows Keck School of Medicine of USC medical students the opportunity to present their Required Scholarly Projects (RSP) and Dean's Research Scholar (DRS) projects to their peers and the USC community at large. RSP is a longitudinal research experience that spans the duration of medical school, in which all students are required to participate. DRS is a distinguished opportunity for an optional fifth year of medical school dedicated to research. The projects presented by our students represent a wide variety of disciplines, from basic science to clinical and translational research.

We are extremely appreciative of the supportive faculty who have volunteered their expertise to mentor students through these exciting research initiatives. We also thank faculty who have volunteered their time teaching the key principles required to successfully conduct research. To the incredibly dedicated staff, we thank you for your outstanding coordination of all RSP and DRS-related activities.

The Office of Educational Affairs would like to thank all of those involved with organizing this Forum. We also extend special thanks to Rohit Varma, MD, MPH, Dean, Keck School of Medicine; Henri R. Ford, MD, MHA, Vice Dean for Medical Education; Nuria Pastor-Soler, MD, PhD, Assistant Dean for Research Mentoring & Director of Required Scholarly Project, David Hinton, MD, FARVO, Director of Dean's Research Scholars, and Stephanie Zia, MD, MACM, Assistant Dean for Career Advising for their support and participation in this Forum. We are very appreciative of the faculty and student judges for reviewing poster presentations. Finally, we are incredibly grateful to our benefactors, the Baxter Foundation, the Wright Foundation, the Medical Faculty Assembly, the Medical Faculty Family and Friends, the Greos Family, and Dr. Frank A. Sinicrope for their commitment and support of medical student research.

PROGRAM SCHEDULE

Welcome Address, Mayer Auditorium – 1:00 p.m.
Rohit Varma, MD, MPH
Dean, Keck School of Medicine of USC

Oral Presentations, Mayer Auditorium – 1:10-2:30 p.m.
Moderator: David Hinton, MD, FARVO
Professor, Keck School of Medicine of USC

Poster Presentations, Harry & Celesta Pappas Quad – 2:45-5:00 p.m.
Dean's Research Scholars
Health, Technology, and Engineering Program
Class of 2019 Medical Students

2017 ORAL PRESENTATIONS

Dean's Research Scholars

Gabriela Bobarnac
(Mentor: **Jon-Paul Pepper, MD**)
The Role of Hedgehog-Responsive Cells in Facial Nerve Regeneration

Margarita Ivanova
(Mentor: **Jo Marie Reilly, MD**)
Not Your Regular Health Class: When Doctors and Scientists Interact with Secondary Students as Professionals

David Perrault, Wright Research Scholar
(Mentor: **Alex Wong, MD**)
Risk Factors for Wound Complications after Sarcoma Resection in the Lower Extremity

Class of 2019

John Carney
(Mentor: **Aaron Strumwasser, MD**)
Hemodynamically Abnormal Thoracoabdominal Trauma Should Undergo Computed Tomography Prior to Definitive Therapy

Jessica Prescott
(Mentor: **Alicia McDonough, PhD**)
Sex-specific Regulation of Renal Transporters During Experimental Hypertension

Andrew F. Sabour
(Mentor: **George Hatch, MD**)
A Nationwide Analysis of Recurrent Hip Irrigation and Debridement for Pediatric Septic Arthritis of the Hip

Melanie Wathugala
(Mentor: **Sook-Lei Liew, PhD, OTR/L**)
Mindfulness Meditation Effects on Spasticity and Quality of Life in Stroke Survivors

REQUIRED SCHOLARLY PROJECT (RSP)
STEERING COMMITTEE

Nuria Pastor-Soler, MD, PhD
Assistant Dean of Research Mentoring
Director, Required Scholarly Project

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Director of Dean's Research Scholars

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Assistant Professor of Clinical Preventive Medicine

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Jane Figueiredo, PhD
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William Tseng, MD
Assistant Professor of Clinical Surgery

Fernando Fleischman, MD
Assistant Professor of Clinical Surgery

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MSIV Research Chair

Roee Astor, MSIII
MSIII Research Chair

Mark Landau, MSII
MSII Research Chair

Acacia Hori, MSI
MSI Research Chair

KECK MEDICAL STUDENT RESEARCH BENEFACTORS

The Keck School of Medicine of USC is sincerely grateful to our benefactors who generously support our student research programs.

Donald E. and Delia B. Baxter Foundation

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Greos Family

Dr. Frank A. Sinicrope

Office of the Dean

TABLE OF CONTENTS

Research Categories

Dean's Research Scholars

Class of 2019 Medical Student Researchers

DEAN'S RESEARCH SCHOLARS

Variables Associated with Repair of Traumatic Peripheral Nerve Injuries

Beina Azadgoli, MS, Don Huong, MD, Hyuma LeLand, MD, Nana-Yaw Bonsu, BS, Milan Stevanovic, MD, PhD, Alidad Ghiassi, MD, Joseph N. Carey, M

Goals: Data regarding outcomes after peripheral nerve injuries is limited and the optimal management strategy for an acute injury is unclear. The aim of this study was to study specific patient and surgical factors that impact sensor-motor outcomes after peripheral nerve injury.
Methods: This was a single center, retrospective study at a level 1 trauma center. Patients with traumatic peripheral nerve injury from 01/2010 – 06/2015 were included. Patients who died, required amputation, suffered brachial plexus injury, or had missing motor-sensory exams were excluded. Motor and sensory exams were graded 0-5 by the Modified BMRC system. Patient characteristics, anatomic nerve injury, level of injury, associated injuries, days until repair, and repair method were analyzed.
Results: 311 patients met inclusion criteria. 258 (83%) patients underwent operative management and 53 (17%) underwent non-operative management. Those who required surgery had significantly more penetrating injuries 85.7% vs 64.2% ($p<0.001$), worse initial motor scores 1.19 vs 2.23 ($p=0.004$), and worse initial sensory exam scores 1.75 vs 2.28 ($p=0.029$). Predictors of improved motor outcomes on univariate analysis were Injury Severity Score (ISS) <15 ($p=0.013$), male sex ($p=0.006$), while upper arm level of injury was a predictor ($p=0.041$) of poor outcome. Nerve reconstruction type between primary, allograft, autograft, or nerve tube did not influence motor outcomes ($p=0.15$). Multivariate analysis did not confirm level of nerve injury to be predictive of outcome. Univariate analysis identified distal forearm level of injury ($p=0.026$) and autograft repair ($p=0.048$) as predictors of poor sensory outcome. These were not found to be significant on multivariate analysis. Days to nerve repair (≤ 24 hours versus >24 hours, $p=0.834$) did not influence motor-sensory outcome.
Conclusion: Outcomes were primarily influenced by patient characteristics and to a lesser degree, injury level, rather than operative repair characteristics.

Nanoparticulate Matter Exposure Mediates White Matter Changes in a Murine Model

Robin Babadjouni, Qinghai Liu, Hank Cheng, Ramon Durazo, Drew M Hodis, Arati Patel, Ryan Radwanski, Constantinos Sioutas, Todd E Morgan, Caleb E Finch, William J Mack

Background: Clinical and epidemiologic studies suggest a relationship between long-term nano-particulate matter (nPM) exposure and white matter injury.[1] Accumulating laboratory evidence suggests that nPM exposure causes inflammation in multiple brain regions.[2] Bilateral carotid artery stenosis (BCAS) is a model of cerebral hypoperfusion which is a complication of chronic heart failure.
Objective: We sought to study the effects nano-particulate matter exposure on microglia activation and complement upregulation within the corpus callosum in a murine model. Further, we sought to examine the synergistic effects of BCAS and air pollution on white matter toxicity.
Methods: C57 black 6J mice were randomized to re-aerosolized nPM (n=18, nPM <200 nm) or filtered air (n=18) cohorts. Exposures were conducted for a total of 150 cumulative hours. A separate cohort of nPM and filter mice (n=12 each) underwent BCAS surgeries 30 days prior to completion of exposures. BCAS consist of application of 0.18 mm microcoils to each common carotid artery. Post-exposure, brains were harvested and immunohistochemical analysis performed. Reactive microglia (IBA-1), reactive astrocytes (GFAP) and C5α deposition (C5α antibody) were quantified in the medial corpus callosum.
Results: *Results for filtered air vs air pollution*: There were significant differences in IBA-1 cell count staining between the groups (filtered air: 94.7± 18.87; nPM: 158.5 ± 41.69, $p<0.05$). No differences in GFAP cell count staining existed between the filtered air (677.5 ± 96.09) and nPM mice (656.6 ± 120.3, p=ns). There were significant differences in C5α density staining between filtered air (8.181 ± 3.863) and nPM mice (14.77 ± 5.989, $p<0.01$). *Results for filtered air + BCAS vs air pollution + BCAS:* There were

significant differences in IBA-1 cell count staining between the groups (filtered air + BCAS: 137.60 ± 28.95; nPM + BCAS: 166.0 ± 16.14, p<0.001).
Conclusion: Chronic particulate matter exposure is associated with white matter changes in a murine model. Bilateral artery stenosis, a model for cerebral hypoperfusion resulting from heart failure contributes to neurotoxicity caused by particulate matter. Regional increases in microglia number and C5α deposition suggest an inflammatory mechanism.

The Role of Hedgehog-Responsive Cells in Facial Nerve Regeneration

Gabriela Bobarnac Dogaru, BS; Alireza Shokrani, MD, MS; Roseanne Hui, BA; Michael Cowan, MS; Jon-Paul Pepper, MD

Background: Facial nerve paralysis is a significant cause of morbidity, affecting speech, oral competence, vision, and emotional expression. Extensive efforts have been undertaken to determine the cellular events that occur during nerve regeneration, in hopes of finding molecular therapeutic targets to improve this process. Increasingly, non-neural cell lineages are recognized as having critical roles in the process of nerve regeneration, but the signaling pathways that drive these cellular responses are not fully understood. The Hedgehog signaling pathway has been shown to mediate complex multicellular responses to tissue injury in multiple tissue types. We therefore sought to characterize the response of Hedgehog-responsive cells following transection of the facial nerve.
Methods: We used a transgenic mouse line with an inducible reporter for lineage tracing of Gli1+ cells (Gli1-CRE;Tdt), and induced a unilateral facial nerve cut injury, using the contralateral side as a control. We analyzed the nerve via immunohistochemistry at 1 day, 1 week, 2 weeks, and 4 weeks after injury.
Results: There was a significant increase in Gli1+ cells both at the site of injury and within the distal nerve segment. Preliminary results show a subpopulation of these cells to be NG2+ fibroblasts that contribute to the regeneration process via production of the pro-angiogenesis factor VEGF-A.
Conclusion: This finding describes a key signaling pathway by which fibroblasts participate in motor nerve regeneration. Intraneural fibroblasts may represent a previously overlooked therapeutic target.

Isolated Penetrating Cardiac Injury: Does Pattern of Injury Predict Outcomes

S Delapena, K Inaba, A Aiolfi, E Benjamin, L Lam, K Matsushima, A Strumwasser, D Demetriades

Background: Penetrating cardiac injuries are associated with a significant mortality burden. Factors impacting outcomes after these injuries, in particular the anatomic location of injury, are unclear. , The objective of this study was to explore the association between patterns of penetrating cardiac injury and outcomes.
Methods: This was a LAC+USC Trauma Registry study. All patients with an isolated penetrating cardiac injury from 01/2008-03/2016 were included. Data collected included demographics, vital signs, hemoglobin and hematocrit levels, Injury Severity Score (ISS), location of injury, and procedures. Outcomes included overall mortality, ventilation days, intensive care unit length of stay (LOS), total hospital LOS, and cardiac complications.
Results: A total of 121 patients were included. Gunshot wounds (GSW) were sustained by 43.8% of patients. Compared to Stab Wounds, GSW victims were more likely to be hypotensive (86.5% vs. 47.0%; p<0.001), neurologically altered (90.6% vs. 41.2%; p<0.001), severely injured with an ISS >15 (94.3% vs. 72.1%; p=0.002, and to have multiple chamber injuries (47.2% vs. 7.4%, p<0.001). These patients were more likely to require ED chest tube placement (77.4% vs. 42.6%; p<0.001) and ED thoracotomy (88.7% vs. 36.8%; p<0.001). Univariate analysis demonstrated higher ED mortality (mortality (73.6% vs. 23.5%; p<0.001), 24-hour mortality (90.6% vs. 35.3%; p<0.001), and overall mortality (90.6% vs. 39.7%; p<0.001) in GSW victims. There was no significant difference in cardiac complications between GSW

victims and Stab Wound victims. After adjusting for relevant covariates, GCS<9 was found to be an independent risk factor for mortality (OR 75.4; p<0.001). Location of injured chamber and injury mechanism were not significant risk factors for mortality.
Conclusions: Presentation GCS was predictive of overall mortality. There was no significant association between injury patterns, specifically the location of injury and outcomes.

Nanoparticles containing TGF-B and IL-2 significantly expand Treg populations in human PBMC

Sophia Giang, David A. Horwitz, Antonio La Cava, Division of Rheumatology, USC-UCLA

Goal: Much evidence suggests that patients suffering from autoimmune disease have decreased numbers of T regulatory cells (Tregs), which play a major role in limiting the body's inflammatory response. Studies have shown that restoring Treg populations in these patients may have a therapeutic effect. Here, we test the efficacy of a novel therapy using nanoparticles containing TGF-B and IL-2 to induce Treg in human peripheral blood mononuclear cells ex vivo.
Methods: Human peripheral blood mononuclear cells (PBMC) from healthy donors are treated with 200ug/ml of PLGA nanoparticles (NP) containing TGF-B and IL-2. These NP are coated with anti-CD3, -28, -4, -8, or a combination thereof, in order to target various T cell receptors; 2ug of antibody is used per 1mg of NP. Treated cells are then cultured for 5 days and then analyzed via FACS for % expression of FoxP3 and CD25. Further studies will evaluate the duration of FoxP3 expression after a single NP treatment, stability of FoxP3 expression under inflammatory conditions, and the suppressive capacity of these induced Tregs.
Results: Preliminary data shows that NP coated with anti-CD3/-28, as well as those coated with anti-CD4/-8, are the most effective in inducing FoxP3 and CD25 expression among T cells. FoxP3, which is the more specific marker of Tregs, was increased an average of 5.88x and 1.19x from baseline (no treatment) for CD4+ and CD8+ cells, respectively, in PBMC treated with anti-CD3/-28-coated NP. For those cells treated with anti-CD4/-8-coated NP, the mean increase in FoxP3 expression was 11.62x in CD4+ cells and 8.40x in CD8+ cells. Compare this with 1.44x and 1.08x increases seen in cells given uncoated NP.
Conclusions: Nanoparticles containing TGF-B and IL-2 are effective in inducing Treg when conjugated with certain T cell-stimulating antigens, particularly anti-CD3/-28, and anti-CD4/-8. While the stability of FoxP3 expression and induced Treg function are yet to be tested, these results reveal a promising role for this new therapy in the treatment of autoimmune disease.

Designing D-Health – USC's Digital Health Innovation Laboratory

Hugh Gordon[1], George Tolomiczenko, PhD, MBA, MPH [1,2]
Keck School of Medicine of USC[1], USC Viterbi School of Engineering[2]

Background: Digital Health innovation is stifled. Despite billions spent on technology improvement, EHR's and associated products still fail to meet the needs of hospitals and caregivers. The lack of effective innovation stems from the difficult process of building, testing, and validating digital health technology.
The tremendous up-front investment creates a barrier to entry for digital health talent. It's easy to select towards product categories requiring less up-front capital expenditure or employ 'blind' product development practices known for high rates of failure resulting in long and unsuccessful innovation cycles.

Hypothesis: Providing entrepreneurs, students and faculty with access to a product development environment containing the relevant technology, education, and stakeholder access, Digital Health innovation cycles will be shortened and the number of digital health projects will increase.
Methods: Using a combination of technical, legal and political infrastructure, a lab will be created at USC to facilitate digital health projects. These projects will be provided with expert advice and support; a "Cloud" that provides compliant infrastructure for prototype development and connections to a wide array of stakeholders.
Results: In brief: D-Health has a network of more than 50 mentors; our companies raised over $6Million in funding and launched 10 hospital based pilot programs and we have new research and community initiatives ongoing.
Conclusion: USC D-Health eliminates barriers to healthcare innovation. D-Health has created a thriving ecosystem of entrepreneurs, healthcare executives, clinicians, policymakers, and angel investors, and venture partners. Our novel *D-Health Lean* startup development practice has helped our D-Health innovators raise millions of dollars in venture funding and enter prestigious entrepreneurship programs. The challenges remain extraordinary however the early results point to a bright future for USC's Digital Health Lab.

Distal Femoral Osteotomy Trends and Survivorship: A Population-based Study

K. Soraya Heidari, BA; Nathanael Heckmann, MD; William C. Pannell, MD; J. Ryan Hill, BS; Braden McKnight, BS; C. Thomas Vangsness, Jr., MD; George F. "Rick" Hatch, III, MD

Background: Malalignment of the lower extremity can lead to early functional impairment and degenerative changes. Distal femoral osteotomies (DFO) can be performed with arthroscopy to correct malalignment while addressing intra-articular pathology. This study aimed to examine survivorship following distal DFO and identify risk factors for failure.
Methods: Data from the California Office of Statewide Health Planning and Development, a statewide discharge database, was utilized to identify patients who underwent a DFO from 2000 to 2014. Patients with trauma, infectious arthritis, rheumatologic disease, congenital deformities, malignancy, or concurrent arthroplasty were excluded. Demographic information was assessed for every patient. Failure was defined as conversion to total or unicompartmental knee arthroplasty. Differences between patients requiring arthroplasty and those who did not were identified on univariate analysis. A multivariate analysis was performed and a survivorship curve was constructed to estimate 5 and 10-year survival.
Results: After exclusions, 420 patients were identified with 4.4 years average follow-up. Of those, 53 were converted to arthroplasty. Arthroplasty patients tended to be older (43.6 years vs. 36.9 years, $p<0.001$) and had a higher number of comorbidities (47.2% with at least one comorbidity vs. 27.5%, $p=0.021$). A diagnosis of osteoarthritis was more prevalent amongst arthroplasty patients (81.1% vs. 53.7%, $p<0.001$). On multivariate analysis, patients were 4% more likely to fail for each additional year of age (OR 1.04, $p=0.013$). Patients with osteoarthritis were also at increased risk (OR 2.57, $p=0.025$). 5- and 10-year survival was 90.2% and 73.2%. Median survival time was 13.9 years.
Conclusion: Older age and a diagnosis of osteoarthritis at the time of surgery were associated with failure. These factors should be taken into account when performing this procedure.

Not Your Regular Health Class: When Doctors and Scientists Interact with Secondary Students as Professionals

Ivanova, M[1]; Barrow, P[2]; Myrick, S[3]; Reilly, JM[1].
[1]USC Keck School of Medicine, [2]NC State University, [3]UCLA

Background: The underrepresentation of minorities in healthcare professions is well-documented.

Existing programs introducing students to science and health professions may limit their reach into underrepresented communities by using conventional models of selection (e.g. an application process).
Purpose: The aim was to implement a direct mentorship program that successfully recruited students from underserved populations and positively impacted those students' knowledge of and attitudes toward the sciences and toward healthcare resources.
Methods: The Health Sciences Mentorship Program (HSMP) was offered for 9th-12th graders at a local public charter school where 71% of students are economically disadvantaged. Students who showed interest by picking up an application, but did not apply, were approached individually, and invited to join. The core of the program consisted of weekly 90-minute meetings during the school day where students engaged with guest speakers (MDs, PDs, DDS, etc.) When invited, guest speakers were asked to treat the student audience no differently than they would treat an audience of their colleagues. Additionally, subgroups of students attended 9 graduate student seminars and 6 college/graduate conferences. Pre- and post- program surveys, individual interviews, and ongoing self-reflections were used to assess the program's impact.
Results: 72 students obtained an application. 42 completed it and were "admitted" into the program (59%). 29 of the remaining 30 (97%) chose to join the program after being invited. HSMP provided 2400+ student-hours of interaction with healthcare professionals. Before the program, 35% of students responded that they experienced apprehension about visiting the doctor. After the program, 26% did so. Likewise, 87% of respondents indicated that after HSMP, they were now "more likely" or "much more likely" to ask questions of their healthcare provider. When asked about the impact of admitting all students to the program, 82.6% of participants indicated a "very positive" or "somewhat positive" impact, with only 5.8% indicating a negative impact.
Conclusions: HSMP changed attitudes towards healthcare and empowered students as patients and advocates for their own health. HSMP showed that inclusivity and elimination of an application barrier is positively viewed by an overwhelming majority of participants. HSMP is now a cornerstone of this school's community.

Population-Specific Fetal Growth Curve for the Indigenous People of Comarca Ngäbe-Buglé, Panama

S.B. Kaiser[1] and B.H. Grubbs, MD[2]
[1] KSOM Univ. of Southern California
[2] Dept. of OB/GYN, KSOM Univ. of Southern California

Introduction: Fetal growth curves help identify abnormally growing fetuses, which benefit from increased surveillance. The most commonly used curve was reported by Hadlock in a primarily Caucasian population, and likely doesn't reflect normal growth potential in other populations. Comarca Ngäbe-Buglé is home to the largest indigenous group in Panama, and has very high rates of pregnancy-related morbidity and mortality compared to more urban areas of the country.
We hypothesize that the Ngäbe-Buglé population has a constitutionally different growth potential than that described by the Hadlock growth curve. The generation of a clinically relevant population-specific growth curve will allow for more appropriate identification of growth restricted fetuses.
Methods: An ultrasound screening protocol was introduced in four rural clinics in the Comarca. Qualified physicians performed serial obstetric ultrasounds which included measurement of the biparietal diameter, head circumference, abdominal circumference, and femur length. These allow for the calculation of estimated fetal weight. Patients without accurate pregnancy dating as determined by a 1st trimester crown-rump length (CRL) measurement will be excluded. Data will be analyzed using quantile regression and the newly generated curve will be compared to the original Hadlock growth curve to identify areas of significant difference.

Results: To date, data from 685 ultrasounds performed on 588 patients have been reviewed. Of these, 35 patients are dated by a first trimester CRL and are included in the study. Following completion of the current study period, ending March 2017, a preliminary growth curve will be generated, which will be compared to the Hadlock curve.
Conclusion: This project has successfully introduced obstetric ultrasound in the Comarca Ngäbe-Buglé. As data collection continues, we will be able to develop the growth curve which we hope will further contribute to improved obstetric outcomes in this community.

Lacunar Viewpoint of Renal Masses

Mike Kwon, MS3, Darryl Hwang, PhD, Bino Varghese, PhD, Steven Cen, PhD, Felix Yap, MD, Chidubem Ugwueze, MS3, Megha Nayyar, MD, Bhushan Desai, MBBS, and Vinay Duddalwar, MD, FRCR Principal Investigator. Department of Radiology, Keck School of Medicine of USC.

Objective: Fractal and lacunarity analyses have been used to differentiate benign from malignant cancers using various imaging modalities. While fractal analysis seeks to quantify the tumor contour and homogeneity and, is more widely applied, the less popular lacunarity analysis evaluates size distribution of empty space and degree of inner structural heterogeneity. The purpose of our study is to assess the utility of these two novel techniques to differentiate oncocytoma and lipid poor angiomyolipoma (lp-AML) from renal cell carcinoma (RCC) on contrast-enhanced computed tomography (CECT).
Material and Methods: In this Institutional Review Board (IRB) approved retrospective study, 131 patients with known pathologies of RCC, oncocytoma and lipid poor AML who underwent preoperative CECT were identified from our surgical database. Three-dimensional regions of interest of the whole lesion were manually segmented for each renal mass and co-registered. The acquired image dataset was divided into two cohorts: malignant (RCC) and benign (oncocytoma and lp-AML) renal masses. Images from each group were analyzed using FracLac, a plugin tool on ImageJ software (NIH, Bethesda, MD) to calculate fractal dimension (FD) and lacunarity values. Depending on the data distribution, either independent t-test or Wilcoxon rank sum test was used to compare the mean FD and lacunarity values of benign and malignant renal masses.
Results: FD values between benign and malignant renal masses showed no significant differences in contour or structural homogeneity ($p>0.5$) in any of the four CT phases. However, in the precontrast phase, lacunarity values of malignant renal masses were significantly higher than the values of benign tumors (1.63 ± 0.68 vs 1.28 ± 0.48, $p<0.01$). In the three postcontrast phases, lacunarity values of malignant renal masses were higher than the values of benign tumors, but none of these were statistically significant ($p>0.05$).
Conclusion: Lacunarity analysis demonstrates promise as a possible tool to differentiate between benign and malignant renal masses on CECT, especially on the precontrast phase, while fractal analysis does not appear to be a viable technique in discriminating malignant (RCC) from benign (oncocytoma and AML) tumors.

Mean Of 2 Hour Delay at Referring ED Following Transfer Acceptance to Level I Trauma Center

Ena Nielsen, BA[1]; David L. Skaggs, MD, MMM[1]; Liam Harris, BA[1]; James L. Pace, MD[1]; Lindsay Andras, MD[1]

[1]Children's Orthopedic Center, Children's Hospital Los Angeles

Background: Timely treatment of pediatric orthopaedic emergencies at level 1 trauma centers is frequently dependent upon transfers from neighboring centers. To our knowledge no prior studies have

evaluated factors affecting time to transfer. Our goal was to determine the average time to transfer and identify factors that influenced that timing.
Methods: Records were collected from our level 1 trauma center for patients with isolated orthopaedic issues accepted for transfer from outside centers in 2015. Open fractures, compartment syndrome, septic arthritis, and supracondylar humerus fractures with ecchymosis or neurovascular compromise were classified as emergent. Rush hour was defined as 6am to 10am and 3pm to 7pm.
Results: 96 patients transferring from 58 different centers met the inclusion criteria. Average distance of transferring hospitals was 21 miles (range: 3.6-109, SD 16.2) by most direct driving route. Accepted diagnoses included 66 closed supracondylar humerus fractures, 12 femur fractures, 11 forearm fractures, 2 cases of septic arthritis/cellulitis, 2 tendon injuries, 2 lower leg fractures, and 1 SCFE. 19% (18/96) were classified as orthopaedic emergencies, and 37% (35/96) were transfers initiated during rush hour.
Average time from transfer acceptance to accepting hospital admission was 203 minutes (range: 68-584, SD 85.8), the majority of which was the time from transfer acceptance to departure from the transferring facility, mean 114 minutes (range: 7-391, SD 71.9). Multiple linear regression found no correlation between transfer time and rush hour (p= 0.40), emergent vs non-emergent (p= 0.42), or routed distance from hospital (p= 0.46).
Conclusion: Mean transfer time exceeded 3 hours and was independent of distance, rush hour, or urgency of patient condition. A mean 2 hour delay was encountered for patients to leave a medical facility following acceptance of transfer to a higher level of care.

Risk Factors for Wound Complications after Sarcoma Resection in the Lower Extremity

David Perrault, BS, Gene Lee, MD, MPH, Antoine Lyonel Carre, MD, MPH, Roy Yu BS, Anmol Chattha, BS, Maxwell Johnson, MS, Daniel Gardner, BS, Joseph N. Carey, MD, William W. Tseng, MD, Lawrence R. Menendez, MD, FACS, and Alex K. Wong, MD, FACS

Purpose: Complications following closure of defects from limb-sparing sarcoma resection are common. Early intervention with reconstructive techniques, including coverage with vascularized tissue, may avoid wound-related morbidity. We aimed to investigate the factors associated with wound complications at our institution.
Methods: A retrospective chart review was performed for 118 patients who had undergone resection of bone or soft tissue sarcoma in the lower extremity from April 2009 to August 2016. Demographics, tumor metrics, and post-operative complications were abstracted. Student's T-test was used for continuous data and Pearson's Chi-square Test for categorical data. Statistical analyses were performed in SPSS.
Results: Of 118 patients who underwent resection of a bone or soft tissue sarcoma, there were 56 reported complications. The most common were wound infection (22.9%), seroma formation (19.5%), non-healing wound (9.3%), dehiscence (8.5%), tissue necrosis (5.1%), and hematoma formation (3.4%). Neoadjuvant chemotherapy was associated with a statistically significant increase in the proportion of wound complications. Likewise, those with tumors located at the knee had a statistically significant increase in the proportion of wound complications. Other demographics and comorbidities, other tumor locations, tumor volume, adjuvant chemotherapy, neoadjuvant radiation, and adjuvant radiation were not associated with greater complication rates.
Conclusion: Neoadjuvant chemotherapy and tumor location at the knee were associated with an increased complication rate. In high risk patients identified by predictive factors of wound complications, early reconstruction with vascularized tissue may minimize postoperative morbidity.

Visions and Voices: Using Photovoice to Document International Migrants' Health Needs in Santiago, Chile

Justin Trop, B.A., and Dr. Mellissa Withers, Ph.D., M.H.S.

Introduction: Recently, Chile has witnessed a significant influx of migrants, largely from other Latin American countries. Due to the myriad challenges that they face, these migrants can experience chronic stress, which increases their risk for mental illness and future cardiovascular disease. In this study, we employ community member-generated photography 1) to explore migration as a social determinant of health and 2) to identify the community's health needs.

Methods: Through connections of the local government's department of health and migrant and refugee program, we recruited fifteen migrant persons from Recoleta — a district in Santiago, Chile — to undergo training in photovoice and then capture through photography their community's situation and health needs. Through discussion of these photos, we will identify major themes as related to project objectives. Upon project completion, there will be an exhibition to display select photos and our conclusions.

Results: This project has not been completed; however, our expectations are as follows. We predict that participants will highlight documentation status as a key factor affecting health due to its broad-reaching influence on access to work, housing, health care, and more. We believe that working conditions, difficulties with cultural adaptation, and experiencias of discrimination will also be cited as sources of chronic stress detrimental to mental and physical health.

Conclusions: The results will show that migration is a complex determinant of health, with chronic stress and limitations in health care access contributing to increased morbidity among the migrant population. These circumstances augment the risk, among migrant individuals, for conditions such as depression and cardiovascular disease. Thus, there exists a need to strengthen support services and networks for migrants with the goal of facilitating their adaptation to life in Chile and access to health care.

ANESTHESIOLOGY

Effect of Intraoperative Fluid Replacement on Postoperative Outcomes in Adults Undergoing Elective Non-Cardiac Surgery

Adrian Campos, Behrod Katebian, Zhongjie Cai, MS, Ling Zheng MBBS, PhD, Mary M. Joseph, MD

Introduction: Intraoperative Fluid Management is a subject of contention within the field of anesthesiology. If inappropriate, it can lead to increased morbidity/mortality. There are numerous proposed fluid management models in the literature, as well as provider preference influencing intraoperative fluids management.
To better elucidate the effect of intraoperative fluids, this study examined the association between intraoperative fluids with post-operative complications at LAC+USC Medical Center.
Methods: A retrospective chart review of 599 patients over 18 years of age who had elective non-cardiac surgery during January 1, 2011-March 15, 2016 at LAC+USC Medical Center was completed. Of those 599 patients, 300 had intra-abdominal surgeries and 299 had extra-abdominal surgeries. The following variables were recorded for each patient within each group: anesthesia type, type of fluids, anesthesia duration, amount of fluids infused, estimated blood loss, urine output, intraoperative vasopressor/inotrope Use, preoperative Hb/Hct and Albumin, pre/intra/postoperative vital signs, mortality. Stepwise logistic regression with backward elimination was performed to investigate the associations between these variables and postoperative complications.
Results: We found that Intra-Abdominal surgeries were 2.472 times more likely to experience postoperative complications than Extra-Abdominal surgeries ($p<0.001$). Also, patients who were infused with >2L of fluids were 1.003 times more likely to experience postoperative complications than those receiving <=2L ($p=0.005$) independent of surgery type (intra-abdominal vs extra-abdominal). The most common complication in both intra-abdominal and extra-abdominal surgery were post-operative nausea and vomiting.
Conclusions: The data demonstrates patients receiving greater than 2L of intraoperative have a greater likelihood of experiencing postoperative complications.

The Use of Cognitive Task Analysis Guided Instruction To Improve The Learning of Oral and Maxillofacial Surgery Procedures

Allen Huang, Roberta Ashley, Department of Anesthesiology

Goal: The goal of this study is to provide evidence to support the efficacy of cognitive task analysis guided instructional protocol in maximizing patient care and safety. Because oral and maxillofacial surgeons are operating under an anesthetist and provider model, it is paramount that should a situation arise, the clinician has been properly trained to assess and treat the underlying etiology. By exploring the efficacy of CTA-guided instructional protocol, we hope to present data that highlights not only the usefulness of these protocols in emergent settings, but the necessity of it as well. Through the use of this protocol, there will be an improvement in the time it takes for an individual to form an differential diagnosis as well as the time it takes for the clinician to treat the underlying etiology
Methods: 3rd year dental students (n = 20) were split into two groups. The first group was taught the diagnosis and treatment of obstruction of patient ventilation during third molar extraction by an expert OMFS instructor using free recall. The other group was taught the diagnosis and treatment of obstruction of patient ventilation during third molar extraction by an expert OMFS instructor using a cognitive task analysis guided instructional protocol. Using an anesthesia simulator, all students started the simulation at baseline and an obstruction was simulated. The time elapsed to differential diagnosis and time elapsed to treatment was recorded in both groups.

Results: Currently, we have not gathered sufficient data to report any results. However, we expect the group that received cognitive task analysis (CTA) guided instructional protocol to outperform the group that received instructions from an instructor using free recall in both time to differential and time to treatment.
Conclusion: While data is still being collected, our expectations from this study will affirm our notion that in a highly stressful and time-sensitive situation, such as that of an operating room setting, the use of CTA-guided instructional protocol will undoubtedly maximize the safety of our patient by improving the clinicians assessment and treatment of the underlying etiology. What this project hopes to achieve is to identify a gold-standard approach to teaching clinicians how to properly evaluate a patient that is acutely obstructing, and eventually translate this practice to other areas of high-stake and time-sensitive situations.

"The utility of profoundly abnormal initial arterial blood gas values in determining clinical futility of emergency hemorrhagic trauma cases: a retrospective study"

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Background: Hemorrhage is the leading cause of preventable death in civilian trauma centers. Massive transfusion and utilization of other valuable hospital resources are being increasingly used. Patients often present with markedly abnormal laboratory values. The purpose of this study was to identify the presence of abnormal blood gas variables that could indicate the futility of ongoing management and massive transfusion in hemorrhagic trauma cases.
Methods: A retrospective study was performed at Los Angeles County Hospital. Data was collected from patients admitted between June 2015 and April 2016 who were classified as "red blanket" cases. Red blanket was defined as hemorrhagic trauma patients immediately sent to the OR following entry into the ER. Baseline variables of age, sex and mechanism of trauma were collected. The initial three arterial blood gas data were obtained, and mortality was determined for each patient. Each variable (pH, base excess, lactate) was examined to determine whether a cutoff point of excessive mortality (>90%) could be identified using a physiological value.
Results: We identified 265 patients, 83% of which were male. Ages ranged from 6-91 years old (average=38.6). Overall mortality was 14%. The highest mortality rates were seen in the lowest 12^{th} percentile for the initial pH value (75%). The average initial pH value for patients who died (7.07±0.13) was significantly lower than for patients that survived (7.32±0.17) [$p<0.05$]. Ten patients had any single recorded pH value ≤ 6.91. The mortality rate among these patients was 90%.
Conclusions: Significant mortality is seen with profoundly low initial pH values ≤ 6.91 in hemorrhagic trauma patients. Consideration should be given to such pH values when resuscitating or massively transfusing such red blanket patients. However, the pH values alone or in correlation with other physiologic variables cannot reliably be used to determine clinical futility in individual patients in the early period after injury.

Restoration of Opiate Sensitivity in Patients with Opiate Refractory, Post-Operative Pain Following Intravenous Magnesium, Lidocaine and Ketorolac Administration.

Edwin Lin B.S., Jerry Luo B.S., Jack Berger M.D., Department of Anesthesiology, LAC+USC

Hypothesis: Patients that don't respond to repeated administrations of post-operative opiate therapy have pain levels that are difficult to control. The objective of my study is to evaluate if I.V. MLK restores

opiate effectiveness in patients suffering from severe post-operative pain (defined as >7/10 on a VAS pain scale).
Methods: I studied the efficacy of an analgesic cocktail consisting of magnesium, lidocaine, and ketorolac (MLK) in opioid resistant patients by performing a retrospective chart study investigating vital signs, pain scores, and analgesic administration doses and times for each patient. I collected these data from both the PACU and the floor unit, then analyzed and charted the data to determine the efficacy of opiate medications before and after MLK administration. I then performed a paired t-test on opiate analgesic longevity (defined as time between hydromorphone doses) before and after MLK administration.
Results: MLK administration restores the analgesic effect of traditional opiates (Figure 1). After a single administration of MLK, the time between opiate administrations drastically increased to an average of 207.7 min from an average of 8.4 min pre-MLK (p=0.0385, Figure 2).
Conclusions: These data demonstrate that a single administration of the MLK cocktail reliably restores efficacy of traditional opiate analgesics in these patients. Administration of MLK should therefore be considered for use as a rescue therapy in patients suffering from opiate-resistant, post-operative pain.

Does regional anesthesia for surgical repair of complex elbow fractures impede the recognition of post-operative compartment syndrome?

Michelle Lin, BS; Casper Hu, MD; Samantha Chau, BS, MS; Jack Berger, MD, PhD

Goal: Regional anesthesia has shown to improve patient satisfaction, reduce opiate use, and generate better healthcare outcomes. Case reports and series have examined whether upper limb regional anesthesia delays or masks the diagnosis of acute compartment syndrome (ACS), but we wish to examine its incidence.
Methods: From 2007 to 2015, we retrospectively examined 124 patients with complex elbow fractures who met our inclusion criteria. Seventy-eight patients underwent non-emergent surgery with a single shot or continuous upper extremity nerve block and general anesthesia including adjunctive preventative analgesic agents. Data was entered into Excel spreadsheets and analyzed with SPSS.
Results: The surgeons evaluated all patients post-operatively for sensory and motor deficits and were not impeded by preoperative nerve blocks. With our multimodal anesthetic protocol, the average length of stay of our non-emergent complex elbow fracture patients was significantly shorter, 0.86 days, than a standard 3-day post-operative length of stay reported in the literature. No patients were diagnosed post-operatively with ACS, had readmissions within 24 hours of discharge, nor had anesthetic complications.
Conclusions: We believe this data provides evidence that multimodal general anesthesia with regional anesthesia can be utilized in complex elbow fracture surgery to improve outcome, reduce length of stay, and improve patient satisfaction without increasing the risk of masking the symptoms of ACS.

Severe Opiate-insensitive, Post-operative Pain relief with Intravenous Magnesium, Lidocaine, and Keterolac.

Jerry Luo B.S., Edwin Lin B.S., Jack Berger, M.D. Anesthesiology, LAC + USC Medical Center

Background: Post-operative pain control with opiate-only pain therapy has many drawbacks. Opiate-only pain relief is not effective for all patients and even more concerning is the development of an opiate tolerance. In this study, I demonstrate that a single administration of Magnesium-Lidocaine-Ketorolac (MLK) is able to lower severe (>7/10 VAS pain) opiate-resistant, post-operative pain to levels

of moderate or less (<6/10 VAS pain). Furthermore, MLK shows no incidences of rebound hyperalgesia which is defined as severe opiate-induced pain within 48 hours of MLK administration.

Methods: In order to determine the intrinsic analgesic effect of the MLK cocktail, a paired T-test was conducted on the mean VAS pain scores collected retrospectively from study-enrolled patients before and after the administration of MLK. The presence or absence of a rebound hyperalgesia effect was determined by analyzing for any incidences of increased VAS pain scores following the administration of an opiate.

Results: In patients suffering from severe post-operative pain despite receiving maximum doses of opiate analgesia, a single administration of MLK reduced mean VAS pain scores from 9.27 to 3.33 ($p<0.0001$, Table 1). A rebound hyperalgesia effect was not found (Figure 1).

Figure 1: Sample of patient pain score

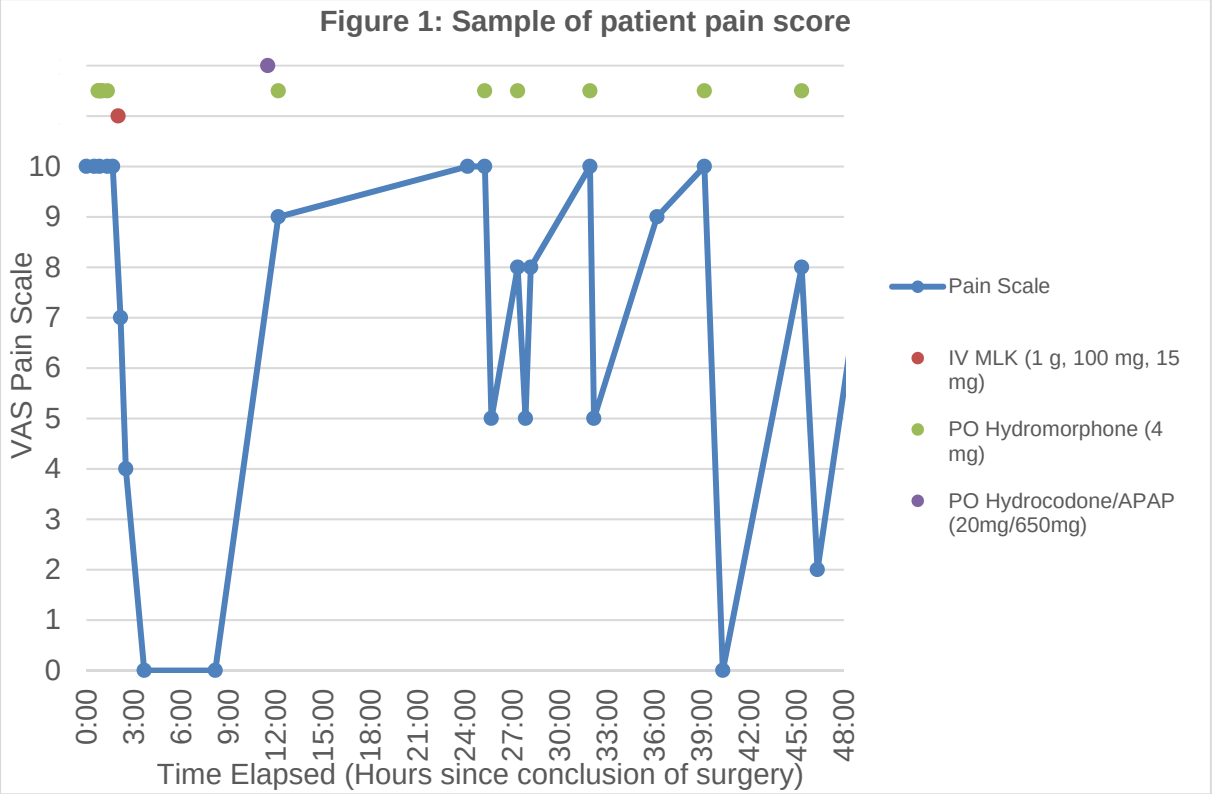

Table 1: VAS Pain Score Before vs. After MLK Administration		
	Before MLK	**After MLK**
Mean	**9.27**	**3.33**
SD	**1.03**	**3.20**
SEM	**0.27**	**0.83**
N	**15**	**15**

*The two-tailed P value is less than 0.0001.

Conclusions: The data reveal that MLK possesses an intrinsic analgesic effect in patients suffering from opiate-resistant, post-operative pain. Remarkably, the MLK cocktail also shows no evidence of potentiating a rebound hyperalgesia effect as there are no incidences of increased VAS pain scores after an administration of an opiate analgesic post-MLK administration. In conclusion, MLK is a low side-effect option for treating patients with opiate-resistant, post-operative pain.

BASIC SCIENCE

The role of cell-cell interactions in the induction of hepatocyte polarity

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Background: The unique microenvironment found within the liver *in vivo* provides hepatocytes with the capacity to perform liver functions. We hypothesize that cell-cell interactions between hepatocytes and non-parenchymal cells in culture are responsible for inducing hepatocyte polarity, and therefore functional maturation. The main goal of this project is to determine the molecular mechanism of hepatocyte polarity induction by utilizing a model co-culture system with the HepaRG human hepatic progenitor cell line.
Methods: To identify optimal cell survivability and hepatocyte functionality in co-culture, HepG2, HUVEC, and LX-2 cell lines were cultured individually in one of four types of culture media, and in three cellular co-culture ratios. Hepatocyte functionality was quantified through qPCR for A1AT, ASGPR, factor X, and G6PC expression. To phenotype the HepaRG cell line, differentiated HepaRG cells were stained with CD49a, CD49f, CD56, CK18, and CK19 antibodies, and flow cytometric analyses were performed using an LSRII flow cytometer and FlowJo.
Results: Experimentation has determined that EBM was the only culture medium that could simultaneously sustain the growth of all three HepG2, HUVEC, and LX-2 cell lines. qPCR analysis of hepatocyte marker gene expression suggested that hepatocytes possessed maximal functionality when HepG2, HUVEC, and LX-2 cells were cultured in a 90-5-5 ratio. Cell surface marker phenotyping of the previously uncharacterized HepaRG cell line demonstrated the presence of two distinct populations: CD49f+CK19+CK18- biliary-like cells, and CK18+CD49f-CK19- hepatocyte-like cells. We will use these results in future co-culture experiments to isolate these two populations from HUVEC and LX-2 cell lines using fluorescence-activated cell sorting.
Conclusions: These initial findings demonstrate that the functionality of hepatocytes is dependent on the cellular environment. Further gene expression and signaling pathway analysis would elucidate the specific molecular mechanisms responsible for these cellular interactions.

Molecular Mechanisms that Contribute to Autism Spectrum Disorder

Gurleen Chadha, Daniel B. Campbell

Background: Previous studies have identified *CHD8* as a leading autism spectrum disorder (ASD) candidate gene. Knockdown of *CHD8* in human neural progenitor cells followed by RNA sequencing revealed altered expression of 1715 genes, 37% of which were identified by ChIP-seq to have CHD8 binding sites. We applied bioinformatics tools including gene ontology, binding and expression target analysis (BETA), and DNA motif comparison, to identify the mechanisms of CHD8-directed gene regulation.
Methods: Knockdown of *CHD8* in human neural progenitor cells was carried out by small interfering RNA, and RNA sequencing was performed to identify altered gene expression. The Database for Annotation, Visualization and Integrated Discovery (DAVID) was applied to differentially expressed genes to identify shifts in functional pathways. BETA was utilized to integrate previously-identified CHD8 binding sites with differentially expressed genes to identify direct targets of CHD8. BETA also identified motifs in the target regions, which were analyzed using STAMP.
Results: Gene ontology analysis with DAVID revealed several significant changes in gene pathways, including downregulation of pathways involved in developmental growth and upregulation of genes involved in response to hypoxia. Our STAMP analysis revealed two recurrent motifs, ELK4 and GAPBA, in CHD8 target regions. Gene ontology analysis of BETA-identified direct targets is ongoing.

Conclusions: Our results provide insight into the pathway shifts that occur in autism at the molecular level. They also identify genes that may be secondarily implicated in autism; these genes might contribute to the severity of ASD. Lastly, we identified motifs that occur in CHD8 binding sites; these may be useful in identifying therapeutic targets.

Identification of neoantigen-specific T cells in glioblastoma

William Chour, Songming Peng, James Heath, Caltech

Background: A universal trait among all cancer types is the accumulation of genetic mutations that give rise to mutated proteins. These proteins are processed by cells to produce a signature library of peptide fragments (neoantigens), which are presented to T-cell receptors (TCRs) to elicit a cytotoxic response from tumor-infiltrating lymphocytes (TILs). Under prolonged tumor burden, the patient's natural immune response is stressed, compromised, and suppressed. To address this issue, adoptive cell transfer (ACT) of TILs has recently emerged as a potential means by which immunotherapy can become an effective treatment. One prospective approach involves identification of α and β TCR subunit mRNA sequences. These sequences are then cloned into healthy, cytotoxic T cells and used to replenish the patient's weakened T cell population. The success of this procedure is predicated upon identification of the appropriate neoantigen library to which a patient's cytotoxic T-cell repertoire is most reactive. Although algorithms exist in the literature to predict the set of neoantigens most likely to elicit such a response, there exists a need to experimentally verify these predictions. As such, we introduce herein a method to capture T cells bound to neoantigen-MHC complexes and to enumerate with high sensitivity the neoantigen to which each T cell is reactive.
Methods: Liquid biopsy TIL samples from a patient with glioblastoma (GBM) were sorted via FACS to isolate CD8+ CD3+ cytotoxic T lymphocytes. Peptide-MHC complexes were synthesized, tetramerized to streptavidin, and then was bound to DNA-barcoded magnetic nanoparticles (NPs). The cells were incubated with the NPs to induce binding between peptide-MHC tetramers and TCRs. Magnetic pulldown was used to remove unreacted cells. The recovered T cells (bound to NPs) were subsequently either added to a cytometer chip to quantify reactivity, or flowed into a deterministic lateral displacement (DLD) microfluidic device to enumerate captured neoantigen identity. For the latter step, fluorescent dyes were sequentially flowed through to enable barcode reading of the DNA segments appended onto NPs.
Results: We selected for the patient's top 11 neoantigens predicted to have the highest binding affinity for HLA-A0201. Peptide-MHC complex integrity was verified by ELISA prior to incubation with NPs. Of the 11 tested neo-antigens, 9 were able to capture individual T cells while retaining tetramer-NP integrity without aggregation during the cytometer chip experiment. These 9 samples were then selected for use in the DLD device, and all 9 produced distinct barcode reads to allow for quantification. At least 3 of these peptides elicited a significant count above noise, and represent potential neoantigen candidates to screen for reactive TCRs in future mRNA sequencing procedures.
Conclusion: The success of ACT in cancer immunotherapy is dependent upon identification of neoantigens with a high binding affinity for TCRs of TILs. Herein we have established a protocol to capture TILs via peptide-MHC tetramers bound to DNA-barcoded magnetic NPs. Subsequent readout experiments via cytometry and microfluidics platforms allow for quantification of reactivity and neoantigen association with each complex. Our results with GBM cells present a promising first step for application of this protocol in other human cancer types and adaptation into future ACT therapies.

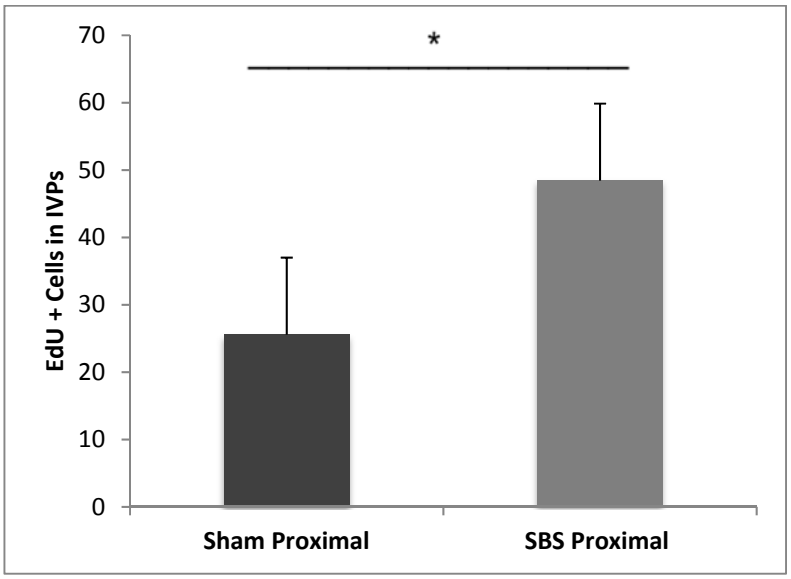
Zebrafish intestinal stem cell migration as a model for intestinal adaptation

Jolie Cooperman, BA, Mubina Isani, MD, Kathy Schall, MD, Tracy Grikscheit, MD; Dept of Pediatric Surgery, CHLA

Goal: Short bowel syndrome (SBS) results in intestinal adaptation of remaining bowel, malabsorption and even death. Intestinal adaptation enhances nutrient absorption and offsets SBS-associated morbidity. Recent evidence exemplifies similarity in zebrafish intestinal structure to human intestine. We have previously shown evidence of intestinal adaptation in proximal intestine of SBS zebrafish compared to the sham group. We therefore examined the stem cell population in zebrafish intervillus pockets (IVPs) in both control (sham operation) fish and fish with induced SBS. We hypothesized there is an increased number of proliferative intestinal stem cells in the proximal SBS zebrafish intestine compared to sham.

Methods: Adult male zebrafish were separated into SBS (n=3) or sham (n=8) groups. SBS was induced via ventral laparotomy, distal ligation, and proximal stoma formation with mid-segment removal to prevent fistualization. Sham fish had ventral laparotomy without bowel manipulation. The zebrafish were weighed after surgery and weekly until harvest at 2 weeks. Two hours prior to harvest, 30µl of 8mg/ml EdU was injected intraperitoneally. The proximal and distal intestine was harvested, opened longitudinally and placed in formalin for whole mount. The EdU was stained with EdU click-it kit and the sections were imaged on the confocal microscope. The EdU-positive cells were counted within the IVPs with Fiji. An unpaired t test compared the EdU-positive populations within the IVPs for the Sham proximal and SBS proximal fish.

Results: EdU-positive cells were increased within the IVPs of the proximal SBS intestine compared to proximal sham (25.16 ± 2.28 EdU+ cells vs 48.43 ±15.06 Edu+ cells; $p < 0.032$).



Graph 1: Greater numbers of EdU+ cells seen within the IVPs in the proximal SBS fish compared to proximal sham.

Conclusions: A significantly greater number of EdU-positive cells are in the IVPs of the SBS proximal fish compared to the sham proximal fish, suggesting greater stem cell proliferation in the SBS fish. We believe the proliferation is responsible for the intestinal adaptation seen after bowel resection. A better understanding of intestinal stem cell proliferation will aid in the development of targets to modulate intestinal adaptation.

Characterization of Metabolic Alterations in Mouse Hematopoiesis with Aging and Following Chemotherapy Exposure

Young Hsu BA, Kwasi Connor PhD, Giridharan Ramsingh MD

Background: Globally, average life expectancy has been increasing and the total number of people facing diseases associated with aging such as diabetes, cardiovascular diseases, and many types of cancer is rising. Growing evidence has shown that hematopoietic stem cell (HSC) function deteriorates with aging. In the current study, we aim to compare changes in metabolic products (metabolites) in chemotherapy treated mouse hematopoietic progenitor cells to those of naturally aged mouse hematopoietic progenitor cells. In addition, we will investigate mitochondrial metabolic activity in naturally aging mice. We propose that metabolic alterations in aging hematopoietic stem and progenitor cells contribute to the changes seen in aging transcriptome, epigenome and physiology. Importantly, the results will allow us to better understand the role of altered metabolic pathway in aging hematopoiesis and identify pathways that can be targeted to prevent age associated hematopoietic disorders.
Methods: Metabolomes from lineage depleted mouse bone marrow cells enriched for hematopoietic progenitor cells from three different groups of mice: young (8 weeks, n= 10), old (18 months, n=10), and young mice exposed to chemotherapy (8 weeks, n=9) were compared using Metabolon. In addition, using the Seahorse Assay, we will assess mitochondrial function through measuring glycolytic and respiratory rate of young and old mice bone marrow cells.
Results: Metabolome analysis revealed an overall increase in polyunsaturated free fatty acids in the old mice group compared to the young mice exposed to chemotherapy. Other lipids, such as lysolipid and lysoplasmalogen, were found to be elevated in the old group compared to the chemotherapy group. In addition, there was an overall decrease in amino acid levels in the old mice compared to the young mice that was not found to be as profound compared to young mice exposed to chemotherapy. The old group also had reduced levels of nucleotides compared to the young group, but such attenuation was not as prominent when compared to the chemotherapy group. When compared to the young group, the metabolome profiles of the old and chemotherapy exposed groups were similar except for the elevation in lipids and reduction in nucleotides of the old group.
Conclusions: Our results showed that there are alterations in metabolic activity as a result of aging and chemotherapy in hematopoietic progenitor cells. Further research using Seahorse Assay will assess the role of mitochondrial dysfunction in these metabolic changes.

Functional Characterization of Microbiome and Mycobiome in Nonalcoholic Fatty Liver Disease and Nonalcoholic steatohepatitis

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Background: The role of indigenous bacterial and fungal communities that make up the bacterial microbiome and fungal mycobiome are emerging as novel targets for understanding disease pathogenesis, preventative, diagnostic, and therapeutic approaches. The primary objective of this research study is to better understand the role of both the microbiome and mycobiome in NAFLD/NASH. In order to do this, two specific aims were created to address this problem: 1: Describe bacterial and fungal succession in subjects with NAFLD and NASH. 2: Characterize metabolites of the bacterial and fungal communities in subjects with NAFLD/NASH to assess functional consequences of changes in the intestinal communities.

Methods: Overweight and obese children (BMI>85%) and non-obese children ages 6 to <21 years of age with and without NAFLD or NASH have been enrolled from various pediatric clinics at CHLA. Stool, urine, blood, and oral swabs have been collected. We will use Next Generation Sequencing to characterize fungal and bacterial communities from the collected samples and will identify keystone bacteria and fungi that are associated with these diseases. Mass spectrometry will be utilized for analysis of metabolites produced by both fungal and bacterial species. Network analyses will be performed to identify key metabolic processes that contribute to progression of NAFLD/NASH.
Results: We currently have 220 patients enrolled to our study and are nearly complete with recruitment. Pending analysis of samples, we predict that the spectrum of NAFLD/NASH leads to marked and distinct alterations in gut bacterial community diversity and metabolites, allowing pathogenic fungal species to proliferate and produce metabolites that contribute to the progression of liver disease.
Conclusions: Identifying specific microbial and fungal compositions could improve our understanding of intestine-liver interactions, lead to possible biomarkers for NAFLD/NASH, and effective targets for interventions.

Lactobacillus murinus Decreases NEC in Neonatal Rats by Decreasing Intestinal COX-2 Expression

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Introduction: Necrotizing enterocolitis (NEC) is an inflammatory disease that affects the gastrointestinal (GI) tract of premature infants and is the leading cause of morbidity and mortality in neonatal intensive care units (NICUs). Certain bacteria, such as *Cronobacter muytjensii,* are known NEC pathogens. Previous work in our lab has shown that *Lactobacillus murinus* is able to protect rats from NEC caused by *C. muytjensii*. However, the mechanism of protection is poorly understood. Upregulation of COX-2, an inflammatory mediator, has previously been implicated in the pathogenesis of NEC. We hypothesized that pretreatment with *Lactobacillus* species decreases COX-2 protein expression induced by *C. muytjensii*.
Methods: Neonatal rats were formula fed in combination with hypoxia for 4 days. *L. murinus, L. reuteri, and L. acidophilus* were given with the first feed at 10^7 and 10^8 CFU/animal. Animals were then challenged with *C. muytjensii* at 10^7 CFU/animal during the second feed. Terminal ileum samples were collected from neonatal rat pups after sacrifice on day 4. Samples were fixed, embedded in paraffin blocks, cut into thin sections and mounted on microscope slides for analysis. Slides were then immunostained for COX-2.
Results: Newborn rats treated with *C. muytjensii* had increased expression of COX-2 in terminal ileum compared to control at both the 10^7 and 10^8 CFU/animal dose. When rats were pretreated with *L. murinus,* COX-2 expression decreased at the 10^7 and 10^8 CFU/animal dose.
Conclusion: In our rat NEC model, *L. murinus* decreases expression of COX-2 in terminal ileum induced by *C. muytjensii, a known NEC pathogen.*

Embryonic expression of the tumor growth suppressor PID1

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Background: PID1 (Phosphotyrosine Interacting Domain containing 1) was discovered in 2006 due to increased expression in fat from obese patients (PMID: 16815647). PID1's first link to cancer was in 2014 by the Epstein lab (PMID: 24300787), who demonstrated a growth-inhibitory effect of PID1 in three

types of brain tumors: medulloblastomas (MB), gliomas and atypical teratoid rhabdoid teratomas (ATRT). Both MBs and ATRTs are childhood brain tumors that belong to the embryonal brain tumor category.
Purpose: We aim to understand the role of PID1 in medulloblastoma by interrogating its expression in embryonic mouse brain, and especially, cerebellum, where medulloblastomas originate.
Methods: Using whole mount and histological sections of mouse embryos from timed pregnancies, we tracked PID1 expression in the developing mouse brain.
Results: My poster will demonstrate the expression of PID1 in E14.5-E18.5 mouse embryo brains. Work is currently underway to identify the cell types in which PID1 is expressed.
Conclusion: PID1 is expressed robustly in discrete areas in the developing mouse brain. This expression sheds light on the clinical correlations of PID1 and brain tumors. Further work is needed in order to refine this analysis and determine the nature of the cells that express PID1. This knowledge will contribute to determining the biological function of PID1 in health and disease.

Investigation of role of helminthic immunomodulation in a murine model of skin graft rejection

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Background: There is mounting epidemiologic evidence that human populations with intestinal roundworms are largely spared from autoimmune diseases such as asthma, inflammatory bowel disease, and type I diabetes. Although the effect of intestinal nematodes on human subjects has been observed in case studies, there're no in vivo models in which this effect can be tested systematically. In this study, we set out to establish an acute inflammatory model in mice that mimics conditions observed in humans. We hypothesized that full thickness skin grafts will be an apt model in inducing acute inflammatory reactions that would ultimately result in the rejection of the graft. Because different degrees of rejection have very distinct appearances, we can use them as a proxy for the degree of immune involvement in the organism.
Methods: Dorsal flaps of euthanized BALC/c donor mice were dissected. The recipient C58BL/6 mice were anesthetized, their thorax shaved and disinfected. An incision was made on the dorsal lateral aspect of the mice, in which a circular flap of skin with a diameter of 0.25-0.5cm was cut. The donor ear tissue was grafted onto the recipients. The graft was secure in place with GLUture topical tissue adhesive. Analgesics were administered for post-op pain relief. The graft was then wrapped in bandages with the non-adhesive gauze segment placed over the skin graft; the bandages were sutured. The animal received ibuprofen in water for 7 days after surgery.
We administered roundworm secretions on day 1 of the skin graft to see if this would affect skin graft rejection, which occurs in 7-12 days.
Results: The above method was modified upon the discovery that the recipient mice were under distress from the presence of the bandage. The bandages were very tight to prevent it from falling off the thorax of the mice as they moved. This caused restriction in the movement of the mice, as well as skin irritations at the edges of the bandages. While the graft procedures were kept constant, we modified the above protocol by removing the bandaging process altogether. Instead, we added a head cone for the mice. The head cones allowed for mobility, and was effective at preventing the animals from eating their own graft.
In the methods above, the animals were single caged post-op, in attempt to prevent them from eating the graft from their cage-mates. While this was effective at preserving the graft, it caused a lot of distress to the animals. Mice are known as social animals, and the single-cage method has been known

to induce anxiety in other experimental models. We introduced a perforated cage divider into our protocol. The cage divider allowed for the mice to co-habitate while not disrupting each other's grafts. After the use of cage dividers, we saw an increase in nesting and decrease in hunching, which are both markers for stress levels.

Conclusions: Although the number of mice involved in this study did not result in statistically significant results, we were able to troubleshoot many aspects of the murine skin graft protocol. After the addition of murine head cones and perforated cage dividers, we saw a reduction in the number of self-induced lesions around the skin graft site, as well as a reduction in the stress level of the mice. The improved skin graft protocol serves as the first step in systematically studying the effects of helminth secretions on the immune system. Further investigations can be done in comparing the effects of different dosages and delivery methods of said secretions.

PROMININ-1 Knockdown Decreases Fibrosis in Biliary Atresia.

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Introduction: In biliary atresia (BA), transplant-free survival after Kasai hepatoportoenterostomy negatively correlates with the extent of fibrosis. We previously demonstrated that an increase in PROMININ-1-expressing ($PROM1^+$) hepatic progenitor cells (HPCs) correlates with fibrosis in BA. Here, we hypothesize that knockdown of *Prom1* leads to decreased expression of fibroblastic markers.

Methods: $PROM1^+$ HPCs isolated from $Mat1a^{-/-}$ mice were cultured $\pm$ recombinant human Transforming Growth Factor-β1 (TGFβ1), a known mediator of liver fibrosis $\pm$ withanolide X030, which selectively knocks down $Prom1^+$ cells. Morphology and gene expression (qPCR) were analyzed at 72 hours. Wildtype (WT) and *Prom1* knockouts (KO) mouse pups were inoculated intraperitoneally with Rhesus rotavirus (RRV) or saline to induce experimental BA. At 2 weeks, whole livers were analyzed for gene expression (qPCR) and immunohistochemistry (IHC). Mann-Whitney and ANOVA were used for statistics were performed

Results: Treatment of $Prom1^+$ HPCs with TGFβ1 promotes differentiation from an epithelioid to a spindle-shaped, fibroblastic morphology, which X030 addition does not qualitatively change. TGFβ1-treated $Prom1^+$ HPCs express significantly more *Collagen-1α1* compared to untreated cells, which was reduced with X030 co-treatment (1.76 ± 0.73 vs 435.77 ± 17.14 vs 107.72 ± 16.63 respectively, $p<0.0001$). Co-treated $Prom1^+$ HPCs trended toward less *Integrin-*α_v expression, which encodes a TGFβ1 co-activator, when compared to TGFβ1 only-treated cells (0.71 ± 0.53 vs 1.46 ± 0.58, $p=0.055$). In RRV-treated KO mice, there was a significant decrease in *Integrin-β6* expression, another TGFβ1 co-activator gene, compared to WT ($p=0.016$). Ductular expression of *Integrin-β6* in RRV WTs was absent in RRV treated KOs by IHC.

Conclusion: PROM1 knockdown *in vitro* and *in vivo* leads to decreased expression of fibrotic markers, suggesting a significant role for PROM1 in the pathogenesis of BA.

The Role of MKK4/7 in JNK Activation in Acetaminophen Induced Liver Injury

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Objective: Prolonged activation of c-Jun N-terminal kinase (JNK) has been shown to be a critical step in sustaining injury caused by acetaminophen (APAP). Though JNK is the terminal MAPK, it is unclear which MAP2K plays a role in its activation—MKK4 or MKK7. This study aims to elucidate the mechanism behind the MAP2K activation of JNK. It will delineate the difference between MKK4's and MKK7's role in sustained JNK activation in acetaminophen toxicity.
Methods: Antisense oligonucleotides (ASO) to MKK4 and MKK7 (versus scrambled control) were used for in vivo knockdown of male C57BL/6NHsd mice. Mice and primary mouse hepatocytes were treated with APAP and the MKK4 and MKK7 levels were measured using western blot analysis (WBA). Histology and ALT levels were also collected to assess the level of APAP injury.
Results: WBA showed MKK4 was expressed in the hepatocyte's cytoplasm with the phosphorylated form (P-MKK4) expressed following APAP administration. Cytoplasmic P-MKK4's presence also corresponded to expression of cytoplasmic P-JNK. MKK4 knockdown showed no P-JNK. This alludes to MKK4's role in JNK activation by phosphorylation. The mitochondria showed the same pattern with the exception of JNK expression. JNK was only present following APAP administration and MKK4 activation, indicating MKK4 plays a critical role in JNK's translocation to the mitochondria. MKK7 expression was barely detectable in the liver compared to the splenic control where it is known to be present. Following the administration of APAP, JNK was activated despite a lack of MKK7 levels. Similar to the WBA data, massive liver injury and ALT elevation were reduced by MKK4 knockdown but not by MKK7 knockdown in both injury models.
Conclusions: MKK7 expression is extremely low in the liver, implicating MKK4 as the major MAP2K activating JNK. These findings further support the critical role of the MAPK cascade and JNK in causing acetaminophen induced acute liver injury.

BEHAVIORAL SCIENCE

Personal Narrative Writing Workshops for Patients with HIV and Preclinical Medical Students: Narrative Medicine in the Post-HAART Era

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Background/Purpose: Since the advent of highly active antiretroviral therapy, HIV-associated morbidity and mortality rates have fallen dramatically. Nevertheless, psychosocial and structural barriers continue to lead to poor adherence to therapy and the development of antiviral drug resistance in many patients. To improve clinical outcomes, physicians today must learn to engage with their patients on the level of their lived experiences, including their social backgrounds and personal values. In 2016, we piloted a novel narrative medicine-based medical education intervention in which patients with HIV and preclinical medical students wrote and shared personal narratives with each other in weekly workshops.
Methods: Nine medical students and five patients from the Maternal Child and Adolescent/Adult Center for Infectious Disease and Virology participated in one of two 5-week long workshop series. Pre- and post-workshop surveys evaluated medical student professional identity and perceived social support and quality of life in patients and medical students. Qualitative methods, including focus group interviews, evaluated participants' experiences of the workshop series. Data triangulation enhanced the validity of the results.
Results: Grounded theory analysis revealed that participants experienced the workshops as safe environments in which to reflect on personal values and share life experiences with others. Medical students and patients agreed that the workshops expanded their sense of agency and empathy toward others, enabling them to explore new ideals for therapeutic physician-patient relationships. Participants also acknowledged an appreciation for how narrative approaches improve health and enact community-level change.
Conclusion: The studied methodology may be an effective and feasible way to foster medical student professional identity formation while contributing to community health. The authors propose implementation of the workshop series on a large scale.

The Effects of Musical Expertise on Sensorimotor Structures

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Purpose: Musical training has long been associated with neurologic changes, such as improvement in executive function and auditory abilities. However, there has been much less research examining gross changes in the brain from musical training. A meta-analysis was conducted to determine the extent to which musical training affected the gray matter and white matter structures of the brain.
Methods: Using Pubmed, Google Scholar, Oskicat, and Scopus, we searched for papers with post-intervention results that were published between 1995 and 2016. We determined if the papers satisfied our study selection criteria. If so, the data from the papers were compiled and sorted according to brain structure. Grouping similar studies, we calculated effect size and variance and modeled the results.
Results: Out of the twenty-five papers concerning gray matter that met the inclusion criteria, twelve papers could be statistically analyzed. In addition, there were twelve white matter papers that met the study criteria; seven out of the twelve studies could be included in our statistics. Five gray matter areas (superior temporal gyrus, planum temporale, precentral gyrus, postcentral gyrus, and cingulate gyrus) could be statistically analyzed. The effect size was 0.66 (0.43-0.89) for the superior temporal gyrus, 0.44 (0.20-0.68) for the planum temporale, 0.6 (0.32-0.88) for the precentral gyrus, 1.07 (0.56-1.58) for the

postcentral gyrus, and 0.71 (0.55-0.87) for the cingulate gyrus. The corpus callosum and corticospinal tract were the only white matter tracts that could be statistically analyzed. Overall, the corpus callosum had an effect size of 0.62 (0.26-0.98) and the corticospinal tract had an effect size of 0.69 (0.45-0.93). **Conclusions:** Compared to non-musicians, musicians have larger gray matter structures and thicker, more organized white matter tracts. For both white and gray matter, there seems to be little to moderate effect from musical training, but more studies are required for a better assessment.

CARDIOLOGY & CARDIOVASCULAR DISEASE

Long-Term Outcomes After Ultrasound-Guided Re-entry Devices for Common Iliac Artery Chronic Total Occlusion

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Background: Re-entry devices (RED) are often used in the endovascular management of common iliac artery (CIA) chronic total occlusions (CTOs) to facilitate procedural success. We examined the impact of RED use on 5-year outcomes including target lesion revascularization (TLR) and major adverse limb events (MALE).
Methods: We performed a two-center retrospective chart review of 126 patients (139 lesions, RED =43) undergoing CIA CTO endovascular intervention between 2006 and 2016. Baseline characteristics and long-term outcomes (TLR, limb loss, MALE, death) were identified. A Cox proportional hazard model was developed to determine if RED use was associated with TLR or MALE.
Results: The mean age was 63.9 years, and the majority (n=86) of patients were male. Anterograde crossing approach and restenotic lesions were less common in the RED group (10% vs. 33.7%, P<.05 and 0% vs.19.7%, P<.05, respectively). There was no significant difference in lesion calcification, Rutherford class, ABI or patient presentation. The 5-year TLR rate was 28% (27.9% and 28.4%). In the univariate analysis for 5-year outcomes, there was no significant association between RED use and TLR (HR: 0.79; 95% CI: 0.4-1.57; P=.51, Figure1), but the association with MALE had a trend towards statistical significance (HR: 0.51; 95% CI: 0.25-1.03, P=.06). Target lesion length was an independent predictor of MALE in both univariate (HR: 1.01; 95% CI: 1-1.02; P<.05) and multivariate analysis (HR: 1.02; 95% CI:1-1.02; P<.05).
Conclusion: This retrospective analysis showed that recanalization using a RED did not negatively impact the need for additional interventions and long term clinical outcomes.

Characterization and Quantification of Anatomy Relevant to Left Atrial Appendage Occlusion: Approaches to Procedural Planning using Cardiovascular Computed Tomographic Angiography as a Virtual Patient Avatar

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Purpose Left atrial appendage (LAA) occlusion is a relatively new surgical procedure that is performed as stroke prophylaxis for patients with atrial fibrillation who cannot tolerate long-term anticoagulant therapy. Transesophageal echocardiography (TEE) and fluoroscopy are typically used for sizing of the left atrial appendage and pre-procedural planning. However, cardiovascular computed tomographic angiography (CCTA) provides a more precise, 3-dimensional model for the assessment of cardiac anatomy. The goal of this study is to demonstrate the value of CCTA as a pre-procedural planning tool for LAA occlusion and to generate a standardized protocol for assessment of LAA dimensions and variable anatomical relationships.
Methods LAA parameters will be precisely measured via retrospective analysis of over 300 CCTA studies using the Vitrea 6.4 Workstation. 2D double oblique coaxial images will be used to quantify LAA size, morphology, angulation, and proximity to other cardiac and thoracic structures. These parameters will be used to identify optimal surgical approaches for individual patients.
Results We suspect that CCTA will demonstrate great variation of the parameters studied in our cohort and allow identification of variables important to the selection of LAA occlusion devices and approaches.

Conclusion CCTA provides a useful tool for the assessment of individual cardiac anatomy and pre-procedural decision making for LAA occlusion. We predict that CCTA will be shown to be the optimal imaging modality for LAA occlusion procedures and will minimize procedural morbidity and mortality.

The Chest X-Ray in Complex Operated Adult Congenital Heart Disease: 3-Dimensional CCTA Correlation

Jiexi Wang and Jerold S. Shinbane, MD

Background: Traditional chest x-ray (CXR) that projects 3-D cardiovascular anatomy into 2-D PA and lateral views is diagnostically challenging in patients with complex operated adult congenital heart disease (COACHD). Coronary computed tomography angiography (CCTA) is the gold standard for 3-D assessment of cardiovascular structure. We sought to compare CCTA to CXR in COACHD patients to better understand the utility and limitations of CXR in this demographic of patients.
Methodology: CXRs and CCTA scans were identified for 19 COACHD patients in our Advanced Cardiac Imaging Database. CCTA were analyzed and reconstructed using Vitrea, and comparable views to PA and lateral CXR were collected and correlated with CXRs taken from the same patients. CCTA were compared to PA and lateral CXR to identify cardiac chambers, pulmonary conduits, thoracic vasculature, and prosthetic valves using cardiovascular silhouettes, calcified structures, prosthetic materials, and pacing leads.
Results: CT/CXR studies from 19 COACHD patients with a mean age of 28.5 (SD=8.6) were included in the study for analysis. Analyzed physiology included Fontan for single ventricle physiology n=6, repair including right ventricular outflow tract reconstruction n=9 (Tetralogy of Fallot repair n=6, double outlet right ventricle repair n=2, truncus arteriosus repair n=1), atrial baffle for D-transposition of the great arteries n=3, and hypoplastic right ventricle with 1.5 ventricle repair n=1.
We expect to be able to identify the major components of the COACHD patients' anatomies and surgical repairs on PA and lateral CXR with CCTA serving as a gold standard for presence of this anatomy.
Conclusions: Analysis of CXR in COACHD patients has not been well studied. Using CCTA as a gold standard and with careful CXR analysis, we can continue to acquire information on how to identify complex structures in these patients on PA and lateral CXR.

DERMATOLOGY

Comparative Analysis of Lucio's Phenomenon in Mycobacterium leprae and Mycobacterium lepromatosis

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Goal: Lucio's Phenomenon (LP) is a rare and aggressive reactional state of diffuse lepromatous leprosy (DLL), a severe form of Hansen's Disease (HD) seen mainly in Mexico and the Caribbean. Recent research suggests that LP may be caused exclusively by M. lepromatosis, a leprosy-causing bacterium discovered in 2008 and fully sequenced via PCR in 2015. Few published studies have used full-genome sequencing to assess HD patients, so this study will be one of the first to do so. It will investigate whether M. lepromatosis was the cause of LP in all cases or if M. leprae may also be a cause. It will then look for significant differences in clinical presentation between M. leprae and M. lepromatosis LP patients.
Methods: Nine patients with LP (pre-Lucio's in two cases) were selected on the basis of characteristic acute skin lesions within the setting of DLL. Four criteria were used to diagnose them with lepromatous leprosy (LL) and five more were used to narrow the diagnosis to DLL. Biopsies were performed and paraffin-embedded samples were sent to the National Hansen's Disease Center in Baton Rouge for full-genome sequencing.
Results: PCR results indicated the presence of M. leprae in one patient and M. lepromatosis in four. Four patients did not test positive for either bacterium, and no patient tested positive for both. Age at diagnosis for the M. leprae patient was six years higher than the average age of the M. lepromatosis patients. Clinical manifestations of disease in patients with M. lepromatosis were, on the whole, slightly worse than in the one with M leprae. All patients presented with eyebrow and eyelash alopecia.
Conclusions: The clinical picture of our five PCR positive patients is consistent with current literature suggesting that M. lepromatosis has a more severe disease course at a younger age than does M. leprae. Importantly, the fact that one patient with LP tested positive for M. leprae but *not* for M. lepromatosis suggests that M. leprae may in fact be a cause for LP, despite studies suggesting that M. lepromatosis is the sole cause.

Efficacy of Nivolumab and Pembrolizumab in NRAS mutant melanoma

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Background: PD-1 inhibitors, pembrolizumab and nivolumab, have shown durable responses and high efficacy in advanced melanoma patients. To date, there has not been any large-scale analysis specifically investigating whether or not PD-1 inhibitors are equally efficacious in melanomas carrying mutated NRAS compared to melanomas carrying wild-type NRAS. Our study's goal is to investigate the efficacy of PD-1 inhibitors in NRAS mutant melanoma.
Methods: Medical records at University of California, San Francisco, Vanderbilt University Medical Center, University of Sydney, and University of Florida were reviewed for pathologist confirmed unresectable stage 3 or 4 melanoma patients who received at least 1 round of pembrolizumab or

nivolumab monotherapy during 2011-2016 and had available NRAS/BRAF mutation status. Responses were assessed via Response Evaluation in Solid Tumors 1.1 criteria. Our primary endpoint was response rate defined as complete response (CR) or partial response (PR) and our secondary endpoint was overall survival (OS). Chi-squared test was used for comparing categorical data and student's t-test for continuous data. OS distribution was assessed using Kaplan-Meier method and log-rank test. Multivariate regression analysis was performed using Cox Regression models.
Results: A total of 351 melanoma patients treated with PD-1 inhibitors were included in the final analysis. There were 69 NRAS mutants and 282 NRAS WT. NRAS mutant and NRAS wild-type melanomas treated with PD-1 inhibitors had similar ORR (38% vs. 38%, p = >.99), 1 year OS (83% vs. 77%, p = .27), and 2 year OS (70% vs. 65%, p = .35). Hazard ratio for NRAS mutant compared to NRAS wild-type melanomas treated with PD-1 inhibitors showed no statistically significant difference (HR =1.277, p = .25).
Conclusion: Therapeutic options for NRAS mutant melanomas are limited compared to their BRAF mutant counterparts. Our study supports the efficacy and clinical usage of PD-1 inhibitors in NRAS mutant melanoma.

Porocarcinoma: A Literature Review

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Background: Eccrine porocarcinoma (EPC) is a rare cutaneous neoplasm arising from the eccrine portion of sweat glands. Due to its rarity, there is a paucity of data in the literature to profile this disease and its diagnosis, work-up, and management. The purpose of this study is to perform a comprehensive review of all EPC cases in the literature and consolidate reported information on patient demographics, lesion location, systemic involvement, method of diagnosis, treatments, and outcomes. The goal is to provide a reference tool for clinicians in the diagnosis and optimum management of patients with EPC.
Methods: A comprehensive PubMed search was performed from 1963, when EPC was first described, to present using PRISMA guidelines. This yielded 137 articles detailing 163 cases of porocarcinoma.
Results: EPC most often presents in elderly patients on the head and neck or lower limbs. All cases are diagnosed with histology, with additional imaging, sentinel lymph node biopsy, and/or fine needle aspiration in cases of suspected lymph node or distant metastasis. Metastatic disease at presentation is not uncommon. The most common treatment is excision followed by Mohs Micrographic Surgery (MMS), though the outcomes after MMS were superior to those after surgical excision.
Summary/Conclusion: EPC is a rare disease with no standard of care. This review of all individual patient data reveals that all patients should have a histological diagnosis with imaging considered for high-risk cases. While wide local excision is currently first-line treatment, MMS is becoming increasingly popular due to its superior outcomes. In this review, we identify several clinical pearls that may be useful in the work-up and treatment of EPC.

Characterizing the burden of skin disease in Hispanic Americans with HIV

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Background: Skin disease is a significant source of morbidity in patients with HIV. Previous studies have shown increased rates of skin cancer as well as infectious and inflammatory dermatoses in HIV patients. However, there is a lack of data on HIV-associated skin diseases in Hispanic populations. Given that Hispanics now outnumber non-Hispanic whites in California according to the US Census, there is a pressing need to study skin disease in Hispanic HIV patients.

Objective: We aim to characterize the spectrum and burden of skin disease in a primarily Hispanic population of HIV patients, with particular attention to the demographics of our patients, their categories of skin diseases, and associated CD4 counts and viral loads.
Methods: We conducted a retrospective chart review of patients seen at the Los Angeles County-University of Southern California HIV Dermatology clinic over an 18-month period from June 2015-November 2016.
Results: A total of 185 patients were included in the study, of whom 133 (71.9%) were Hispanic. 78.2% of the Hispanic patients were male and the mean age was 48.5±10.3. The most common diagnoses among Hispanics were inflammatory dermatoses (25.6%), including diseases such as seborrheic dermatitis and psoriasis. Other common diagnostic categories included benign skin lesions (24.8%), skin infections (19.5%), lipodystrophy (6.9%), pigmentation disorders (6.1%), and skin cancer (4.5%). The most common individual diagnosis overall was warts (10.1%). Notably, the mean CD4 count at the index visit for patients with infections (384.3) was significantly lower than the overall mean CD4 count for all the patients in our sample (499.7) (p-value=0.022). The distribution of skin conditions was similar to that of non-Hispanic patients from the same clinic.
Limitations: This study included patients at only one clinic, therefore the results may not be generalizable to the broader population.
Conclusions: Inflammatory skin conditions were the greatest source of morbidity in this study, though warts were the overall most common diagnosis. Patients presenting with skin infections had significantly lower CD4 counts than the overall patient population. Hispanics with HIV have diverse cutaneous manifestations and are a population meriting further study to more fully characterize their burden of skin disease.

Sex Disparities and Barriers to Care for Women with Non-Melanoma Skin Cancer

Achyuth Sriram Medical Student, Shane Zhou Medical Student, Shauna Higgins M.D. Research Advisor, Ashley Wysong M.D. M.S. Primary Investigator

Goal: Multiple studies have shown that women have barriers to health care including differences in cost, coverage, and transportation that delays their care. This study investigates the sex disparities and barriers to care associated with non-melanoma skin cancer (NMSC) in the United States, the most prevalent and treatable cancer in the United States.
Methods: The National Health Interview Survey (NHIS) is a database that keeps track of a broad range of health topic data that is collected through personal household interviews. The NHIS (years 2006-2015) was utilized in a cross-sectional analysis to evaluate adults who ever had non-melanoma skin cancer. Multivariate logistic analyses was utilized to elucidate the sex disparities in barriers to care while controlling for socioeconomic disparities relating to NMSC.
Results: There were 4.10 ± 0.09 million adult NMSC cases. After controlling for age, education, income level, geographic region, and type of insurance, among adults who suffered from NMSC, men were significantly less likely to delay care due to cost (OR: 0.689, $p < 0.0070$), due to phone delays (OR: 0.501, $p < 0.00282$), and due to transportation delays (OR: 0.303, $p = 0.0041$).
Conclusion: Women who have NMSC have a statistically significantly probability of delaying care due to cost, phone delays, and transportation delays. This delay of care should be unacceptable for a very prevalent and treatable cancer. NMSC when treated early have a much lower risk of mortality. If the disease is allowed to progress, the survival rate drops dramatically. Targeted initiatives should be developed to address these health disparities for women with NMSC.

Hypothyroidism as a Potential Risk Factor for Cutaneous Squamous Cell Carcinoma

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Purpose: To determine whether the prevalence of hypothyroidism in patients diagnosed with cutaneous squamous cell carcinoma (SCC) in higher than the prevalence of hypothyroidism in the general population.
Methods: A database of patients with SCC of the skin was searched. A total of 265 patients with a prior histological diagnosis of cutaneous SCC were identified. Prior medical history and medications were reviewed for the presence of hypothyroidism and/or thyroid replacement therapy ('levothyroxine') prior to the diagnosis of SCC. Multiple prevalence studies were gathered for comparison that reported the prevalence of overt and subclinical hypothyroidism in the general U.S. population. Prevalence data for the elderly U.S. population was gathered as well.
Results: Of the 265 patients with diagnosed cutaneous SCC, 61 (23%) were found to have a prior diagnosis of hypothyroidism. General prevalence studies have reported a prevalence range 3.6 to 16.6%, with higher prevalence in elderly cohorts. The prevalence of hypothyroidism amongst the study population of SCC patients was found to be significantly greater than the prevalence of hypothyroidism (overt and subclinical) in any general and/or elderly U.S. population reported ($p = .003$).
Conclusion: Patients with cutaneous SCC are more likely to have a history of hypothyroidism than the general population. Given the chronological distribution of the two diseases, we conclude that hypothyroidism may act as a risk factor for the development of cutaneous SCC.

Sun Safety Exposure, Behavior, and Education at a Vietnamese Free Clinic

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Background: Skin cancer is heavily understudied in skin of color despite the higher mortality and morbidity risks associated with this demographic. Thus, this study aimed to establish a baseline understanding of sun exposure, behavior, and education among patients at a free clinic in Vietnam.
Methods: A prospective survey-based study was given to patients at a free clinic in Long An, Vietnam while they waited to see the physician. Surveys (n=241) were analyzed to assess prevalence of sun exposure, sun safety behaviors, and sun safety education in this population.
Results: Data from 241 survey participants indicated that 35.69% of patients spend over 3 hours per day directly under the sun. The prevalence of sun safety behavior was high with 58.09% of patients using at least 3 of the 5 listed sun safety behaviors. However, sunscreen usage was very low (8.71%). Sun safety education was low with only 31.94% of patients scoring over 50% when surveyed about their sun safety knowledge.
Conclusion: When compared to Americans, sunscreen usage is significantly lower and protective clothing usage is significantly higher in this Vietnamese population. This is likely due to cultural and socioeconomic reasons. The high sun exposure prevalence and low education level of this sample suggests that this population is at an arguably high risk of skin cancer. Thus, this clinic could benefit from implementing a sun safety education program. In particular, men have worse sun safety behavior and education than women, and lower education level is associated with poorer sun safety education. Thus, men and patients with lower education should be especially targeted in skin cancer education initiatives.

Collaborative Connected Healthcare for Management of Chronic Skin Diseases: A Randomized Controlled Trial Evaluating a Novel Online Model in Psoriasis

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Background: Psoriasis patients often experience limited access to dermatologic care, which may lead to worse clinical outcomes and a reduced quality of life. Teledermatology is one approach to improving access to care; however, the traditional model designates the primary care provider (PCP) as the intermediary, preventing communication between dermatologist and patient. In this study, we seek to improve the existing teledermatology structure with a collaborative connected health (CCH) model that permits multi-directional communication among psoriasis patients, dermatologists, and PCPs. Our goal is to compare the effectiveness of CCH to that of in-person psoriasis care in three main sectors: disease severity, quality of life, and access to care.

Methods: 300 psoriasis patients were recruited from outpatient dermatology clinics. They were stratified into groups of mild, moderate, or severe psoriasis severity and randomized 1:1 to CCH or in-person care. At baseline, all participants completed assessments on psoriasis severity, quality of life, and access to care. Follow-up assessments were given at Months 3, 6, 9, and 12.

Results: The CCH group showed a decrease in mean body surface area (BSA) of psoriasis lesions from 10.01% to 7.91% after 6 months, while the in-person group showed a decrease from 8.61% to 5.23%. The CCH group also showed an increase in mean health status score from 75.4 to 77.47, while the in-person group showed an increase from 73.38 to 76.22. Equivalence analysis is pending study completion at 12 months. Most patients reported their commute time to the clinic to be 31-60 minutes.

Conclusions: While improvement in psoriasis severity and quality of life is expected with in-person dermatologic care, the preliminary results suggest that the online CCH model also leads to improvement in both areas. Online visits may also eliminate excessive commute times for many psoriasis patients.

ECONOMICS OF HEALTHCARE

Los Angeles County FQCHs Quality Scores Compared to Those of the National Average

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Goal: Federally Qualified Healthcare Centers (FQHC) are avenues to care for patients in the safety-net and receive a unique source of federal funding. Because Los Angeles County faces many challenges in caring for their extensive safety-net population, we wanted to quantify and compare quality of LA County with national FQHC quality.

Methods: FQHC quality data was obtained from the Health Resources Service Administration. Data includes clinics' patient demographics, services offered, clinic characteristics, Healthcare Effectiveness Data and Information Set (HEDIS) quality metrics, and cost. Means of 31 characteristics or metrics were compared using an independent samples T-test.

Results: We obtained data of 1375 FQHCs, of which 54 are located within LAC (n = 54). LAC FQHCs have significantly more racial/ethnic minorities, more patients ≤65, more patients best served in another language, more patients at below both 200% and 100% of the federal poverty level (FPL), more patients with Medicaid/CHIP patients, and less patients with Medicare and third party insurance. LAC FQHCs total spending, per patient spending, and grant money received was comparable to the national average. LAC FQHCs significantly outperform the national average on rates of cervical and colorectal cancer screening, adolescent and adult weight screening and follow-up, and on appropriate therapy for heart attack/stroke patients. LAC FQHCs ranked significantly lower on blood pressure control (BP>140/90).

Conclusion: LAC clinics perform significantly better on 5 quality measures despite health disparities that can function as barriers to quality care. Because of LAC's seemingly higher technical quality, more research should be done to 1) figure out how LAC clinics manage to achieve these higher quality scores and 2) whether these scores translate into better health outcomes. It would be useful to compare similar quality metrics across different types of primary care clinics, including County-based systems or private practices, to help figure out where the most cost-effective avenues of care lie.

Metric	Nation avg	LAC avg	p-value
Total clinics -n	1321	54	N/A
Total Patients	17667.57576	18050.85185	0.922
Older Adults (age 65 and over)	9.02%	5.88%	0.000
Racial and/or Ethnic Minority	54.17%	86.17%	0.000
Best Served in another language	17.60%	39.01%	0.000
Patients at or below 200% of poverty	90.83%	97.01%	0.000
Patients at or below 100% of poverty	67.07%	76.23%	0.000
Uninsured	27.21%	29.29%	0.421
Medicaid/CHIP	42.69%	60.07%	0.000
Medicare	10.29%	5.16%	0.000
Other Third Party	19.91%	5.49%	0.000
Hypertension	23.48%	18.96%	0.000
Diabetes	12.50%	14.66%	0.020
Asthma	5.62%	5.35%	0.494
HIV	1.19%	1.26%	0.906
Access to Prenatal Care (First Prenatal Visit in 1st Trimester)	76.36%	74.98%	0.562
Cervical Cancer Screening	50.12%	58.21%	0.002
Adolescent Weight Screening and Follow Up	51.31%	63.26%	0.002
Adult Weight Screening and Follow Up	56.08%	64.84%	0.008
Adults Screened for Tobacco Use and Receiving Cessation Intervention	79.67%	81.07%	0.691
Colorectal Cancer Screening	35.04%	46.52%	0.000
Childhood Immunization	70.56%	72.31%	0.586
Depression Screening	49.08%	56.80%	0.066
Dental Sealants	42.56%	46.20%	0.437
Asthma Treatment (Appropriate Treatment Plan)	83.82%	78.63%	0.129
Cholesterol Treatment (Lipid Therapy for Coronary Artery Disease Patients)	76.82%	77.85%	0.681
Heart Attack/Stroke Treatment (Aspirin Therapy for Ischemic Vascular Disease Patients)	76.44%	81.81%	0.017
Blood Pressure Control (Hypertensive Patients with Blood Pressure > 140/90)	62.53%	67.89%	0.000
Uncontrolled Diabetes > 9%	31.29%	28.49%	0.210
Health Center Service Grant Expenditures	$ 2,610,239.96	$ 2,201,644.41	0.202
Total Cost	$ 14,393,482.96	$ 19,909,430.52	0.482
Total Cost Per Patient	$ 957.63	$ 889.80	0.478

Metrics where LAC is significantly higher than National – highlighted in Green
Metrics where National is significantly higher than LAC – highlighted in Blue

Efficacy of Insurance Against a Small Loss Incentive Strategy in Promoting Exercise Behavior

Patra Childress, Daniella Meeker PhD, Tara Knight PhD, Alan Rothfeld MD, Jason N. Doctor PhD

Background: The purpose of this study is to evaluate the efficacy of an at-risk incentive program in promoting exercise behavior and preventing chronic disease in a population of overweight individuals. This study hypothesizes that patients who are offered an at-risk reward that can be insured with attendance at free exercise sessions are more likely than patients who are offered the expected value of this reward to participate with greater regularity in an exercise program, leading to improved health outcomes and fewer complications from chronic disease.
Methods: 152 adult patients of QueensCare's clinics who have been referred by their healthcare providers to free exercise classes were randomized to either an Incentive Insurance or No Incentive Insurance condition. Each week, all participants were given a lottery ticket for a $20 reward to be redeemed after the first of two classes offered the following week. They were informed that they had a 90% chance of winning the award; by attending the second class in a week, people in the Incentive Insurance arm could guarantee this award. People in the No Incentive Arm were given the expected value of the incentive insurance irrespective of the lottery result. Attendance was followed for 12 weeks, and health outcome will be evaluated after one year.
Results: The overall rate of attendance was greater in the Incentive Insurance arm than the Expected Value of Insurance arm of the study ($p<0.05$). People the Incentive Insurance arm were more likely to attend the second class provided in a week considering they had attended the first ($p<0.05$).
Conclusions: The results support the hypothesis that an at-risk incentive strategy is more effective than a flat-rate monetary compensation strategy in promoting regular exercise behavior among overweight adults. Considering the short-term success of this intervention, it will be useful to demonstrate how this style of incentive program can be used to develop behavior patterns and impact long-term health.

EDUCATION

The Use of Cognitive Task Analysis Guided Instruction to Improve the Learning of Oral and Maxillofacial Surgery Procedures

Eric Mejia DDS; Roberta Ashley CRNA EdD CHSE; Allen Huang DDS; Robert Keim DDS, EdD;

Purpose: Oral surgery is one of the few specialties where the operator is able to simultaneously provide deep sedation and general anesthesia. The Commission on Dental Accreditation sets the standards where oral surgery residents must complete anesthesia training for at a minimum of 5 months one of which is dedicated to pediatric anesthesia. Furthermore, the resident must function as an anesthesia resident with commensurate level of responsibility. Despite these requirements, there has been increasing concerns whether adequate training is provided and if the operator/anesthetist model is a safe entity going forward. The study will attempt to compare teaching methods to ensure that training is optimized to maximize learner self-efficacy.

Methods: The design will be a single-blinded experimental where third and fourth year dental students will be randomly assigned to two study groups. One group will be taught the diagnosis and treatment of obstruction of patient ventilation during third molar extraction in the operator anesthetist model by an expert OMFS instructor using free recall while the other group will be taught using a cognitive task analysis guided instructional protocol.

Results: Experimental results are still pending. Students will be placed in an anesthesia simulation scenarios and study measures will be accuracy of the students' differential diagnoses and treatments provided. Times will be measured based on time to react and time on task for the anesthesia simulation programs.

Conclusion: The outcome of this experiment will be to analyze whether there are statistically significant gains in procedural knowledge, increased accuracy and increased speed of differential diagnoses and treatments provided in a simulated emergency situation among the different groups. While attempting to control many confounding variables such as students' previous knowledge and study habits, this experiment will attempt to isolate the efficacy of distinct teaching methods of cognitive task analysis versus the traditional free recall.

Assessing differences in professionalism definitions between pre-clerkship medical students and attending physicians.

Phillip Abarca[1], Stephanie Zia[1],

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Background: A focus of medical school is to educate and instill professional behavior in students. However, professionalism is a difficult concept to define and varies across medicine (Birden, 2014). Additionally, there is evidence to suggest that faculty may not feel prepared or capable of teaching professionalism in medical students (Bryden, 2010; Sturman, 2014). These issues contribute to difficulties in preparing and maintaining professionalism in medical students during their education and beyond.

To better assess differences in professionalism definitions amongst attending physicians and medical students affiliated with KSOM, we propose submitting a previously validated questionnaire to compare personal concepts of professionalism between the two cohorts based on the 7 domains of professionalism identified by the American Board of Internal Medicine.

Methods: A survey consisting of the Medical Professionalism Survey (MPS) (Jauregui, 2016) will be distributed via email to pre-clerkship medical students at the KSOM, and attending physicians with > 4 years of post-training experience at medical facilities associated with the KSOM. Results of the survey will be analyzed to assess differences between the two cohorts.

Results: Based on previous research (Jauregui, 2016), we posit that the "altruism" domain will be greater in medical students, whereas the "honor and integrity" and "respect for others" domains will be greater in attending physicians.
Conclusions: Research improving our understanding of medical professionalism can lead to improved medical professionalism education. This is all the more important considering that unprofessional behavior in medical school has been associated with medical board infractions during their medical career (Papadakis, 2004). We hope this study identifies differences in professionalism definitions which we can address in pre-clerkship training.

An Objective and Subjective Evaluation of Mentor Outcomes in a Near Peer Teaching Program

Omid Jalali[1], Emily Pott[1], & Kayvan Kazerouni,[1] Donovan Roy, MS[2], Anne Vo, Ph.D[3]
[1]Keck School of Medicine of USC, [2]Department of Academic Support Services [3]Department of Clinical Medical Education

Purpose: Peer teaching and near peer teaching programs have grown in popularity in medical education. These programs may offer benefit to students, mentors, and institutions. Research in near peer teaching programs has largely focused on student's experiences and changes in exam performance, rather than those of the mentors. In addition, when mentor outcomes have been evaluated, there has been very little focus on objective data, and only subjective descriptions of the experience have been analyzed. This manuscript will evaluate objective and subjective mentor outcomes in the Keck Anatomy Mentorship Program (KAMP): a near peer, cadaveric, gross anatomy teaching program at the Keck School of Medicine of USC.
Methods: This study will employ a mixed methods design, using interviews and focus groups to assess mentor's (n=10) subjective perceptions of the program. Mentor performance on the musculoskeletal gross anatomy exam will be compared to prior MS2 averages to assess objective data on the efficacy of the program in enhancing mentor knowledge of gross anatomy.
Discussion: We hope to find that KAMP provides positive subjective and objective outcomes for MS2 mentors. Subjective outcomes we hope to analyze include changes in interpersonal, communication, and teaching skills as well as an overall growth in leadership. Objective outcomes will hopefully provide us insight into whether or not a near-peer teaching program is an effective means for improving mentor knowledge and exam performance in gross anatomy.

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Examining Student Performance After Implementation of the Keck Anatomy Mentorship Program

Kayvan Kazerouni,[1] Emily Pott[1], & Omid Jalali[1], Donovan Roy, MS[2], Anne Vo, Ph.D[3]
[1]Keck School of Medicine of USC, [2]Department of Academic Support Services [3]Department of Clinical Medical Education

Background: Anatomy-based skills were ranked as being of high importance in clinical practice, but recently the anatomical knowledge of medical graduates has been criticized by anatomists and surgeons. The Keck Anatomy Mentorship Program (KAMP) that was put into place at the Keck School of Medicine in Fall 2016 addresses this problem by providing a platform for face-to-face, small-group cadaveric teaching, a method for learning anatomy strongly preferred over self-direction. Peer teaching has been widely recognized as a valuable approach to learning and allows for deeper understanding of concepts. In the framework of KAMP, students obtain advice and insight in a non-threatening environment and have the opportunity to reduce test anxiety and foster a sense of community within and between classes.
Methods: The mentorship program takes place weekly over the course of this academic year as a pilot effort. Twenty-one MS1 students were paired with ten MS2 mentors identified based on exemplary performance on their first-year gross anatomy exams as well as superior interpersonal skills. Two students were paired with each mentor. In addition to the two-hour anatomy lab session corresponding with each MS1 gross anatomy workshop, mentors are also providing MS1 students with a weekly review packet containing high-yield concepts.
Discussion: We aim to compare gross anatomy practical exam performance, rates of gross anatomy test anxiety, and subjective senses of community of KAMP participants to those of non-KAMP students within the Keck School of Medicine Class of 2020. This analysis will be done by examining gross anatomy practical exam performance and objective survey data including the Test Anxiety Inventory and an original survey created by the program directors. We hypothesize that there will be a difference between the two groups, with the KAMP students showing greater improvement in gross anatomy exam scores, a greater reduction in test anxiety, and a greater sense of community than their peers. This study, along with others focusing on KAMP, will provide a framework to replicate and expand this initiative in future years.

Differences in Multi-Tasking Ability Over the Course of Medical Education

Sridevi Korand, Todd P Chang, MD, MAcM, Susan Fischer, PhD, Cha Chi Fung, PhD

Background: Multi-tasking (MT) ability was shown to be a significant factor in efficient multi-patient clinical care. Medical school emphasizes serial thinking while such multi-tasking is often learned from work experience. This study's goal is to look for a difference in MT ability among 3 cohorts at different stages of education. We hypothesize that there is no difference between undergraduate & medical student MT but residents score higher than the others.

Methods: This is a cross sectional study with CSUCI undergraduates, 2nd year KSOM students and CHLA pediatric residents. Subjects voluntarily completed a validated Multi-Tasking Assessment Test (MTAT) on personal computers. The MTAT is an online test requiring different task completion with interruptions. Medical knowledge is not required. The MTAT yields two scores: 1. Time to Classify (TTC) scores measure time to complete a task correctly in seconds (s); 2. Strategy scores (out of 36) measure to what extent subjects used paths that maximized efficiency. A one-way ANOVA was used to compare the TTC and Strategy scores among the three groups.
Results: A total of 34 undergraduate students, 30 medical students and 15 residents were included. The mean TTC scores were 123.7 ± 40.7s for undergraduates, 51.9 ± 25.1s for medical students, and 48.8 ± 21.2s for residents. The mean Strategy scores were 3.1 ± 4.4 for undergraduates, 13.7 ± 9.1 for medical students, and 15.7 ± 11.5 for residents. There were statistically significant differences between groups for both TTC score (p<0.001) and Strategy score (p<0.001).
Discussion: A significant, graduated difference was found in MT ability between undergraduate students, medical students, and pediatric residents. This suggests multi-tasking may be an ability that improves with experience. This provides a reason to develop an assessment/education tool for MT ability in the setting of multi-patient clinical care.

Cross-Sectional Study Assessing Nutrition Attitudes and Knowledge of Keck School of Medicine Students Across All Four Years

Zoe Memel, Cha-Chi Fung, PhD, Gregory Harlan, MD, MPH

Background: Currently, KSOM does not meet the 25 hours of nutrition education the Institute of Medicine recommends. Many illnesses can be improved with dietary changes yet it is unclear how prepared students are to educate patients about dietary options. Our goal was to conduct a needs assessment on students' attitudes toward the importance of nutrition education, their current level of nutrition knowledge, and any significant differences between class years. Evaluating all four classes helps understand temporal changes in students' attitudes and knowledge in nutrition and provides a baseline for future studies.
Methods: All four class years were asked to complete an online validated survey in October 2016 (Qualtrics software). Descriptive statistics were performed for each classes' scores. We used ANOVA and Pearson analyses to evaluate for differences between class years.
Results: 199 students completed both sections "attitudes & knowledge" (MSI (67) MSII (72) MSIII (53) MSIV (7)) while 235 completed the attitudes section. Using ANOVA analysis no significant difference was found between class year attitudes in nutrition. Mean students' attitudes toward the importance of nutrition in routine care was 31.3/40, physician-patient relationship 34.1/40, physician efficacy 19.1/30, and patient behavior motivation 9.72/15 with higher scores indicating greater importance. 66% of students were dissatisfied with the quantity and 61% with the quality of nutrition education. Mean knowledge score was 58.6% (range 23.8 to 90.5). There was a significant difference in knowledge scores between class years (ANOVA variance $F(2,187)=21.801$, $p< 0.01$) with higher class years achieving higher scores.
Conclusion: Students believe nutrition education is important. They show low nutrition knowledge and feel deficient by the amount of nutrition currently taught. We need a coordinated effort to incorporate more nutrition into the KSOM curriculum.

Weight Stigma Reduction among Medical Students through Narrative Medicine

Kelly Park, BA[1], Rachel Fox, MS[2], Jonathan Chou, MS[1], Pamela Schaff, MD[1], Anne Vo, PhD[1]
[1]Keck School of Medicine of USC
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Background: Physicians often endorse dehumanizing perceptions of fat patients (fat used here as a neutral descriptor of size) as being unattractive, unintelligent, and less disciplined. This stigma is associated with worse health outcomes for fat patients, who not only receive substandard, discriminatory care but often delay necessary care in fear of such treatment. Negative stereotyping of fat patients among medical students resemble that of physicians. Thus, interventions to reduce fat phobia should occur before patient contact. Narrative methods like creative writing are powerful bias reduction tools but mostly address mental illness. Conversely, while weight stigma interventions have included education as well as direct contact, neither educational nor contact methods have used narrative medicine. We hypothesize that our novel intervention, which combines narrative medicine's empathic potential with contact-based prejudice reduction, will more effectively reduce anti-fat stigma and increase empathy for fat patients.
Methods: 5 students and 5 non-medical participants will meet for six sessions of close reading, discussion, and paired writing feedback. Each student will be paired with a fat person who has experienced weight-based medical discrimination. To evaluate the effects of this intervention, we will conduct a mixed methods study using the Fat Phobia Scale (FBS) and participant focus groups. The FBS will be administered before and after the workshops and will be analyzed using descriptive statistics. Content analysis will be conducted on focus group data to identify prevalent themes.
Results: We expect a larger decrease in anti-fat bias among students than among fat participants. Focus group data will help develop future workshops.
Summary: Weight discrimination in medicine is rooted in lack of empathy and dangerous to patient health. Medical students with less anti-fat bias will be better equipped to practice empathetic and effective care for fat patients.

The Fidelity of Implementation of the Keck Anatomy Mentorship Program

Emily Pott[1], Kayvan Kazerouni,[1] & Omid Jalali[1], Donovan Roy, MS[2], Anne Vo, Ph.D[3]
[1]Keck School of Medicine of USC, [2]Department of Academic Support Services [3]Department of Clinical Medical Education

Background: A paucity of data exists regarding how to measure the fidelity of a new implementation. Due to the lack of a streamlined method for analysis, there is low incentive for authors to address this aspect of an intervention. However, without reporting fidelity along with the success or failure of an established program, it cannot be assessed whether a failure in impact is due to a program itself or problems adhering to this program's implementation strategy, a conundrum described as Type III error. With this knowledge in mind, we hypothesized that we could assess our own intervention, the Keck Anatomy Mentorship Program (KAMP) in an objective manner. Briefly, our near-peer mentorship program involved pairings of two MS1 students and one MS2 mentor for a pilot longitudinal gross anatomy tutoring experience.
Methods: In order to assess our innovation, we are measuring five elements agreed upon in the literature as valid to judge fidelity. These elements are 1) Adherence to an intervention 2) Exposure or dose 3) Quality of delivery 4) Participant responsiveness, and 5) Program differentiation. These aspects will be assessed using quantitative data obtained from attendance logs and qualitative data from focus groups of both mentors and students. In the focus groups, topics regarding the five elements of fidelity

above will be discussed using specific prompts and questions, and each group will be moderated by an objective member of the faculty. The responses will be coded for themes.
Discussion: It is expected that the element of program differentiation will reveal the most about KAMP's fidelity and therefore replicability. Program differentiation is defined as an identification of the essential aspects of a program, without which the program would not have had its intended effect. Although elements such as adherence can be measured quantitatively using mentorship time logs, our results surrounding this topic will be gained from coding of themes discussed in focus groups. By assessing the fidelity of its implementation, we hope to gain insight on how we may improve KAMP and streamline its continuation and expansion in subsequent years.

Utilization Analysis of Keck Medical Students with different VARK learning styles interacting with the KOLI-Memorang Initiative

Katherine Seebald, Medical Student, and Dr. Anne Vo, Department of Medical Education

Background/Goal: Keck Online Learning Initiative, or KOLI, is a collaboration among Keck administrators and students along with the leadership at Memorang, an online flashcard and memory games company. This program aims to support medical students' studying through curriculum-specific e-learning materials. The goal of this investigation is to understand the relationship between program usage across current first year Keck medical students with different learning styles.
Methods: This is a cross-sectional, mixed methods study using data from the VARK Questionnaire, KOLI survey, Memorang user data, and student focus groups. KOLI satisfaction and usage questions will be administered via Qualtrics to about 190 Keck first year medical students. Their responses on the VARK will be de-identified and linked to other data sources. Correlational and descriptive analyses will be conducted between students' learning styles, KOLI satisfaction, and usage of different Memorang features. These data will be augmented with data from audio-recorded student focus groups. Focus group data will be analyzed thematically to suggest potential relationships for why and how students choose to use the KOLI-Memorang platform.
Predicted Results: It is theorized that students with dominant VARK "visual" and "reading/writing" learning styles are more likely to start and continue using KOLI-Memorang than those with "auditory" and "kinesthetic" styles. It is predicted that students who enjoy Memorang and/or have dominant visual and reading/writing styles will appreciate multiple learning modes (flashcards, matching cards, multiple choice, and online games). Those who do not enjoy Memorang, and/or those with auditory or kinesthetic-dominant learning styles, may prefer the online games for the auditory stimulation and fast pace.
Significance: The endpoint is to identify qualitative and descriptive trends via statistical analysis and focus groups to improve the KOLI-Memorang experience for more Keck first year students.

EMERGENCY MEDICINE & TRAUMA

Attitudes Toward Commitment to Pill Security and Limited Opioid Use Among Adolescents in an Urban Emergency Department

Sahib Grewal, B.S. Michael Menchine, MD/MPH

Introduction: Prescription opioid abuse is a growing problem in the USA, and adolescents continue to be exposed to prescription opioids at a young age. The purpose of this study is to learn how to target interventions for adolescents to reduce the hazards associated with prescription opioids, but there is little to no information on the adolescents taking opioids, making it difficult to effectively develop and target these interventions. We are trying to assess the current attitudes of adolescents towards the potential harm of opioid use/misuse, previous experience with pill security, and if adolescents are willing to consider to committing to pill security and limited opioid use in a clinical setting. We hypothesized that among adolescents aged 15-22 years old that were admitted to the LA county Ed, we expect there to be a difference in commitment to pill security and limited opioid pain medication use when comparing race, gender, previous opioid use, and attitudes toward opioid use.
Methods: For assessment, a 31 question survey was created on survey gizmo and given to a consecutive sample of patients aged 15-22 years old who were admitted to the LA county Ed after obtaining verbal consent, excluding Psych and non-English speaking patients. Survey was generally given during the morning and afternoon Ed shifts.
Results/Conclusion: The overall purpose of this study was to see if interventions toward opioid pill security and limited use could be applied broadly to a patient population without focusing in on certain groups. Of the 91 eligible patients who took the survey, we now anticipate finding no difference in commitment to pill security and limited opioid use when comparing race, gender, previous opioid use, and attitudes toward opioid use. We anticipate there will be no obvious groups who are not willing to commit to interventions directed at pill security and limited use of opioids, meaning these interventions can be applied broadly to an adolescent patient population.

Safety of early venous thromboembolism prophylaxis for isolated blunt splenic injury

Brenda Lin, BA, Kazuhide Matsushima, MD, Luis De Leon, MD, Gustavo Recinos, MD, Alice Piccinini, MD, Elizabeth Benjamin, MD, PhD, Kenji Inaba, MD, Demetrios Demetriades, MD, PhD

Introduction: Non-operative management (NOM) has become the standard of care in hemodynamically stable patients with blunt splenic injury. Due to the potential risk of bleeding, there are no widely accepted guidelines for an optimal and safe timeframe for the initiation of venous thromboembolism (VTE) prophylaxis in patients undergoing NOM. The purpose of this study was to explore the association between the timing of VTE prophylaxis initiation and NOM failure rate in isolated blunt splenic injury.
Methods: After approval by the institutional review board, we utilized the American College of Surgeons Trauma Quality Improvement Program (ACS TQIP) database (2013-2014) to identify adult patients who underwent NOM for isolated blunt splenic injuries. The incidence of overall NOM failure was compared between two groups: 1) VTE prophylaxis <48 hours after admission (early), and 2) VTE prophylaxis ≥48 hours (late). Similarly, we compared the incidence of NOM failure after the initiation of VTE prophylaxis. Multiple logistic regression analysis was performed for NOM failure adjusting for clinically important covariates.
Results: Of the 816 patients who met the inclusion criteria, VTE prophylaxis was given < 48 hours and ≥48 hours after admission in 144 and 147 patients, respectively. Overall NOM failure rate was 13.4%. While the overall NOM failure rate was significantly lower in the early group compared to late group (4.9% vs. 21.8%, $p<0.001$), there was no significant difference in the NOM failure rate after the initiation

of VTE prophylaxis between the groups (3.5% vs. 3.4%, p=1.00). In the multiple logistic regression analysis, early initiation of VTE prophylaxis was not significantly associated with NOM failure (OR: 1.19, 95% CI 0.31-4.51, p=0.80).
Conclusion: Our results suggest that early initiation of VTE prophylaxis (<48 hours) does not increase the risk of NOM failure in patients with isolated splenic injury. Further prospective study to validate the safety of early VTE prophylaxis is warranted.

Patterns of Injury in General Aviation Accidents

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Background: The National Transportation Safety Board documents nearly 1,500 private aviation accidents a year in the U.S., and their data reports that the majority of these accidents do not result in fatalities. However, the burden of injuries in survivors remains undefined.
Methods: Patients involved in aviation accidents that were neither commercial nor military were retrospectively identified from the National Trauma Data Bank (NTDB) from January 2007 to December 2014. Clinical demographics and outcomes were abstracted.
Results: During the study time frame, 2,989,627 patients were registered in the NTDB. Private aviation made up only 0.04% of these injuries, and 1,335 patients were identified from the database. Median age was 54 years (IQR 2-88), with 87.0% of the population being male. On presentation, 13.6% had a GCS ≤ 8, 7.2% were hypotensive, and the median ISS was 13 (6-22) with 20.7% patients having an ISS > 24. Lower extremities were the most common body region injured (53.3%), followed by the spine (50.2%), face (49.2%), head (44.8%), thorax (44.2%), upper extremities (43.1%), abdomen (19.9%), and neck (4.1%). Overall mortality was 6.4%, with most deaths occurring within the first 24 hours (72.1%). Of patients who died, the most prevalent injuries were rib/sternal fractures (51.2%), intracranial bleeds (39.7%), and hemo/pneumothoraxes (39.5%). As for operative burden, 31.7% of patients had major orthopedic procedures, 11.1% had spinal procedures, 7.5% had vascular procedures, 3.8% underwent laparotomies, 0.9% had craniectomies/craniotomies, and 0.8% had a thoracotomy. After logistic regression was performed, having a GCS<8, being hypotensive, and having a thoracic vascular injury were all independent predictors of mortality.
Conclusion:
Private aviation accidents are rare and associated with low mortality, but a significant burden of injury. Patients that survive experience high rates of lower extremity, spine, and facial injuries; and the need for surgical interventions, particularly orthopedic, is common.

Hemodynamically Abnormal Thoracoabdominal Trauma Should Undergo Computed Tomography Prior to Definitive Therapy

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Purpose: The triage of hemodynamically abnormal trauma patients is debated. We investigated outcomes for hemodynamically abnormal thoracoabdominal trauma undergoing computed tomography (CT).
Methods: All hemodynamically abnormal (HR≥120, SBP<90 mmHg) thoracoabdominal trauma patients at our Level I trauma center in 2014 were reviewed. Patients achieving normalization (SBP≥90) were

included. Patients who were pregnant, age<18, who underwent resuscitative thoracotomy, or had isolated non-cavitary injuries were excluded. Variables abstracted included demographics, injury mechanism, injury severity score (ISS), ED findings, laboratory data, CT findings and operative details. Primary outcomes were hospital length-of-stay (HLOS), ICU LOS, ventilator days and mortality. Secondary outcomes were operative data, transfusion data, complications, and cost. Data was analyzed by unpaired Student's t-test (continuous variables) and Chi Square analysis (categorical variables). Significance was denoted at a $p \leq .05$.
Results: 201 patients were included. Thirty-five (17%) went directly to the OR; 166(83%) went to CT. The CT and OR groups were matched for age (34±2.0 vs. 38±1.2 years, p=0.1), injury burden (mean ISS-CT=18±2.7 vs. ISS-OR=18±0.9) and resuscitation time (81±43.0 vs. 67±9.4 minutes, p=0.7). No difference in primary outcomes was observed (p>0.1 for each). Patients undergoing CT prior to OR had increased recognition of intraabdominal injuries (89 vs. 74%, p=0.05), a significant reduction in negative explorations (2.3 vs. 8.6%, p<0.01) and a decreased need for PRBCs (2±0.6 vs. 7±2.5 units, p<0.01), FFP (1±0.3 vs. 4±1.3, p<0.01) and platelets (0.3±0.1 vs. 1±0.4 units, p=0.03) throughout admission. Patients in the OR group had an increased need for surgical procedures (37.1 vs. 12.1%, p<0.01).
Conclusion: Hemodynamically abnormal thoracoabdominal trauma resuscitated to SBP≥90 should undergo CT scanning prior to definitive therapy.

The Injured Cyclist: An Epidemiological Analysis of Cyclist Trauma and the Effects of Drug and Alcohol Use on Injury Severity and Outcome

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Background: Bicycles are an increasingly common form of transportation. While previous studies have described the epidemiology of injuries involving cyclists, the effects of drug and alcohol use on outcomes are poorly defined.
Objective: To describe the associations between substance use and injury burden and outcomes after bicycle trauma.
Methods: We identified 2,749 patients from the LAC+USC Trauma Registry, from January 2010 to September 2015, who were injured while riding a bicycle. We abstracted demographic information (age, gender, ethnicity, ICD9 diagnostic codes, vital signs, Glasgow Coma Scores (GCS), and Injury Severity Scores (ISS); data also included toxicology reports. Outcomes of interest included intensive care unit (ICU) length of stay, ventilator days and mortality, and were compared using univariate and bivariate analysis.
Results: Overall patients were more likely to be male (2393; 87.0%), with a median age of 36. Extremity fractures were the most common form of injury (789; 28.7%), followed by head injuries (628; 22.8%) and thoracic injuries (293; 10.7%). Of the 773 (28.1%) patients who underwent a toxicology screen, 321 (41.5%) tested positive for drugs and/or alcohol. Univariate analysis showed that patients with a positive toxicology screen had a higher burden of injury (ISS $\geq$ 16; 15.3% vs. 7.8%; p<0.001), specifically involving head trauma (32.4% vs. 21.6%; p<0.001) and thoracic trauma (17.4% vs 9.8%; p<0.001). However, in a multivariate analysis, intoxication was not an independent risk factor for mortality (1.2% vs. 1.0%; OR, 2.934; 95% CI, 0.772-11.153; p=0.114).
Conclusions: Although drug and alcohol use are associated with a higher burden of injury in cyclists, they are not associated with higher mortality.

Pitfalls in performing the FAST exam: where do learners go wrong? A descriptive study of false negatives and false positives in 1000 trauma patients

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Background: The Focused Assessment with Sonography for Trauma (FAST) exam is well accepted for the evaluation of trauma patients to identify hemoperitoneum. Despite the widespread use of the FAST exam, the sensitivity ranges greatly depending on the study with most values reported between 64% and 98%. Past work has investigated patient factors associated with a false negative FAST, but none have specifically examined ultrasound images and operator errors that could lead to inaccurate interpretations.
Objectives: The aim of this study was to describe the operator error/ultrasonographic limitations of FAST exams in a cohort of trauma patients over an 18-month period. We aimed to describe the most frequent locations of false negatives (FN) and false positives (FP) and to categorize technical errors as inappropriate depth, inadequate evaluation of quadrant, or inappropriate gain.
Methods: We performed a retrospective review of patients meeting trauma team activation criteria from Dec 2014 to May 2015, specifically looking at our false positives and false negatives. CT, operative intervention, and/or emergency department thoracotomy served as the gold standard, therefore patients without any of those 3 interventions were excluded. Patient demographics, presentation, and injury patterns were reviewed. FN and FP exams were reviewed independently by an expert ultrasonographer who graded image quality based on the ACEP 5 point scale for image adequacy and identified major limitations including inappropriate depth, inadequate evaluation, and/or inadequate gain.
Results: 947 patients were included. There were 16 (1.7%) FP and 41 (4.3%) FN FAST exams (intra-abdominal or pericardial injury). FAST sensitivity and specificity was 80.7% and 97.8% respectively for any abdominal injury and 83.4% and 97.8% for hemoperitoneum. 60.7% of FP/FN cases were blunt trauma and 40.3% were penetrating trauma. FP for free fluid were most frequently seen in the pelvic and pericardial views (40% of cases). The most common injury in the false negative cohort was liver injury with free fluid (38% of cases), with bowel injury second (33%). There were 45 FP/FN cases recorded for review. The expert reviewer deemed images to be insufficient for diagnosis 35.75% of time, with the highest percentage of insufficiency in the RUQ. The most common inadequacies for both FN and FP exams were inadequate views in the right upper quadrant and left upper quadrant, gain too high in pelvic view, and views being off axis/chambers not visualized for the cardiac view.
Conclusions: FP/FN occurred infrequently (6% of cases). FP were most often located in the pelvic and cardiac region. The most common missed injury in FN was liver laceration. Interestingly, the highest percentage of inadequate view was also in the right upper quadrant. On retrospective review, operators had more issues with adequate evaluation over gain or depth. Further studies are needed to identify educational interventions to improve adequate evaluation and thereby decrease FP and FN.

Hypoglycemia and Lactic Acidosis out Perform King's College Criteria for Predicting Death or Transplant in Acetaminophen Toxic Patients

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Background: Acetaminophen toxicity is common, and is characterized by hepatic failure. In cases that are not improving with standard medical therapy with N-acetylcysteine, some patients may require hepatic transplant. While there are various criteria to predict patients who would benefit from

transplant, the King's College criteria remain one of the most widely used. However, the King's College criteria have several limitations, and do not incorporate glucose, an important marker of hepatic function. The primary objective of this study is to compare the presence of hypoglycemia, coagulopathy, and metabolic acidosis with the King's College Criteria for predicting a composite endpoint of death or transplant.
Methods: Multicenter cohort study of adult patients admitted at one of six university-affiliated teaching hospitals throughout the United States with a discharge diagnosis of acetaminophen-induced liver failure.
Results: A total of 334 subjects were identified. Fifty-one subjects (15.3%) met the composite endpoint of death or transplant. Ninety-six (28.7%) subjects met the King's College Criteria for transplant. The presence of hypoglycemia increased the odds of reaching the composite endpoint by 3.39 fold. The combination of hypoglycemia, coagulopathy, and lactic acidosis performed better than the King's College criteria (pseudo R2 for the area under the curve of 0.93 vs. 0.20 for the King's College criteria).
Conclusion: The combination of hypoglycemia, coagulopathy, and lactic acidosis performed better than the King's College criteria for predicting death or transplant.

MOTOCROSS VS. MOTORCYCLE INJURY PATTERNS: A RETROSPECTIVE NTDB ANALYSIS

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Background: While motorcycle crashes have been well studied, motocross-related injury patterns and outcomes are poorly understood. The purpose of this analysis was to compare motocross and motorcycle collisions.
Methods: Data on motocross and motorcycle drivers and passengers were extracted from NTDB (2007-2014). Variables extracted were demographics, mechanism of injuries, Abbreviated Injury Scale (AIS) for each body area, Injury Severity Score (ISS), and vital signs in the emergency department. Primary outcomes were injury patterns and demographics. The Secondary outcome was mortality.
Results: A total 141,529 (2.4%) patients were involved in either a motocross or motorcycle collision. Of those collisions, 31,252 (22.1%) involved motocross bikes, and the remaining 110,277 (77.9%) involved motorcycles. Most patients were drivers (94.4%). Motocross riders were younger (23 vs. 42, $p<0.001$) and less likely to be female (9.5% vs. 13.4%, $p<0.001$). Helmets were used more often by motocross riders (68.9% vs. 54.1%, $p<0.001$). Motocross patients were less likely to have severe head or chest injuries (43.6% vs. 53.8%, $p<0.001$ and 75.0% vs. 76.0%, $p=0.029$, respectively). Overall mortality was 1.2%, and was significantly lower in the motocross group (0.3% vs. 1.4%, $p<0.001$). Stepwise logistic regression analysis identified age >60, GCS $\leq$8, hypotension, AIS$\geq$3, and riding a motorcycle to be independent predictors of mortality. Helmets were protective against mortality (OR 0.866; 95% CI, 0.755-0.992; $p=0.039$). In the subgroup analysis, riding motocross bikes was an independent predictor of lower mortality (OR 0.458; 95% CI, 0.359-0.585; $p<0.001$ and OR 0.127; CI 95%, 0.017-0.944; $p=0.044$, respectively).
Conclusions: Motocross and motorcycle collisions are distinct mechanisms of injury, with motocross having improved outcomes compared to motorcycle collisions. Riding a motorcycle is an independent risk factor for mortality. Wearing a helmet is a protective factor against mortality.

Reliability of the Abdominal Exam in Blunt Trauma Patients with Altered Mental Status

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Background: Blunt trauma (BT) patients with altered mental status (GCS < 14) require careful diagnostic consideration given that history and physical exam findings may be unreliable.

Objectives: The goal of this study was to investigate the reliability of a normal abdominal exam in patients with a GCS < 14 using CT of the abdomen-pelvis (AP) as the reference standard.

Methods: This retrospective study is from the Los Angeles Department of Health Services registry of BT patients who presented to the ED from January-November 2015. We evaluated whether altered patients (GCS <14) and a normal abdominal exam were significantly associated with an abnormal CTAP, defined as any traumatic finding by radiologist read. An abnormal abdominal exam was defined as the presence of any abnormal finding upon assessment and physical evaluation. The sensitivity and specificity of abdominal exam to CT findings were assessed. Inter-rater reliability was performed in 10% cases.

Results: Of the 500 BT patients identified by the trauma registry, 296 received a CTAP. CTAP was negative in 187 patients and positive in 54 patients. Of the 159 patients with a GCS ≥14 and a normal abdominal exam, CTAP was negative in 130 (81.7%) and positive in 29 (19.3%), compared to the 82 patients with a GCS ≥14 and an abnormal abdominal exam, where 57/82 (69.6%) had a negative CTAP and 25/82 (30.4%) had a positive CTAP. The sensitivity of the abdominal exam in patients with a GCS ≥14 was 46.2% (95% CI:32.8-60.2%) and the specificity was 69.5% (95% CI:62.3%-75.9%).

Of the 55 patients with a GCS < 14, CTAP was positive in 11 patients and negative in 44 patients. Of these patients, 44 had a normal abdominal exam and 11 had an abnormal abdominal exam. Of the 44 patients with a GCS < 14 and a normal abdominal exam, CTAP was negative in 35 (79.5%) and positive in 9/44 (20.5%). This is in comparison to the 11 patients with a GCS < 14 and an abnormal abdominal exam, where 9 (81.8%) had negative CTAP and 2 (18.2%) had a positive CTAP. The sensitivity of the abdominal exam in patients with a GCS < 14 was 18.2% (95% CI: 3.2%-52.2%) and the specificity was 79.5% (95% CI: 64.2%-89.6%). See Table 1.

Conclusion: Overall, the abdominal exam was not a very sensitive test in determining the presence of blunt trauma found on CTAP in either the group with a normal or a low GCS. Specifically, no relationships regarding the sensitivity of the abdominal exam and CTAP results could be reliably made in the setting of low GCS. Although the abdominal exam of patients with a normal GCS had a slightly higher ability to correlate with an abnormal CTAP than the abdominal exam with low GCS, the sensitivities were still quite low.

Although a reliable abdominal exam in patients with low GCS may identify some patients who are appropriate for serial abdominal exams rather than immediate CT larger studies are needed to assess the safety of relying on the abdominal exam for such patients.

Table 1. Patient Abdominal Exam and GCS with CTAP Results.

	Pos CTAP	Neg CTAP	Sensitivity	Specificity
GCS < 14				
Normal abd exam	9 (81.8%)	35 (79.5%)		
Abnormal abd exam	2 (18.2%)	9 (20.5%)	46.2% (95% CI: 32.8-60.2%)	69.5% (95% CI: 62.3%-75.9%)
GCS ≥ 14				
Normal abd exam	29 (19.3%)	130 (81.7%)		
Abnormal abd exam	25 (30.4%)	57 (69.6%)	18.2% (95% CI: 3.2%-52.2%)	79.5% (95% CI: 64.2%-89.6%)

New re-engagement to care strategy implemented at the LAC-USC Emergency Department successful at re-engaging out-of-care HIV/AIDS patients to HIV care although homelessness and substance use pose significant barriers.

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Background: Many individuals have HIV diagnoses but are out-of-care. The aim of this study is to implement a re-engagement strategy that begins HIV treatment in the emergency department and arranges continuity of care, thus integrating the ED into the patient-centered medical home and care continuum as it relates to HIV care.
Methods: Patients were screened for past medical history of HIV/AIDS, HIV positive status, or other indications of HIV. If positive, the HIV fellow was notified to see the patient and create an HIV Care Plan including laboratory testing, recommendations, and follow up instructions. Each patient filled out a survey to indicate barriers to HIV management. A retrospective chart review was performed to determine successful re-engagement, defined by 1 follow up visit, as well as barriers to care associated with unsuccessful re-engagement.
Results: 49% of out-of-care individuals were successfully re-engaged to HIV care. The top 2 barriers reported were substance use (41.5%), homelessness (37.7%). Homelessness was reported by 48.2% of individuals who failed to re-engage compared to 25.0% of individuals who successfully re-engaged. Substance use was reported by 48.3% of individuals who did not re-engage compared to 33.3% of individuals who successfully re-engaged with care. Overall, 70% of individuals who indicated homelessness as a barrier (n=20) and 64% of individuals who indicated substance use as a barrier (n=22) did not re-engage to HIV care.
Conclusions: Overall, this strategy was successful in increasing rates of re-engagement of out-of-care individuals to HIV care compared to the previous protocol of providing walk-in appointments at HIV clinic. Since substance use and homelessness are reported at higher rates among those who did not

successfully re-engage, these are both important barriers to address when trying to re-engage individuals to HIV care.

Evaluation of Single vs. Dual Tube Thoracostomy After Thoracotomy for Trauma

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Objective: Draining the chest cavity with two chest tubes after thoracotomy for trauma is controversial. This paper aims to determine whether using two tubes after thoracotomy for trauma is more effective than using a single tube.
Patients and Methods: A 9-year retrospective review (2007-2015) was performed at our academic level I trauma center. All patients that underwent trauma thoracotomy (unilateral and bilateral) were included for analysis (N=99). Patients with incomplete data, pediatric patients (age < 18), pregnant patients, and early deaths (< 24 hours) were excluded**.**
Results: When analyzed by chest cavity, dual tubes have increased drainage bilaterally ($p<0.008$) and require more days to clear the right chest ($p<0.002$). Patients with dual tubes bilaterally are associated with increased ICU length of stay ($p=0.05$) and ventilator days ($p=0.04$).
Conclusions: While dual chest tube insertion achieves greater drainage, it comes at the cost of increased time to clear the chest and is associated with worse outcomes in bilateral injuries. One chest tube may be sufficient post-trauma thoracotomy; routine placement of two chest tubes is not recommended.

The Dangers of Equivocal FAST in Trauma Resuscitation

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Background: Equivocal Focused Abdominal Sonography for Trauma Examinations (FASTs) confound decision-making for trauma surgeons. We sought to determine whether equivocal FAST (defined as discordant or indeterminate) has a deleterious effect on trauma outcomes.
Methods: A 2-year review (2014-2015) of all trauma activations at our Level I trauma center was performed. Patients were matched at baseline and FAST results were compared. Outcomes included resuscitation time (RESUS-h), ventilation days (d), hospital length of stay (HLOS-d), ICU length-of-stay (LOS-d) and survival (%). Additionally, skill level of the sonographer was stratified by novice (PGY years 1-3) or expert skill levels (PGY-4/fellow or attending).
Results: A total of 1,027 patients were included. Compared to concordant FAST examinations, equivocal FASTs were associated with increased HLOS ($p=0.05$), higher mortality ($p=0.02$), decreased PPV in the RUQ ($p=0.02$) and LUQ ($p=0.00$) and significantly decreased specificity in the thoracic, RUQ, LUQ, and pelvic windows (all $p=0.00$). A trend of greater PPV in the thoracic window ($p=0.09$) amongst fellow/PGY-4 and attending providers compared to PGY levels 1-3 was observed.
Conclusion: Based on the data, equivocal FASTs portend worse outcomes than concordant FASTs due to high false-negative rates, specifically in the thoracic region and the upper quadrants and lower thresholds for intervention are recommended.

Venous Thromboembolism Prophylaxis in Patients Undergoing Intracranial Pressure Monitoring is Safe

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Introduction: The use of venous thromboembolism (VTE) prophylaxis in patients with severe traumatic brain injury (TBI) and intracranial pressure monitoring (ICPM) is controversial. This study's purpose was to determine the safety of VTE prophylaxis in TBI patients undergoing ICPM.
Methods: A seven-year (2008-2015) retrospective analysis of patients undergoing ICPM at our academic Level I trauma center was conducted. Inclusion criteria were ICPM patients surviving ≥7 days that were eligible for VTE prophylaxis. Variables abstracted from the registry included patient demographics, clinical data, injury profiles, ICP data, and pharmacy data. Outcomes included ICP data pre/post initiation of prophylaxis, VTE incidence, hemorrhage expansion on CT, and need for neurosurgical intervention.
Results: A total of 213 patients met inclusion criteria. Of these, 104 (49%) received VTE prophylaxis (ICPM-PPx) and 109 (51%) did not (ICPM-no PPx). Groups were matched for age (p=0.1), sex (p=0.7), admission SBP (p=0.8), GCS (p=0.7) and total injury burden (mean ISS ICPM-PPx=25±1.3 vs. ICPM-no PPx=23±1.1, p=0.2). Among patients on prophylaxis, 40 (39%) began prophylaxis with an ICPM in place (pre-d/c) while 64 (63%) began prophylaxis with the ICPM removed (post-d/c). Among patients who began VTE prophylaxis with ICPM in place, mean ICP did not change appreciably with prophylaxis (mean ICP pre-d/c of ICPM=12±0.6 vs. post-d/c of ICPM=11±0.8 mmHg, p=0.1) and there was no difference in the need for neurosurgical intervention (pre-d/c=7.3% vs. post-d/c=3.1%, p=0.3). The proportion of increased intracranial hemorrhage (ICH) identified by CT was similar pre-d/c vs. post-d/c (10.0% vs. 10.0%, p=0.9).
Conclusion: Anticoagulant prophylaxis can be initiated safely with-or-without an ICP monitor in place. Intracranial pressures do not change significantly, there is no increased need for surgical intervention, and there is no increased incidence of worsened ICH on CT.

The Independent Prognostic Value of B Lines in Patients Presenting to the Emergency Department

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Background: B lines are abnormal sonographic artifacts appearing as ray-like vertical lines extending from the pleural line on thoracic ultrasound, indicating sub-pleural interstitial edema. The prognostic value of B lines seen on point-of-care ultrasound (POCUS) has not been widely investigated, with only two recent studies associating B lines with higher morbidity and mortality upon hospital discharge in admitted patients with congestive heart failure. To date there have been no published studies looking at the prognostic value of B lines in patients presenting to the emergency department (ED).
Methods: The study is being conducted as a retrospective cohort study, utilizing existing medical record data from patients who presented to the LAC+USC ED during the period of June 1, 2015 through December 31, 2016. Patients are included in the study if they presented with a non-traumatic chief complaint warranting a thoracic POCUS, received a thoracic POCUS, and received a chest x-ray within 24 hours of their initial ED evaluation. Patient data being collected falls into 3 categories: 1) variables for sample description and to be included as regression model covariates, 2) variables to indicate disease severity, and 3) variables to indicate primary and secondary outcomes. Additionally, thoracic POCUS images for eligible patients are being reviewed for the presence or absence of B lines.

Results: Data is currently being collected. The primary study outcome will measure length of stay (ED or inpatient). Secondary outcome measures will include place of disposition (discharge, admission, or morgue), admission rates, return rates to the ED within 1 week, and interventions administered. It is anticipated that patients with positive B lines compared to patients without B lines will have longer hospital courses (in the ED and inpatient), increased levels of care up to disposition, increased admission rates, increased ED return visits, and require higher levels of interventions.

ENDOCRINOLOGY

Point-of-Care Serum Testing to Identify Diabetes Mellitus in Ngöbe Women

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Background: Diabetes mellitus (DM) is a common, yet preventable, malnutrition-related ailment seen throughout the world. The incidence of DM among women of childbearing age is of interest, and can be particularly devastating, due it its implications regarding maternal and fetal health. *Passow et al.* puts forth evidence showing pregnant women with diabetes give birth to heavier children who are more likely to be hypoglycemic. This can lead to maternal complications as well as neurological damage to the infant. Our group sought to measure the prevalence of DM in women of the Ngöbe indigenous population of Panama.
Methods: Point-of-care serum glucose monitors are portable and reliable devices used for DM testing. All women, 14-45 years old, arriving at the clinic were asked for consent to undergo serum testing. All compliant patients had basic medical information recorded along with blood glucose and hemoglobin A1c (HbA1c) measurements. Patients found to have blood glucose and HbA1c measurements consistent with DM were evaluated for treatment, counseled on adherence to medical therapy, and given educational materials detailing DM risks and prevention.
Results: Among all women (14-45yo) who received a random blood glucose test (n=268), the average blood glucose was ~123 mg/dl. Among these individuals, 16 patients (~6.3%) had blood glucose levels ≥ 200 mg/dl, a value concerning for DM. Fasting blood glucose tests were administered to a subset of patients seen at clinic. Among these women (n=34), the average fasting blood glucose was ~125 mg/dl. Among these individuals, 21 (60%) had blood glucose above 100 mg/dl—a value concerning for pre-diabetes, and 9 patients had blood glucose above 125 mg/dl—a value concerning for diabetes.
Conclusion: From our preliminary results, we conclude that blood glucose control is a significant challenge facing the Ngöbe people as well as their care providers. Further data collection and analysis must be done for the benefit of future treatment and education strategies.

GENETICS

A Genome-Wide Association Study for Plasma Apolipoprotein Levels.

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Introduction: Elevated plasma levels of total cholesterol (TC), low-density lipoprotein (LDL) cholesterol, and triglycerides, together with the decreased high-density lipoprotein (HDL) cholesterol levels have been epidemiologically associated with cardiovascular disease risk. Very few studies have investigated the genetic determinants of apolipoproteins found on LDL and HDL particles, such as apolipoprotein B (ApoB) and apolipoprotein A2 (ApoA2). ApoB is presented as one molecule on LDL particles, and serves as the ligand for endocytosis by the LDL receptor and is known to be pro-atherogenic. By contrast, the role of ApoA2 is less clear, although it is present on HDL particles and has been implicated in reverse cholesterol transport and insulin resistance. To date, GWAS have been carried out for ApoA2 and ApoB in either only relatively small numbers of subjects or only in cohorts of women. The aim of the present study is to identify genetic factors controlling plasma levels of ApoB and ApoA2 as well as determine their relationship to other lipid metabolites and risk of CAD.
Methods: We performed a two-stage genome-wide association study (GWAS) for ApoB and ApoA2 levels in ~4900 GeneBank subjects.
Results: A GWAS for ApoB levels identified two loci on chromosome 1p13.3 (rs7528419) and 19q13.32 (rs445925), which were replicated in the follow up analysis. Both variants were associated with lower ApoB and LDL levels, as well as with decreased risk of CAD. In addition, rs7528419 was significantly associated with decreased TC, whereas rs445925 was associated with increased HDL. A GWAS for Apoa2 levels identified one locus (rs4073054) on chromosome 1q23.3, which was replicated in the follow up analysis, but was not associated with other lipid metabolites, or risk of CAD.
Discussion: We identified one locus in *APOA2* that was associated with ApoA2 levels. Furthermore, we identified two loci localized in *CELSR2* and near *APOE-APOC1-APOC2-APOC4*. Both loci were associated with ApoB and LDL levels, as well as risk of CAD.

GERIATRICS

Developing a Tool to Improve Documentation of Injuries in Older Adults

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Background: Elders who present to healthcare providers may be victims of unsuspected abuse, but documentation of injuries in older persons is often inadequate. A body diagram-based tool, similar to those used in child abuse and sexual assault cases, may be appropriate to document injuries in geriatric patients. This project aimed to develop a practical tool that facilitates thorough medical documentation of injuries, which can later be used as evidence in potential elder abuse forensic cases.
Methods: We conducted and audio recorded phone interviews with 11 elder abuse experts (3 emergency physicians, 2 geriatricians, 3 prosecutors, 2 detectives and 1 forensic pathologist to determine important elements for an elder abuse documentation tool. The recordings were transcribed and analyzed by 3 separate graders using grounded theory methodology. The injury documentation tool was developed in accordance with the expert interviews, and then presented to 2 focus groups (1 family physician group and 1 emergency physician group) to assess its usability.
Results: All experts interviewed agreed that there was a need for an organized tool to document injuries in geriatric patients. Experts recommended that the tool document the following: wound appearance prior to treatment, circumstances surrounding the injury and a full-body examination. Several experts recommended the use of photography in conjunction with written documentation. Focus groups stated that the tool was practical, but desired that it be limited to 1 page, double-sided to minimize physician burden.
Conclusion: The routine use of a body diagram-based tool to document injuries in older adults may prove valuable for legal prosecution. Photography may be a particularly valuable adjunct to such a tool. Further research is necessary to evaluate the impact of this tool in-clinic.

Effects of RCQI Education and Empowerment on Clinician Satisfaction in an Interprofessional Geriatric Primary Care Clinic

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Background: Interprofessional care models are increasingly popular for healthcare delivery to geriatric populations. However, issues of efficiency, interprofessional conflict, and communication particularly arise in interprofessional clinics. These can lead to clinician dissatisfaction, which can in turn lead to patient dissatisfaction and adverse outcomes. This project has a two-pronged hypothesis. The primary hypothesis is to determine if it is possible to effectively teach clinicians in an interprofessional environment to conduct RCQI. If RCQI can be implemented in this setting, the secondary hypothesis is to determine if, as a result of acquiring these skills, the clinicians report improved satisfaction with their clinical environment.
Mehtods: The subjects of this study are the ten clinicians in the Geriatric Assessment Program at Keck Hospital. A pre-survey was conducted via RedCAP to assess clinician knowledge of RCQI and satisfaction. Then, two didactic sessions were conducted, one in a conference call utilizing powerpoint, and one in person in small groups. The clinicians will then bequestioned on how they implemented RCQI. Then, a post-survey will be administered to assess clinician knowledge and satisfaction after these didactic sessions.

Results: The results of the pre-survey of clinicians showed that while 70% of clinicians rated their knowledge of what RCQI was as adequate, only 40% rated their ability to implement it as adequate. When asked if RCQI could be used to improve clinic function and improve their own clinical experience, 80% stated they agreed and strongly agreed.
Conclusion: The post-survey of clinicians has not yet been completed. When this data has been collected, I will analyze the data to determine if clinicians' knowledge of RCQI has improved, and if their satisfaction with the clinic experience has improved. If we are able to improve clinician satisfaction by empowering clinicians to conduct RCQI and improve their clinics themselves, it could have a strong impact on clinicians and their patients.

Depression, anxiety, health-related quality of life and other health factors in older adults with HIV/AIDS

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Background: Older people with HIV/AIDS are at elevated risk for depression and anxiety, which may negatively impact health-related quality of life. HRQOL is a measure of health status that incorporates physical function and the Healthy Days Index (total number of days with good mental and physical health). We examined the relationships among depression, anxiety, and HRQOL in this population.
Methods: Data were collected from HIV+ individuals ages ≥50 (n=133) recruited from medical clinics in Los Angeles, CA and New Orleans, LA. Bivariate analyses were performed using t-tests and Pearson's correlations.
Results: Mean age of participants was 56.7 years with a mean of 18.1 years living with HIV. Most participants were male (71.4%), Black/African American (62.4%), and reported non-detectable viral loads (83.8%). 43.5% of participants were at risk for depression (>10 on CES-D-10) and 32.3% had moderate to severe levels of anxiety (≥10 on GAD7). Anxiety and depression were often comorbid ($p<.001$). Higher depression and anxiety scores were associated with more health conditions ($p<.001$), worse physical function ($p<.001$), fewer healthy days ($p<.001$), more prohibitive days ($p<.001$), greater perceived stigma ($p<.001$ and $p<.01$), and lower medication adherence self-efficacy ($p<.001$). Depression and anxiety were not associated with years since diagnosis, CD4 count, viral load, substance use, or social isolation.
Conclusions: Depression and anxiety were present at high rates and were associated with poor HRQOL and negative health/psychosocial outcomes. Findings suggest the importance of addressing mental health issues and understanding how mental and physical health may interact to create vulnerability in this population.

Health Disparities

Differences in Buprenorphine Treatment Attitudes Between Large Urban Centers

Anthony Torres, Rolando Tringale MD, Andrew Subica MD, Tasha Perdue Ph.D.

Goal: Despite its superior efficacy, lower side effect profile, and 14 years of availability, Buprenorphine, a medication-assisted treatment (MAT) approved in 2002, has not been adopted by many physicians, and continues to be underutilized by patients in the United States, compared to Methadone. To examine bicoastal variability in buprenorphine maintenance treatment (BMT) barriers and demand, data was collected from 100 predominantly Latino and African-American Los Angeles Needle exchange participants and compared with existing BMT attitudes data from a New York needle exchange published by Fox et al. 2015.

Methods: Survey data was collected from 100 participants in order to understand medically assisted treatment (MAT) preferences among individuals receiving services from a comprehensive harm reduction center. In-person recruitment occurred on the day of data collection by an announcement in the lobby of the center. Inclusion criteria were: 1) age 18 years or older, 2) receiving some form of service from the agency, 3) reported using a prescription opiate in the past 12 months, and 4) English speaking. Each participant received $15 cash for participation in survey data collection. Survey data was collected using secure online survey software.

Results: Significant differences were found in both willingness to engage in BMT (29% Los Angeles and 46% NYC, $p = 0.018$) and in lack of awareness of BMT (26% Los Angeles and 9% NYC, $p = 0.002$). Barriers to and demand for BMT are different between large urban centers in the United States for a variety of reasons, yet the educational differences are stark.

Conclusions: Focusing on urban education of different MAT modalities, such as BMT, may increase both awareness and willingness to engage in treatments, with the highest potential for impact in low BMT education urban centers with high minority populations, such as Los Angeles.

IMAGING & RADIOLOGY

Case Series Evaluating the Safety & Efficacy of TACE and Ablative Therapies for Small Renal Masses

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Purpose: There is growing evidence supporting IR guided treatments of renal masses including RFA, microwave, and cryoablation. In the liver, combination therapy with trans-arterial chemoembolization followed by thermal ablation appears to be more effective than ablation alone. In light of these findings, we are undertaking this study to evaluate the safety and efficacy of trans-arterial chemoembolization and ablation for small Renal Cell Carcinomas (< 4 cm).
Methods: The study will involve a retrospective review of patients who had undergone both procedures for small renal masses in the past ten years to determine the rates of complications, need for further interventions, and tumor recurrence.
Results: We expect to see oncologic efficacy with potential decrease in bleeding complications associated with cryoablation. There should also be an improvement in confidence in the ablation of endophytic lesions.
Conclusion: This data will increase the armamentarium of minimally invasive procedures available for the treatment of renal cell carcinomas.

Diurnal and activity-related variations in weight-bearing articular cartilage of the knee using quantitative T2 mapping and Fitbit

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Purpose. To investigate the variation of magnetic resonance imaging (MRI) T2 values of femoral and tibial articular cartilage in the knee using T2-relaxation time mapping in an active, asymptomatic population between morning and afternoon scans and to correlate any changes with activity level and body-mass index (BMI).
Methods. 7 male volunteers and 3 female volunteers with ages ranging between 24 to 46 years old underwent activity tracking with Fitbit pedometers in order to determine each participants' activity level and correlate this with any changes in values from sagittal MRI T2 maps obtained in the morning and afternoon of two consecutive days. Average T2 values from four weight-bearing cartilage regions of the knee (medial tibia, lateral tibia, medial femoral condyle and lateral femoral condyle) were compared between morning and afternoon scans and any statistical association between change in T2 values and time of day, steps counted, or BMI were investigated.
Results. No statistically significant differences were observed between T2 values obtained from morning and afternoon scans. Significant, but small magnitude differences associated with baseline activity were observed in the medial femoral (0.16±0.07ms, p=0.02) and medial tibial (0.22±0.06ms, p<.01) cartilage regions, but there was no significant change observed with subsequent daily activity. Increasing BMI was associated with a significant, but small magnitude decrease in lateral tibial T2 values (-0.23±0.09ms, p = 0.02).

Region	Diurnal T2 change (ms)	P-value
Lateral tibia	-0.11±1.24	0.93
Lateral femoral condyle	0.04±1.31	0.98
Media tibia	1.32±1.28	0.31
Medial femoral condyle	1.94±1.29	0.14

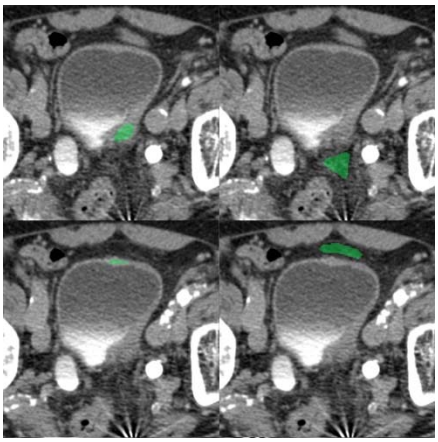
Discussion. No significant diurnal variation in T2 relaxation times were observed in a cohort of healthy and active individuals. Our results suggest that normal daily activity, as measured by Fitbit pedometers, does not produce significant change in the T2 values from morning to afternoon, nor is there an association with steps counted.

Radiomic evaluation of bladder cancer – differentiating transitional cell carcinoma from micropapillary carcinoma

Ting-wei Fan, Harshawn Mali, Vinay Duddalwar, Darryl Hwang, Steve Cen, Bino Varghese

Goal: Micropapillary carcinomas are more aggressive variants of typical transitional cell carcinomas of the bladder and have poorer prognosis. We investigate the practicality of using radiomics to differentiate between these two types of bladder cancers.

Methods:



33 cases were found of patients diagnosed with MPCs from our database at USC Norris Cancer Hospital and Keck Hospital of USC. They were sectioned, and regions of interests (ROIs) were manually drawn and separately saved for the MPC tumor (top left), invaded perivascular fat (top right), normal bladder wall (top left), and normal perivesicular fat (bottom right). 33 CT scans of patients with TCCs will also be analyzed for comparison. *For the three categories of radiomic characteristics:* gray-level co-occurrence matrix (GLCM), texture, and heterogeneity, a single parameter with the best prediction accuracy under each category will be nominated to the multivariate model. The difference in AUC between the full model and the reduced model will be compared using the z test.

Results: We have not yet analyzed the data, but we expect to see differences in heterogeneity and texture to allow us to quantify the difference between MPC and TCC.

Summary/Conclusion: Ideally, CT scans and the metrics we have used here could be applied to various ostensibly indistinguishable masses to provide clinicians with an accurate diagnostic tool without the need for invasive procedures to confirm diagnoses. This information can be extrapolated to other malignancies in order to provide a quick way of distinguishing between different malignant subtypes to drive patient care. If this type of characterization becomes the standard of diagnosis, clinicians can save time and reduce the need for more invasive confirmatory procedures.

Resting-state functional connectivity in Autism Spectrum Disorders (ASD): A Review

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Background: Ongoing debate exists within the resting-state functional MRI (fMRI) literature over how intrinsic connectivity is altered in the autistic brain, with reports of general over-connectivity, under-connectivity, or a combination of both. Classifying autism using brain connectivity is complicated by the heterogeneous nature of the condition, the age and sex of participants included, designs of the resting-state scan, and the analysis technique used to evaluate the data. This review systematically examines the resting-state fMRI autism literature to date and compares studies in an attempt to draw overall conclusions that are presently challenging.
Methods: The PubMed database was searched for all articles directly comparing individuals with ASD using resting-state fMRI.
Results: A total of 67 studies were included with key results highlighted in the figures below. The majority of studies reported both under- and over-connectivity (30), followed by under-connectivity (22), and over-connectivity (9). Six additional studies were included that did specify connectivity changes.

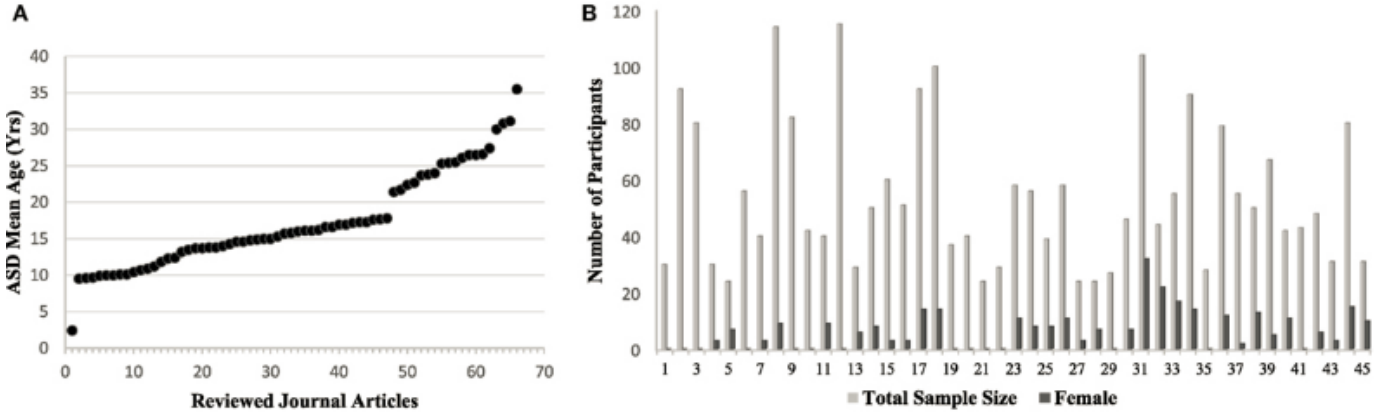

Figure 1. (A) The mean age of ASD participants per study. Gaps can be seen in age representation from 3 to 9 years and 17 to 21 years. **(B)** Representation of female participants in each study.

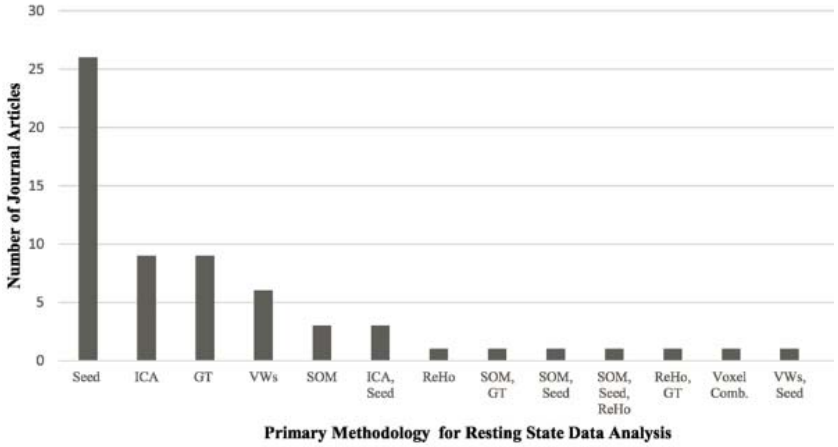

Figure 2. Primary methodology used for rs-fMRI data analysis

Conclusions: While hallmark connectivity patterns are still unclear, evidence suggests that ASD is most likely characterized by instances of both under- and over-connectivity. More research is necessary to

determine characteristic functional connectivity alterations in ASD, the time at which alterations occur, and whether these changes occur on a spectrum from ASD to "typically developing" individuals.

MR Elastography at 3T: Retrospective Comparison of Two Data Acquisition Protocols for Image Quality and Inter-rater Reliability of Post-Processing Technique

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Goal: To evaluate MR elastography (MRE) cases performed at our institution between January 2014 and November 2016 for adequacy of MRE sequence implementation at 3T magnet strength and for post-processing reproducibility.
Methods: One hundred forty-three studies were performed using 2 MRE pulse sequences customized by Mayo Clinic for the GE 3T HDxT scanner: standard fast gradient echo (FGRE) and modified sequence to account for susceptibility due to iron overload (IO). Two radiologists, a medical student, and a technologist post-processed the MRE data set using MREAnalysis software (MATLAB, Mathworks, Inc.) for ROI-based reporting of results. The impact of motion artifact (MA) and driver susceptibility artifact (DA) was also independently evaluated by the two radiologists. Statistical analysis and inter-rater agreement were then performed.
Results: Initial results of the first 79 MR studies between two radiologists are as follows: mean liver stiffness (kPa) acquired from IO source images measured 2.29 ± 0.81 versus 2.61 ± 1.04 from FGRE ($p=.11$) with near perfect reproducibility (intraclass correlation coefficients = 0.999 and 0.998, respectively); 79.8% incidence of MA with IO versus 38.0% with FGRE ($p<.01$); 0% incidence of DA with IO versus 79.75% with FGRE ($p<.01$); 100% inter-rater agreement in assessing DA with IO; moderate agreement in assessing DA with FGRE (kappa coefficient [KC] = 0.47); slight agreement in assessing MA with both IO and FGRE (KC = 0.23 and 0.20, respectively).
Conclusions: Preliminary results suggest that MRE optimized for 3T magnet strength can achieve a highly reproducible liver stiffness assessment regardless of radiologist skill level. While not statistically significant, IO tends to calculate lower liver stiffness values versus FGRE. While IO avoids DA, it is affected more by MA.

Application of Magnetic Resonance Spectroscopy for Assessing Pilocytic Astrocytomas

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Background: Pilocytic astrocytomas represent the most common type of pediatric brain tumor. Molecular subgroups of pilocytic astrocytomas, most notably tumors with *BRAF* alterations, have been shown to differ in terms of clinical behavior as well as in responsiveness to treatment. For instance, pilocytic astrocytomas with an activating *BRAF* V600E mutation may be treatable with a selective *BRAF* V600E inhibitor. Currently, cytogenetic analyses of tumor tissue are required to identify alterations in *BRAF,* a requirement that is dependent on invasive brain surgery. However, an advanced, noninvasive imaging technique called magnetic resonance spectroscopy (MRS) has demonstrated potential for characterizing brain tumors in the absence of tissue. The aim of this project is to assess the ability of MRS to distinguish pilocytic astrocytomas based on (1) *BRAF* status, and (2) clinical aggressiveness.
Methods: This retrospective study analyzed data from 65 patients (0-17 yr) diagnosed with pilocytic astrocytomas at CHLA between 2001 and 2016, who received MRS. These patients were followed during their treatment, and event-free survival and overall survival were calculated as proxies for tumor aggressiveness. Cytogenetic analysis of tumor biopsies will be used to determine *BRAF* status: *BRAF*

V600E point mutation, *KIAA1549:BRAF* fusion, or no *BRAF* alteration. MRS metabolite concentrations will be correlated with the *BRAF* status and survival outcomes.
Results: Cytogenetic analyses of tumor tissue are in progress. Once *BRAF* status has been established for the tumors in the study, we will determine if the metabolite concentrations measured by MRS differ between the *BRAF* molecular subgroups.
Conclusions: Significant results could provide insight about whether MRS can identify alternations in *BRAF* or predict clinical aggressiveness of pilocytic astrocytomas upon initial patient presentation.

Utility of Shear Wave Elastography to Assess Liver Fibrosis in Liver Transplant Patients with Hepatitis C

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Purpose: Accurate staging of liver fibrosis in transplant patients is critical to proper treatment and management of fibrosis progression in chronic liver disease. Liver biopsy has been the gold standard technique in the assessment of fibrosis due to chronic liver disease both before and following liver transplantation (LT). We seek to determine whether shear wave elastography (SWE) and the measures of tissue stiffness it provides can be a consistent, quantitative measure of liver fibrosis in Hepatitis C virus (HCV) patients following LT.
Materials and Methods: In this IRB-approved study, 34 consecutive HCV-positive LT subjects underwent sequential SWE at the time of their clinically indicated liver biopsies. A total of 45 SWE scans were included. Spearman correlation was used to examine the correlation between SWE values versus METAVIR Fibrosis Score. ROC curve was used to develop prediction model when predicting the indication for biopsy based on METAVIR Score: biopsy is not indicated for Metavir Scores 0 or 1, while biopsy is indicated for Metavir Scores of 2-4 . The diagnostic cut off point was selected using Youden's index. Sensitivity, specificity, false positive and false negative value were calculated based on the selected cut point. The ANOVA test for global difference, followed by contract test for the difference from the reference group (category 0) with Bonferroni correction for multiple testing was used to assess non-linear difference in SWE values across METAVIR Scores.
Results: SWE values statistically significantly correlated with METAVIR Scores ($r=0.56$, $p<0.01$). AUC for SWE values in predicting the biopsy decision was 0.85 (95% CI: 0.72, 0.98). Threshold SWE value of 1.68 m/s was selected. The sensitivity, specificity, false positive and false negative value associated with this cut point was 100%, 74.1%, 53.5%, 0%. ANOVA showed global difference in SWE values across METAVIR Scores ($p=0.03$). SWE values were borderline significantly higher in category 2 of METAVIR Score, $p=0.017$.
Conclusion: A strong correlation exists between SWE tissue stiffness values and histopathological METAVIR scores in our population. We hope that SWE can be used as a consistent, noninvasive method of evaluating fibrosis in patients with chronic liver disease to limit the need for core liver biopsies in eligible patients. The study will also evaluate the utility of sequential SWE to monitor the progression of fibrosis longitudinally in chronic liver disease, but we await subsequent trials in our study population.

Shear Wave Elastography: Evaluation of Novel, Non-Invasive and Quantitative Ultrasound-Based Techniques for Assessment of Liver Fibrosis in Liver Transplant Recipients with Non-Hepatitis C Chronic Liver Disease

Paul Latterman, Corinne Deurdulian MD, Shefali Chopra MD,
Bhushan Desai MD, Edward Grant MD

Introduction: Patients who have undergone liver transplantation need to be carefully followed and periodically evaluated for liver fibrosis. To date, liver biopsy has been the gold standard for determining the degree of fibrosis; however, since biopsies are invasive and prone to complications, we aim to determine if shear wave elastography (SWE) can serve as a reliable tool for determining the degree of fibrosis in certain liver transplant recipients.

Methods: We are performing a prospective study on HBV and non-viral liver disease patients who have received a liver transplant. Each subject will undergo an SWE in the right lobe of the liver on the same day that they report for a clinically indicated follow-up liver biopsy. Using data provided by the manufacturer of the system, the SWE values will provide predicted METAVIR fibrosis scores. These will then be compared to the METAVIR scores assigned by a blinded hepatopathologist based on the patient's corresponding biopsy sample.

Results: A total of 40 patients who underwent liver transplantation for HBV and non-viral liver disease have been included in our study thus far. Three patients have had multiple follow-ups, which provides us with a total of 44 SWE studies and biopsies to compare. Six (14%) of the predicted METAVIR scores based on the SWE matched the assigned score provided by the hepatopathologist. Of those six, two patients were transplanted because of chronic HBV, two transplants were because of drug induced liver injury, one transplant was because of nonalcoholic steatohepatitis (NASH), and one transplant was because of alcoholic cirrhosis.

Conclusion: Although preliminary results do not show much correlation between the SWE results and the biopsies, further evaluation may help us understand why. Specific factors such as age, sex, and indication for transplant may play a role in how closely the SWE can predict liver fibrosis. Additionally, the cutoff points for which SWE values correspond to which METAVIR scores may need to be adjusted once more patients have been studied.

Mental Health & Psychiatry

Benefits of Mirtazapine for Depression in Children and Adolescents with Cystic Fibrosis

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Children's Hospital Los Angeles

Background: Children and adolescents with Cystic Fibrosis (CF) are more likely to be depressed, which leads to lower quality of life and adherence to treatment. CF patients suffer from nausea, loss of appetite, and weight loss, so SSRIs, the current first line of treatment, may not be acceptable due to its side effects. Mirtazapine has been shown to increase appetite and have anti-emetic and sedating effects, side effects that may be better suited for CF patients. Accordingly, a retrospective chart review was undertaken at Children's Hospital Los Angeles (CHLA) to determine the utility of mirtazapine in depressed pediatric patients with CF.
Methods: The charts of patients seen for psychiatric consultation at CHLA with the diagnosis of CF who took mirtazapine for more than 5 days were reviewed for changes before and after treatment. Weight, nausea, and depressive symptoms such as insomnia, anorexia, depressed mood, anxious mood, suicidal ideation, anhedonia, lethargy, hopelessness, psychosis were compared using McNemar's test.
Results: Out of 18 identified patients, four patients were excluded from the study due to insufficient follow-up data. One patient stopped mirtazapine after 4 days because of irritability. Thirteen patients (9 females, 4 males) were evaluated (age: 8 to 20 years). A median dose of 15 mg of mirtazapine was given for a median of 197 days. The McNemar's test revealed that symptoms of anxiety, depression, anorexia, insomnia and lethargy were significantly improved after treatment with mirtazapine ($p<0.01$). Irritability, hopelessness, suicidal ideation, anhedonia, and nausea were not significantly improved with mirtazapine treatment ($p>0.05$). A paired t-test revealed that there was a significant difference in weight before and after treatment $t(12)= -3.14$, $p<.01$.
Conclusions: Depressive symptoms, appetite, insomnia, and weight improved during mirtazapine administration, although no change in nausea could be appreciated. Overall, the medication was well tolerated. Thus, mirtazapine may be a better option for pediatric patients with CF.

Association of Major Depressive Disorder and Post-Traumatic Stress Disorder with Suicidal Ideation and Behavior in a U.S. National Sample

Omin Kwon, John Briere

Background: Major Depressive Disorder (MDD) has been classically regarded as a leading factor associated with suicidality. However, contradictory evidence suggests that MDD significantly predicts suicidal ideation, but not behavior. Other studies suggest that Post-Traumatic Stress Disorder (PTSD) is a significant predictor of both suicidal ideation and behavior. We aim to better characterize the relationship of MDD and PTSD to suicidality and explore differences in how they contribute to suicidal ideation versus behavior.
Method: We performed analyses on the Trauma Symptom Inventory 2 (TSI-2) sample, in which 679 individuals representative of the U.S. population were administered the TSI-2 questionnaire to assess depression and other psychological measures, and the PTSD Checklist Civilian Version (PCL-C) to assess PTSD. These measures were correlated to suicidal ideation and behavior measures using both univariate and multivariate regression.
Results: At the univariate level, suicidal ideation was correlated with PCL-C PTSD ($r = .360$, $p < .001$), TSI-2 Depression ($r = .659$, $p < .001$), TSI-2 Anger ($r = .544$, $p < .001$), and TSI-2 Tension-Reducing Behavior ($r = .534$, $p < .001$). However, multivariate regression revealed that only PCL-C ($\beta = .118$, $p < .001$) and TSI-2 Depression ($\beta = .514$, $p < .001$) were significant predictors.

Univariate correlation analysis indicated that Suicidal Behavior was related to PCL-C PTSD ($r = .361$, $p < .001$), TSI-2 Depression ($r = .390$, $p < .001$), TSI-2 Anger ($r = .400$, $p < .001$), and TSI-2 Tension-Reducing Behavior ($r = .523$, $p < .001$). Out of these four independent variables, multivariate regression showed that only PCL-C PTSD ($\beta = .200$, $p < .001$) and TSI-2 Tension-Reducing Behavior ($\beta = .475$, $p < .001$) were significant predictors of suicidal behavior.
Conclusions: Our data supports previous findings suggesting that MDD predicts suicidal ideation while PTSD predicts suicidal behavior. Our data suggests that this may be due to intense affective states and impulsivity associated with PTSD. This implies that future suicide prevention efforts should aim to include more extensive screening for traumatic symptomology.

Mirtazapine Use in Depressed Pediatric Oncology Patients

Diem-Tran Nguyen BA, Paulina Kaiser BS, Susan Turkel MD, Alan Hanft MD

Background: Depression is a common debilitating complication observed in pediatric patients with cancer. Selective serotonin reuptake inhibitors are currently the first line pharmacologic treatment for depression in the child and adolescent population, but their side effects and drug interactions may be difficult for cancer patients to tolerate. Mirtazapine has been shown to be effective in managing depressive symptoms and some chemotherapy associated adverse effects in adults. Though mirtazapine has been used in depressed pediatric patients, very little data exists regarding its use in children and adolescents with a malignancy. We explored the hypothesis that mirtazapine may be an effective and tolerable option to address anxiety and depressive symptoms and chemotherapy associated nausea, weight loss, and insomnia in pediatric oncology patients.
Methods: Pediatric oncology patients seen by the Consultation-Liaison Service at Children's Hospital Los Angeles who received mirtazapine between May 1, 2004 and April 1, 2014 were retrospectively identified. For each patient, mirtazapine dose, duration of use, response, and adverse effects were recorded. Symptoms of interest prior to mirtazapine use were compared to symptoms upon treatment cessation with the exact McNemar's Test.
Results: From the 220 patients who were treated with mirtazapine for depression during this period, 110 oncology patients were identified. There were 49 females (45%) and the mean age at mirtazapine initiation was 14.6 years ($\pm$ 3.46). The median dose of medication was 652.5 mg. The most symptom improvement with mirtazapine was observed for insomnia (79/91, $p<0.001$), anxiety (48/70, $p<0.001$), anorexia (58/88, $p<0.001$), and depressed mood (70/110, $p<0.001$).
Conclusions: Among our cohort, there was improvement in depressive symptoms, anxiety, anorexia, and insomnia during the course of mirtazapine administration, indicating a potential role for mirtazapine in addressing depression and anxiety in pediatric cancer patients.

NEPHROLOGY & UROLOGY

Altruism at a cost—the reality surrounding living kidney donation

Bernardo Guevara, Dr. Alicia A. McDonough, Professor of Cell and Neurobiology

Per the 2016 United States Renal Data System (USRDS) Annual Data Report, the prevalence of CKD is on a subtle rise (perhaps due to earlier detection or improved outcomes in affected persons) while the prevalence of end-stage renal disease (ESRD) is approaching a plateau phase. The precise reasons for this stabilization may be difficult to pinpoint, but there should be little doubt that the addition of living kidney donation (LKD) to the limited list of potential treatment options for ESRD has contributed. Currently, reputable LKD advocates, such as the National Kidney Foundation (NKF) and the National Institutes of Health (NIH), fully endorse this practice, assuring potential donors of the relatively little short and long-term risks associated with LKD. While their claims attesting to the short-term safety of donation may hold some weight, long-term outcome studies for living donation are still somewhat lacking and warrant more attention. Recent prospective studies are increasingly supporting the idea that living donation does indeed confer significant risks to donors in the long-run. For instance, it has already been established that uninephrectomy results in a reduced eGFR and compensatory structural and physiological changes in the remaining kidney. While such physiological adaptations are anticipated to occur for the sake of homeostasis, other, more concerning, findings demonstrating intrarenal damage (mimicking CKD) as well as cardiovascular remodeling have been discovered. This opinion piece not only aims to shed light on such findings to better-guide informed decisions, but also aims to provide a unique perspective on the complicated and worrisome process of living kidney donation. As such, unlike the literature currently available to existing healthcare practitioners, researchers, and prospective donors, we also plan to share existing donors' take on the current donor process and their personal experiences, in hopes that this information will be beneficial to a vast audience. Lastly, we will conclude with sharing personal recommendations on how to potentially treat and manage existing living kidney donors and ensure that their act of kindness truly don't come at a severe cost to their own well-being.

Sex-specific Regulation of Renal Transporters During Experimental Hypertension

Jessica E. Prescott, Luciana C. Veiras, Donna L. Ralph, Alicia A. McDonough, Ph.D.

Background: Hypertension is a major risk factor for stroke and cardiovascular disease, and is associated with significant morbidity and mortality. In the United States, approximately one third of adults suffer from high blood pressure, and the majority of those affected do not have their condition under control. After age 64, women have a significantly higher prevalence of hypertension than men, and are thus more susceptible to the harmful sequelae of an elevated blood pressure. We aim to define sex-specific molecular mechanisms regulating blood pressure in men vs. women, and further explore the potential for therapies targeting these physiologic differences.

Methods: We determined how renal transporters are regulated in female rats subjected to Angiotensin II infusion, the most well studied model of experimental hypertension. After collecting blood pressure measurements and urine at baseline, osmotic minipumps containing Ang II were implanted subcutaneously. During the 14-day period of Ang II infusion, tail cuff BP was measured daily. After the Ang II challenge, animals were anesthetized for collection of blood and tissues. Our findings are reported using quantitative immunoblotting with specific antibodies.

Results: We have shown that in female rats, NHE3, NKCC, NKCC-P, and cleaved γ-ENaC are significantly elevated in the setting of Ang II hypertension when compared to normotensive control female rats. Female rats had a mean increase in systolic BP of 82.8 mmHg in response to Ang II hypertension.

Summary: Few studies have addressed sex-specific differences in renal transporter regulation in the setting of hypertension, and females have been chronically underrepresented in many areas of biomedical research. This study aims to not only reduce this disparity, but also suggest specific renal

targets for therapeutic intervention in the management of hypertension in females.

Sodium Intake and Serum Sodium

Matthew McCarron, Niels Graudal M.D.

Background/ Purpose/ Goal/ Hypothesis: Sodium restriction remains a standard goal for both national nutrition policy and the treatment of many diseases. It has been previously proposed that sodium intake should not affect serum sodium levels, but not thoroughly studied. With evidence that low serum sodium is correlated with increased mortality, both in the hospital and outside, we sought to investigate the relation of sodium intake with serum sodium. With recent evidence suggesting a J-shaped relation between sodium intake and all-cause mortality, it seemed plausible
Methods: Studies were selected for this meta-analysis based on database searches using the following combinations of search terms: 1) salt or sodium, 2) restriction or dietary, 3) blood pressure or hypertension, 4) randomized or random. We combined 1, 2, 3 and 4 and found 291 references. Of these 166 met the inclusion criteria.
Results: Early data analysis shows a statistically significant 1.7 mmol decrease in serum sodium when comparing between “high” and “low” sodium diets.
Summary/ Conclusion: This study suggests that there is a direct correlation between sodium intake and serum sodium. Further studies need to focus on specifically at risk populations, patients on diuretics and the elderly who already possess few subcutaneous reserves of sodium. Serum sodium may be more affected by intake in these populations.

Contrast-enhanced ultrasonography: a novel imaging modality for liposarcoma

Aurash Naser-Tavakolian, Mittul Gulati, Vinay Duddalwar, Anne Schuckman, Siamak Daneshmand, Shefali Chopra, Manju Aron, Hooman Djaladat

Background: Liposarcoma (LS) is the most common scrotal malignancy and is rare relative to paratesticular lipoma (PL). Scrotal masses are initially imaged by ultrasound (US) where the diagnosis of LS over PL is favored by avid vascular flow within the tumor. Contrast-enhanced ultrasound (CEUS) is a novel imaging modality that visualizes vascular flow in greater detail than US by using a microbubble contrast agent with minimal side effects. CEUS is more accurate than US in identifying solid organ malignancies and it avoids the risk of CT-associated iodine contrast toxicity. This study discusses the diagnostic findings of US and CEUS imaging of PL and LS.
Methods: US findings in a series of extratesticular neoplasms (3 LSs, 2 PLs) between 2009 and 2016 are described. CEUS, plus quantitative analysis (QA), was used in a case with two neoplasms: a spermatic cord well-differentiated liposarcoma (WDLS) and a retroperitoneal dedifferentiated liposarcoma (DDLS).
Results: US visualized the well-differentiated fat and aggressive dedifferentiated components of the LSs. All three LSs had hypoechoic and heterogeneous components by US with avid vascular flow. PLs had either minimal flow or were avascular on US. CEUS of the spermatic cord WDLS showed peripheral enhancement with central necrosis. QA of enhancing tumor of the WDLS including a time-intensity curve demonstrated shorter time to peak (29.14 sec vs. 42.77 sec), higher peak intensity (7.46 dB vs. 4.09 dB), and rapid washout relative to normal adjacent inguinal tissue. CEUS of the retroperitoneal DDLS showed heterogeneous enhancement with scattered necrosis. The time-intensity curve of enhancing tumor of the DDLS showed shorter time to peak (31.65 sec vs. 48.41 sec), higher peak intensity (23.65 dB vs. 5.52 dB), and rapid washout relative to normal adjacent skeletal muscle.
Conclusion: Liposarcoma is distinguishable over paratesticular lipoma on ultrasound due to avid vascular flow. Contrast-enhanced ultrasound and subsequent quantitative analysis may be of diagnostic value in grading liposarcoma.

Changes in Cardiac Output with Volume Removal in Critically Ill Patients Requiring Hemodialysis

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Introduction: Patients with intravascular volume depletion increase cardiac output (CO) with volume administration. In two studies, patients with intravascular volume overload increased CO after ultrafiltration (UF) (1, 2). In another study, end stage renal disease patients without volume overload decreased CO 20-30% with ultrafiltration (3). We postulate critically ill patients with intravascular volume overload should improve CO with UF, assuming excess volume is not removed. To test this hypothesis, we assessed CO changes in critically ill patients undergoing hemodialysis (HD) with UF to remove volume. We predict patients who achieved >500 mL of UF without transient hypotension may increase CO.
Methods: In a retrospective study, of 267 ICU patients with renal failure in 658 encounters, a subset of 116 patients in 254 encounters had HD, of which 12 patients in 39 encounters had CO data recorded before and after UF.
Results: CO increased >10% in 12 encounters of which 2 developed transient hypotension. CO decreased >10% in 7 encounters of which 4 developed transient hypotension (Chi squared=3.35, p=0.067). There was no relationship between change in CO and pressor utilization (Chi squared=1.03, p=0.311) or between UF volume and change in CO.
Summary: CO tended to increase more frequently with HD/UF in encounters that did not develop hypotension but decreased more frequently with development of transient hypotension.
Limitations:
1) Retrospective study 2) Sample size too small to assess significance
Conclusion:
A larger population size is needed to assess our hypothesis.

THE EFFECT OF CHRONIC NARCOTIC USE ON RECOVERY FOLLOWING RADICAL CYSTECTOMY WITH ENHANCED RECOVERY PROTOCOL

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Introduction and Objective: Previous research has shown that enhanced recovery after surgery (ERAS) protocol following radical cystectomy with a focus on less narcotic use postoperatively is associated with improved recovery and decreased hospital stay. However, the effect of this protocol in the subset of patients who have already been on narcotics preoperatively is unknown. We reviewed patients with chronic narcotic use who underwent radical cystectomy with enhanced recovery protocol to evaluate their postoperative recovery in terms of pain, GI function and hospital stay.
Methods: Using our IRB approved bladder cancer database, we retrospectively reviewed the prospectively-maintained dataset of 294 patients who underwent open radical cystectomy with ERAS protocol for urothelial bladder carcinoma between 5/2012 and 12/2015. The protocol mainly includes no bowel preparation or NGT, early feeding, predominantly non-narcotic pain management and μ-opioid antagonists. Opioid use and pain scores (visual analog scale) were analyzed and compared up to post-operative day 3. All routes of opioid use were recorded and converted to the morphine equivalent dose (MED). Post-operative records were also reviewed for length of stay (LOS), 30-day GI complications and readmissions.

Results: 44 patients with preoperative chronic (mean >30 days) narcotic use were identified and matched (based on age, sex, BMI, CCI, pathologic stage, and diversion type) with 88 patients without preoperative narcotic use (table 1). Patients with previous narcotic use reported higher pain score (4 vs. 3.1, p=0.007) and used significantly more opioids (13.3 MED vs. 8.6, p=0.003) following surgery; however, there was no observed difference in median LOS (4 vs. 4, p=0.8), 30-day GI complications (20.4% vs. 20.4%, p=1.0) or 30-day readmission rate (20.4% vs. 9%, p=0.09).
Conclusion: Patients with chronic narcotic use might experience more pain and opioid use early after radical cystectomy with enhanced recovery protocol. There was, however, no observed difference in hospital stay, early GI complications or readmission rate.

Table 1. Demographic and analgesic data of 132 pts underwent radical cystectomy with enhanced recovery protocol

	Chronic Narcotics	Control	P
No. pts	44	88	
No. Female	7	14	1.0
Mean age	69.4	70	0.7
BMI	27.1	27.3	0.7
CCI			0.5
0	16	33	
1	14	21	
=>2	14	34	
Pathological stage			
CIS	12	34	0.2
Organ confined (< T3)	35	70	1
Extravesical (>T2)	5	10	1
LN +	4	8	1
Diversion Type			
Orthotopic	29	58	1.0
Heterotopic	15	30	

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NEUROSCIENCE & NEUROLOGY

Mindfulness Meditation Effects on Spasticity and Quality of Life in Stroke Survivors

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Purpose: Roughly 30% of stroke survivors experience spasticity, a velocity dependent increase in stretch reflexes. Stress and anxiety are thought to increase spasticity. Mindfulness meditation has been shown to reduce stress and anxiety. Here, we explored whether 2 weeks of daily mindfulness meditation could reduce both stress and spasticity.

Methods: Ten chronic stroke patients with motor deficits were recruited. Participants came to the lab for two visits. On the first visit, participants were introduced to mindfulness meditation. Baseline measurements of spasticity, stress, and quality of life (QoL) were taken (Day1-Pre; see Table 1 for all measures). Then, they listened to a 39-minute guided mindfulness meditation and repeated spasticity measures (Day1-Post). Every day for the next 2 weeks, they listened to a short guided-meditation at home. They then returned to the lab for a second visit (Day 15), where the same procedures were followed as in the first visit (Day15-Pre, Day15-Post). Paired t-tests were used to determine if there were differences in outcomes after 2 weeks.

Results: We found significant improvements in spasticity in both the bicep and wrist at the end of the study (see Table 2). However, there were no within session spasticity changes (pre vs post on same day). In addition, measures of Energy, Personality, and Work/Productivity (SSQoL subscores) significantly improved after training. There were no significant changes in any of the other measures.

Conclusion: This pilot study suggests that 2 weeks of short guided mindfulness meditation can significantly improve some aspects of stress and spasticity. Future research is needed to explore this effect in a larger sample with a control group, and to better understand the mechanisms behind this effect.

Measure	*Day1-Pre*	*Day1-Post*	*Day15-Pre*	*Day15-Post*
Questionnaires: Stroke Survivor Quality of Life (SSQoL), Hospital Anxiety and Depression Scale (HADS), Freiburg Mindfulness Inventory, and Multidimensional Locus of Health (MLH)	x		x	
Self-reported spasticity, anxiety, and tone (scale 0-10)	x	x	x	x
Fugl-Meyer Upper Extremity (FMUE)	x		x	
Modified Ashworth Scale (MAS) – bicep and wrist	x	x	x	x

Table 1. Timing of measures, indicated by "x."

Measure	*Day1-Pre*	*Day15-Pre vs Day1-Pre*	*T (df)*	*P*	*Day15-Post vs Day1-Pre*	*T (df)*	*P*
MAS – Bicep	1.50 ± 1.56	0.95 ± 0.58	2.5 (9)	0.023	0.95 ± 0.58	2.5 (9)	0.023
MAS – Wrist	1.45 ± 1.41	0.95 ± 1.36	2.7 (9)	0.023	0.85 ± 1.44	2.9 (9)	0.018
SSQoL – Energy	9.22 ± 10.19	12.22 ± 7.44	2.7 (8)	0.025		n/a	
SSQoL – personality	9.50 ± 7.17	11.70 ± 7.34	2.7 (9)	0.026		n/a	
SSQoL – Work/Productivity	11.00 ± 10.67	12.1 ± 7.4	2.5 (9)	0.032		n/a	

Table 2: Significant changes ($p<0.05$) following meditation training. Paired t-tests are shown with t statistic (degrees of freedom) and p-value.

Cognition, Neuropsychiatric Symptoms and Everyday Functioning in Latino Older Adults

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Objective: The purpose of this study was to examine neuropsychiatric symptoms (NPS) and activities of daily living (ADLs) in elderly Latinos with and without dementia. We also evaluated relationships between NPS, ADLs and executive function.

Participants and Methods: 560 elderly, community-dwelling non-Latino whites (n = 423) and Latinos (n = 137) completed the Neuropsychiatric Inventory–Questionnaire (NPI-Q) and Functional Activities Questionnaire (FAQ) with an informant. A subset of participants (n = 55) completed the Trail-Making-Test B (TMT-B), a measure of executive function. Chi-square, ANCOVA with Bonferroni correction, and partial correlation were used to evaluate relationships between these measures in Latinos and non-Latino whites with normal cognition, mild cognitive impairment, and dementia.

Results: Latinos were reported to have a significantly higher frequency of NPS compared to non-Latino whites, with increased frequency in 6 and 3 out of 12 NPS within the normal cognition and dementia diagnostic Latino groups respectively. Latinos with normal cognition had poorer ADLs than non-Latinos, with increased dependence in doing taxes and paying bills. There was no significant difference in TMT-B completion time between ethnic groups and no correlation between NPI-Q total score and TMT-B completion time. There was a strong, positive correlation between FAQ total scores and TMT-B completion time for Latinos ($r = 0.68$, $p < 0.05$), and a moderate correlation for non-Latino whites ($r = 0.46$, $p < 0.01$).

Conclusions: In this study, we found that Latinos were reported to have more neuropsychiatric symptoms than non-Latino whites in the normal cognition and dementia diagnostic groups. We found an increased difficulty in performing ADLs in Latinos and a stronger relationship between difficulty performing ADLs and poor executive function in Latinos when compared to non-Latino whites. These findings suggest that cultural differences may play a role in behavioral symptoms and neuropsychological test performance and should be considered in the assessment of dementia.

Gastrointestinal Medical Comorbidity and Autism Spectrum Disorder

Michelle Connor and Pat Levitt

Background: Approximately 40% of children with Autism Spectrum Disorder (ASD) have gastrointestinal disturbances (GID), such as functional constipation (FC). This co-occurrence is well known, but there is limited research to investigate the relationship between disorders when they occur in the same child. This study aims to analyze this relationship by monitoring behavioral outcomes in ASD and symptom improvement in FC when treatment is administered by a gastroenterologist.

An objective biomarker for oxidative stress (F2t-IsoProstanes) that has been shown to be elevated in ASD and FC is also being measured. While F2-isoprostanes are a reliable measure in a variety of conditions in adults, there has been far less application in pediatric populations, with little data regarding reference ranges and no publications on possible ethnicity differences.

Methods: Children diagnosed with ASD and FC will undergo treatment for FC, and the effect on behavior and pathophysiology will be assessed. Time-matched, longitudinal assessment of social communication, behavior, FC, and oxidative stress will occur at baseline, 3 month, 6 month, and one year follow up visits. ASD behavior will be quantified using several psychologist and parent administered validated

questionnaires, with the primary outcome measure being the Social Responsiveness Scale (SRS). Changes in GID will be assessed via a parent-administered questionnaire on pediatric GI symptoms (QPGS) and clinical assessment.
Results and Conclusions: Because almost all families are self-identified Hispanic, the study could contribute to the growing literature on isoprostane levels as a measure of oxidative stress in an additional ethnic group. The relationship between F2-isoprostane levels, behavioral and GI symptoms will also be determined. This will build a clinical understanding of the impact of medical treatment on improvements in ASD behavior and oxidative stress, to more completely characterize the relationship between ASD and FC.

Nucleoside Treatment for TK2 Deficiency.

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Background: Thymidine kinase 2 (TK2), a critical enzyme in the mitochondrial pyrimidine salvage pathway, is essential for mitochondrial DNA (mtDNA) maintenance. Mutations in the nuclear gene *TK2* cause TK2 deficiency, which manifests predominantly in children as myopathy with mtDNA depletion. Molecular bypass therapy with the TK2 products, dCMP and dTMP, prolongs the lifespan of Tk2-deficient ($Tk2^{-/-}$) mice by 2-3 fold. Because we observed rapid catabolism of the deoxynucleoside monophosphates to deoxythymidine (dT) and deoxycytidine (dC), we hypothesized that deoxynucleosides might be the major active agents.
Methods: Tk2 H126N ($Tk2^{-/-}$) knock-in mice received 520mg/kg/day of oral dC+dT. Body weight was assessed daily, since an inability to gain weight was the first sign of disease in this mouse model. We performed a survival curve. In addition, brain, heart, liver, kidney, intestine and muscle from animals sacrificed at postnatal day 13 (P13) or 29 (P29) were analyzed for mtDNA depletion, as well as Respiratory Chain Enzyme (RCE) levels and activities in brain. Data in columns were expressed as the mean ± SD and analyzed with Mann-Whitney test. Survival curves were analyzed with a Mantel-Cox test. A $p<0.05$ was considered statistically significant.
Results: We observed that dC+dT delayed disease onset and prolonged lifespan of Tk2-deficient mice by 2-3 fold, similarly as 400mg/kg/day of dCMP+dTMP. It also restored mtDNA copy number at P13, although only partially in brain. dC+dT therapy rescued RCE activities and levels at P13, while deficiencies of complex I activity and lower levels of the RCE complexes were evident at P29.
Conclusion: Our results reveal a novel nucleoside therapy for TK2 deficiency. Oral administration of dC+dT demonstrated benefits previously observed with dCMP+dTMP treatment and appears to be well-tolerated and easily translated to patients indicating that this substrate enhancement therapy may retard progression of this devastating disease in patients.
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High Rate of Subject Retention into Prehospital Stroke Research with Telephone-Based Physician-Investigator Driven Enrollment

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Background: The validity of the data produced by a clinical trial is critically dependent upon obtaining informed consent. The process of obtaining informed consent can be difficult in an acute stroke setting when consent must be granted by the investigative physician over the phone while the clinical trial is

started by EMS personnel on the ground. We aim to investigate a parent study (FAST-MAG Trial) that enrolled patients under federal regulations authorizing exception from informed consent (EFIC) for research performed in emergency circumstances when a stroke rendered the patient incapable of providing consent, by a legally authorized representative, and self enrollment. This study examines the outcomes of enrolling patients via EFIC, a legally authorized representative, or self enrollment and the effect it had on patient recruitment and retention.
Methods: Retention is analyzed in preexisting data from the FAST-MAG clinical trial of 1,700 patients; 1,017 self enrolled patients, 21 enrolled by via EFIC, and 662 enrolled by legally authorized representatives are compared in recruitment and retention in analysis of preexisting data from the FAST-MAG clinical trial of 1700 patients.
Results: In this study 21 patients were enrolled under EFIC by individuals who knew the patient well, 662 patients were enrolled by legally authorized representatives present at the time of the incident, and 1,017 patients were self enrolled. Of 1,700 patients only 22 (1.3%) withdrew from the study before completion. From those enrolled via the EFIC, none withdrew. Patients enrolled by an on scene legally authorized representative (LAR) had 8 withdraw and patients who self enrolled had 14 withdraw.
Conclusion: Patients enrolled via the exception from informed consent (EFIC) were not correlated to higher rates of withdrawal from when compared to those self enrolled or patients enrolled by legally authorized representatives (LAR). Patients enrolled by EFIC and by a LAR had lower rates of study withdrawal when compared to the self enrolled group, but higher rates of death during the study. The lower rates of withdrawal in these two groups, EFIC and LAR, could relate to the severity of stroke in these groups.

Exercise Motivation in Patients with Parkinson's Disease

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Purpose: Despite the benefits of exercise in improving motor function and quality of life in patients with Parkinson's Disease (PD), little is known about motivation, self-efficacy to overcome barriers, and perceptions towards exercise in persons with PD. This study seeks to assess various aspects of motivation to exercise in patients with PD within the theoretical frameworks of Self Determination Theory and Social Cognitive Theory and determine what relationships these aspects of motivation have with one another and physical activity.
Methods: A number of surveys will be administered to individuals with PD that have been recruited from a number of clinics and screened for inclusion/exclusion criteria. These include the Physical Activity Scale for the Elderly (PASE), the Behavioral Regulations in Exercise Questionnaire-3 (BREQ-3), the Psychological Needs Satisfaction in Exercise Scale (PNSE), the Multidimensional Self-Efficacy for Exercise Scale (MSES), the Multidimensional Outcome Expectations for Exercise Scale (MOEES), and the Barriers Subscale of Exercise Benefits/Barriers Scale. Relationships between these measures will be examined using structural equation modeling (SEM).
Results: We expect that current level of physical activity as assessed by the PASE will be positively correlated with MSES score, BREQ-3 score, and MOEES score and negatively correlated with the barriers subscale. Additionally, we expect the PNSE score to be positively correlated with the index score on BREQ-3.
Conclusions: These findings will help establish insights than will impact the way clinicians deliver information regarding exercise benefits as well as designing exercise interventions for individuals with PD.

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Machine Learning Model for Seizure Prediction in Epilepsy

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Background: Approximately 1/3 of people with epilepsy do not have an effective treatment to control their seizures. Machine learning (ML) models have become increasingly efficacious at classifying seizure status using scalp electroencephalography (EEG) recordings, despite utilizing limited data sets. Electrocorticography (ECoG), records electrical signals with superior spatial resolution and a reduced signal-to-noise ratio. Using long-term ECoG recordings to train established ML modules will produce a program capable of accurately predicting whether a patient is likely to have a seizure in the near future, specifically 4 hours prior to a seizure.
Methods: Preictal and interictal ECoG recordings were subdivided into training and testing data. Signal post-processing was performed using scikit-learn, an open access machine learning module written in Python. Feature extraction utilized implementation of ordinary least squares linear regression, linear support vector machine (SVM) and K-Nearest-Neighbors (KNN) modules, which were further enhanced via the gradient boosted module XGBoost.
Results: Patient ECoG data is being formatted into training and testing data sets. A combination of the ML models listed above produced a receiver operating characteristic curve area (a measure of specificity and sensitivity) of 0.807 for a smaller dataset. We expect that this value will improve with analysis of longer ECoG recordings.
Conclusion: A program capable of predicting an imminent seizure could provide advanced warning to an epileptic patient, allowing them to take precautionary measures. It could also allow the administration of an anti-seizure medication, or could also be used in conjunction with recently developed responsive neurostimulation units to further reduce seizure frequency.

Atypical pituitary adenomas: a systematic literature review and comment on standardization of diagnosis

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Context: Atypical pituitary adenomas (APAs) are a subset of pituitary adenomas (PA) characterized by the WHO to have higher risk histopathological features than typical PAs. To date, no systematic meta-analysis pertaining to the prevalence and clinical characteristics of APAs has been published.
Objective: We reviewed the literature to describe the prevalence of APAs and associated clinical courses. We then comment on potential issues in standardized application of WHO criteria.
Methods: A systematic review identified studies reporting prevalence and clinical characteristics of APA according to PRISMA guidelines. Initial keyword search produced 355 abstracts, of which 193 abstracts met pre-specified inclusion and exclusion criteria. After full review, seven studies were included for analysis, containing data on 1,264 patients. Five studies reporting histopathological details were included in the meta-analysis. Two independent reviewers determined the quality of studies and extracted data regarding prevalence, outcome, clinical, histopathological, and imaging characteristics.
Results: Of the 1,264 included patients, 173 patients (5.3%) met criteria for APA (range: 3-15%). The average MIB-1/Ki-67 LI was 5.34% (mean range: 3-7%, overall range: 3-25%). Invasion on neuroimaging was reported in 35% of APA patients. Nonfunctional PAs were the most common pathological subtype (45%), followed by GH-secreting PAs (20%) and prolactinomas (18%). Recurrence/progression occurred in 19% of APA patients over follow-up (range 37-75 months). Only 2/8 studies utilized identical grading criteria, demonstrating a potential lack of standardization.
Conclusions: The prevalence of APAs among surgically-treated PAs is 5.3%. The 2004 WHO guidelines for APA diagnosis provide a starting point to assess the prevalence and treatment response in APA patients.

Based on the insights obtained during the past decade of research, reevaluation and refinement for more consistent application of the 2004 WHO diagnostic criteria may improve future understanding of this relatively heterogeneous disease entity.

Outcomes and Associated Prognostic Factors after Surgical Intervention for Traumatic Intracranial Hemorrhage

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Purpose: Traumatic brain injury (TBI) frequently leads to significant long-term disability and thus has a dramatic social and economic impact on our society. Knowledge of prognostic factors for favorable outcome following surgical intervention is important for identification of patients who would benefit from operative treatment.
Methods: A retrospective chart review of 181 TBI patients who underwent craniotomies or craniectomies for evacuation of subdural, epidural, or intraparenchymal hematoma at LAC+USC between 2008-2010 was conducted. Outcomes were assessed using both the Glasgow Outcome Scale (GOS) and modified Rankin Scale (mRS) to allow for objective assessment of patient recovery and degree of disability or dependence in daily activities. A good outcome was defined for the purposes of this study as a GOS 4-5 or a mRS 0-3, approximately defined as moderate disability or better. Outcomes were examined in relation to patient demographic and perioperative clinical characteristics. Continuous variables were compared using a Wilcoxon Rank-Sum Test given non-normality of data, while dichotomous variables were compared using a chi-square test.
Results: The mean patient age was 43.1 years (range 1-95 years). Most patients (81.8%) were male. The most common type of hemorrhage was subdural hematoma, present in 74.0% of patients. At discharge, 51 (28.2%) and 73 (40.3%) patients achieved a good outcome using GOS and mRS scales, respectively. Independent predictors of favorable outcome included younger age, higher Glasgow Coma Scale (GCS) score on admission, absence of preoperative coagulopathies, absence of fever, shorter operative duration, and shorter length of hospital stay.
Conclusions: The factors investigated in this study support some of the current prognostic models regarding surgical treatment of post-traumatic intracranial hematomas. Identification of factors associated with favorable outcomes will aid in operative decisions as well as discussions with families regarding prognosis.

Nano-particulate Matter Exposure Causes Increased Selective Recognition Impairment in Adult Mice with Chronic Cerebral Hypoperfusion

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Goal: Air pollution exposure and chronic cerebral hypoperfusion (CCH) have been shown to have a relationship with decreases in neurocognition in epidemiologic and clinical studies. Previous studies have shown memory impairment in mice with CCH, however the effects on memory of urban nano-particulate matter (nPM) in mice with CCH has not been explored. This study attempts to show the effects of exposure nPM and CCH on recognition memory in a murine model.
Methods: Chronic cerebral hypoperfusion was induced secondary to bilateral common carotid artery stenosis (BCAS) in 24 mice. The nPM was collected using high-volume ultrafine particle samplers near the CA-110 Freeway in Los Angeles. Nine week old wild type C57BL/6J mice were separated into nPM

with no BCAS (n=12), filtered air with no BCAS (n=12), nPM with BCAS (n=12) and filtered air with BCAS (n=12) cohorts. Memory was assessed by novel object recognition (NOR) test and 8-arm radial maze testing. The mice were exposed to filtered air or nPM for 5 hours a day, 3 days a week over the course of 10 weeks.
Results: In the 8-arm radial maze test, there was no significant difference in revisiting errors (p=.296) or number of novel entries (p=.418) between the filtered air and nPM with no BCAS cohorts. A significant difference in revisiting errors (p=.018) and novel entries (p=.02) was found between filtered air and nPM with BCAS cohorts. However, NOR test results demonstrated no significant difference in working memory (p=.129) and reference memory (p=.735) in the filtered air and nPM with no BCAS cohorts or in working memory (p=.922) and reference memory (p=.735) in the filtered air cohort and nPM with BCAS cohorts.
Conclusion: Although there was no significant difference in working or reference memory seen in nPM and filtered air without BCAS cohorts, the significant difference seen between nPM and filtered air with BCAS cohorts points to the possibility that air pollution can exacerbate memory changes in populations with cerebrovascular comorbidities.

Transsphenoidal resection of nonfunctioning pituitary adenomas: A 411 patient single center series

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Background: The rapid evolution of surgical approaches to pituitary tumors has dramatically decreased complications rates. The most common method of resection is via a transsphenoidal approach, which utilizes a small opening to reach most pituitary tumors, including non-functional pituitary adenomas (NFPA). This study reviews a large single-center series of surgically treated NFPA, analyzing all factors in comprehensive tumor management. The aim was to review patterns in all phases of treatment to optimize care and minimize complications.
Methods: We performed a retrospective series analysis of 411 patients requiring transsphenoidal resection of NFPA at Keck Hospital from 1992-2015. Inclusion criteria were 18+ years of age, transsphenoidal procedure for an NFPA, and ≥3 months of follow-up. Patient demographics, preoperative symptoms, tumor imaging and immunostaining, extent of resection, intraoperative CSF leak, follow-up time, recurrence, progression, and post-operative complications were all reviewed.
Results: The most common presenting symptoms included vision loss (55.0%) and headache (37.2%). Hypothyroidism (20.4%) was the most frequent preoperative pituitary disruption. Post-surgical complications were highlighted by hyponatremia and transient diabetes insipidus (5.84% each). A significant correlation was noted between gross total resection (GTR) and lack of cavernous sinus invasion ($p<0.0001$). 67.2% of surgeries resulted in GTR and 51.5% of cases experienced an intraoperative CSF leak. The mean follow-up time was 51.0±50.8 months. Recurrence of the NFPA occurred in 6.81% of patients with a mean time to recurrence of 62.5±43.4 months and progression occurred in 10.71% with a mean time of 47.7±48.5 months before progression. There were no deaths.
Conclusions: This study supports the established notion that transsphenoidal resection is the safest and most effective method of NFPA management. The consolidation of data for the same patients at all stages of the treatment process elucidates trends that could be useful in diagnosis and limiting complications.

Clinical validation of a proposed intraoperative consistency grading system for meningiomas

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Goal: The present study aims to clinically validate a previously proposed intraoperative grading system to objectively assess consistency of meningiomas and relate consistency scores to extent of tumor resectability, a measure of surgical outcome.
Methods: The proposed grading system was prospectively assessed in 124 consecutive patients undergoing craniotomy for meningioma resection by multiple neurosurgeons at LAC+USC Medical Center and Keck Hospital. Grading scores were subjected to chi-square analysis for independence with extent of tumor resection, categorized by gross total resection (GTR) or subtotal resection (STR), which was determined by postoperative MRI findings.
Results: 124 patients were included in the analysis. The distribution of overall tumor consistency scores was as follows: Grade 1, 2.4%; Grade 2, 12.1%; Grade 3, 45.2%, Grade 4, 31.5%, Grade 5, 8.9%. For statistical analysis, individual grades were grouped into Grade 1 and 2, Grade 3, and Grade 4 and 5, the distribution of which was as follows: 14.5%, 45.2%, and 40.3%, respectively. The proportion of STR for each category was as follows: Grade 1 and 2, 27.8%; Grade 3, 32.1%; Grade 4 and 5, 54.1%. A chi-square test of independence was performed to examine the relation between consistency scores and extent of resection. The relation between these variables was significant, X^2 (5, N = 124) = 6.62, $p<0.05$.
Conclusions: These data demonstrate evidence for the clinical validity of the proposed intraoperative grading scale with respect to extent of tumor resectability, a measure of surgical outcome in the resection of meningiomas. Future studies will relate intraoperative consistency scores to preoperative MRI studies in order to predict tumor consistency and, thus, extent of resectability during the preoperative planning stage.

Physician Comfort with Deep Brain Stimulation for Parkinson's Disease

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Background: Physicians treating patients with Parkinson's Disease (PD) tend to recommend Deep Brain Stimulation surgery (DBS) after traditional drug treatments are no longer effective for a patient. Recent literature suggests improved patient outcomes if DBS is done at earlier stages of the disease.
Goal: To examine trends in DBS intervention over time that may be reflective of attitudes towards conducting surgery to treat PD.
Methods: Using the Nationwide Inpatient Sample database (NIS) from 2000 to 2011, we will examine the trends in patient age over time of PD patients receiving DBS to observe whether physicians are performing DBS for PD patients at younger ages. We will also examine the percentage of PD patients receiving DBS over time to observe whether physicians are performing DBS more often for PD patients. ICD-9 codes used for NIS: Primary Idiopathic PD diagnosis: 332.0 and DBS procedure: 02.93.
Results and Discussion: Trends in age were insignificant, but may have been confounded by a concurrent increase in the age of patients diagnosed with PD. Elderly patients may be receiving more effective screening for PD, which could lead to an inflation of older patients with PD who may receive DBS. This could mask an otherwise real decrease in age of DBS intervention among PD patients, within the timeframe. Data should be compared with trends in age of PD diagnoses. Additionally, the percentage of PD patients receiving DBS increased significantly during the timeframe, supporting the hypothesis that surgeons are becoming more comfortable suggesting DBS for patients with PD than before.
Conclusion: Our results suggest that physician attiudes may have become more accepting of DBS as a therapy for PD patients, which may lead to better population-level outcomes for patients with PD.

Surgical Outcomes & Complications of Endoscopic or Microscopic Transsphenoidal Resection of Prolactinomas in a Pituitary Center

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Introduction: Surgical resection (TSSR) of prolactin-secreting adenomas is usually reserved for those who are intolerant or resistant to dopamine agonist (DA) therapy. Data regarding predictors of persistent disease after surgical resection is sparse.

Methods: Retrospective chart review of patients undergoing TSSR for prolactinoma at Keck Medical Center was conducted from 1995 to 2016. Data was retrieved from the USC Pituitary Tumor Registry, which includes 1700 of patients. Data was verified by chart analysis. All patients received a pre-operative workup and MR imaging to determine the size of adenoma and extent of invasion. Diagnosis of prolactinoma was based on clinical presentation and confirmed by histopathology of surgical specimens. Hormonal remission was defined as normalization of prolactin levels. Patients were grouped by hormonal remission vs. non-remission and analyzed by two-tailed Fisher's exact test or an unpaired t-test ($p<0.05$).

Results: 47 cases were included. The majority of cases was female (74.5%). Average age at the time of surgery was 36.5 years. Invasive tumors were found in 74.5% of patients. Gross total resection was achieved in 66%. Hormonal remission was achieved in 51%. Of those that achieved hormonal remission; 15 did so without additional medications and 9 with post-surgical DA therapy. Hormonal non-remission group (n=23) had significantly higher preoperative prolactin levels than the hormonal remission group (n=24) (mean=619.2ng/ml vs 230.8 ng/ml, p=0.034). Tumor invasion was associated with post-operative hormonal non-remission (p=0.017). Gender, age, tumor diameter, and gross total resection were not significant predictors of hormonal remission.

Conclusion: Preoperative prolactin levels and presence of invasion may predict disease persistence after resection. Although prolactinomas are more common in females, gender did not appear to not play a role in predicting hormonal remission.

ONCOLOGY

Response to Immunotherapy in Refractory, Relapsed and Progressive Neuroblastoma

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Background: Neuroblastoma (NB) is a pediatric neuroendocrine tumor. Despite treatment, survival rates remain near 50%. GD2, a disialoganglioside, is expressed on NB cells but not normal human tissues. Dinutuximab is a chimeric anti-GD2 antibody. The clinical trial ANBL0032 evaluated the effects of dinutuximab combined with granulocyte macrophage stimulating factor (GM-CSF) alternating with dinutuximab and interleukin 2 (IL-2) as therapy for NB post-induction and consolidation chemotherapies. The clinical trial ANBL1221 assessed combination and simultaneous infusion of chemotherapy with dinutuximab followed by GM-CSF in children with relapsed, refractory or progressive NB. The role of immune effector cells is critical in the response to immunotherapy. The general health of the hematopoietic system and percent of different white blood cells in the patient's peripheral blood before and after courses of immunotherapy may correlate with their response to treatment. In addition, immediate changes in the profile of immune cell subset post cytotoxic chemotherapy may predict response to therapy.
Method: A chart review of 10 patients at Children's Hospital Los Angeles who have been treated under ANBL0032, ANBL1121, or were treated per these protocols was carried out. Patients' complete and differential blood counts, before and after each course of immunotherapy; other risk factors and tumor biological features, such as the amplification of the MYCN oncogene; the patients' clinical responses to therapy and their MIBG Curie scores were recorded.
Results: Results are pending. Response to immunotherapy, assessed via MIBG Curie scores as well as progression or remission of disease while on therapy, may be associated with the response of certain immune cell subsets post-therapy.
Conclusion: This study may help elucidate why some patients respond to therapy with dinutuximab and others fail to do so. This may help better personalize therapy for neuroblastoma patients in the future.

Patterns of failure in head and neck cancer reirradiation treatment

Christina Phuong, Sukhjeet Batth, Nicholas Trakul

Background: Reirradiation (re-RT) has been shown to improve disease control in head and neck cancers compared to chemotherapy alone at unresectable sites; however, related short and long term toxicities can be severe[1]. Prior research has investigated the response rate of re-RT for recurrent head and neck cancer and prognostic factors for overall survival[2,3]. These studies focused largely on disease control resulting from re-RT in comparison to surgery or chemotherapeutic treatment. Here, we characterize toxicities and treatment outcomes in recurrent head and neck cancer patients requiring re-RT. We believe patterns of failure can be predicted.
Methods: Retrospective oncologic outcomes and toxicity data from reirradiated head and neck cancer patients at LAC+USC Medical Center or Norris Comprehensive Cancer Center from 2009-2016 were collected from the ARIA database. Sites included were oropharynx (n=1), lip and oral cavity (n=6), salivary gland (n=3), nasopharynx (n=4), larynx (n=2), hypopharynx (n=3), neck/infratemporal fossa (n=1), and the parotid region (unknown primary, n=1). Common toxicities were scored using Common Terminology Criteria for Adverse Events V4 (CTCAE). Measured outcomes were overall survival, local recurrence, regional recurrence, or distant metastases. KaplanMeier analysis was used to determine survival statistics.
Results: A total of 21 patients fit the criteria for head and neck cancer re-RT. Re-RT followed surgery in 14 (67%) patients, concurrent chemotherapy was administered to 17 (81%) patients, and 10 (48%) patients were treated with all three modalities. Median radiation dose was 66.5Gy. Severe grade 3 or 4

toxicities were reported in 19 (90%) cases. With a median follow up of 20mo, median overall survival time was 17mo. Median locoregional recurrence free and distant metastasis free survival times have not been reached.
Discussion: Preliminary analysis support previous studies that suggest radiation related toxicities can be severe and must be considered.

Natural History of Acute and Subacute Neurotoxicity in 67 Acute Lymphoblastic Leukemia Patients

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Background: Acute lymphoblastic leukemia (ALL) is the most common childhood malignancy. Current chemotherapy regimens cure almost 90% of patients. One of the largest improvements was the recognition that the CNS is a sanctuary site for leukemic blasts; all ALL patients are now given prophylactic CNS therapy to prevent relapse. As a result, 5% of patients experience high-grade neurotoxicity, leading to cerebrovascular accidents, encephalitis, and intractable headaches, among other sequelae.

There are currently no formal standardized guidelines for the management of these syndromes in ALL patients. Though many of these acute and subacute neurotoxicities resolve quickly and spontaneously, their symptomatologies are frightening for families, and may influence providers to alter well-established treatment regimens.

A better understanding of these neurotoxic events may allow providers to more effectively manage them. We report the natural history of 67 patients that experienced some form of neurotoxicity during their treatment for ALL.
Methods: Chart review of all patients age 1-21 diagnosed with ALL at CHLA between 2008 and 2014. Patients that underwent relapse or bone marrow transplant are censored at that time. Neurotoxicities were classified based on the Common Terminology Criteria for Adverse Events version 4 (CTCAE4). Stroke-like syndrome (SLS), posterior reversible encephalopathy syndrome (PRES), isolated seizures, and steroid psychosis cases were examined in more detail.
Results: Of 364 patients included, 67 (18.4%) of patients experienced at least one neurotoxic event of any grade. 21 patients experienced SLS, nine experienced PRES, ten experienced isolated seizures, and eight experienced steroid psychosis.
Conclusion: Neurotoxicity is a relatively common and serious adverse event in the treatment of ALL. Because it is acutely frightening and poorly understood, it may lead to mismanagement of ALL patients.

Older Age and Higher Definitive Stage Associated with Not Receiving Guideline-Recommended Care for Non-Small Cell Lung Cancer

Lindsay Yang, BS, and Alex A. Balekian, MD, MSHS

Goal: To examine compliance with American College of Chest Physicians' stage-specific care guidelines in non-small cell lung cancer (NSCLC) and to identify factors associated with receiving recommended care as part of the National Lung Screening Trial (NLST).
Methods: From NLST data, NSCLC patients who received recommended care were defined as: surgery within 90 days or radiation within 120 days of diagnosis of clinical Stage I; surgery within 90 days and adjuvant chemotherapy within 120 days for Stage II; chemotherapy plus radiation within 120 days for Stage III; and chemotherapy within 90 days without radiation for Stage IV. Covariates included age at diagnosis, sex, race, personal history of chronic obstructive pulmonary disease or coronary artery

disease, and definitive stage. Variables associated with compliance were identified with multivariate logistic regression.
Results: In the NLST, 1803 patients were diagnosed with NSCLC, of whom 1784 had a recorded definitive stage: Stage I (46%), II (8%), III (22%), and IV (25%); 1294 (73%) received recommended care. Unadjusted rates of recommended care were 72%, 92%, 80%, and 61% in Stages I, II, III, and IV, respectively ($p<0.0001$). Unadjusted rates of recommended care also decreased with advanced age [ages 55-59 (76%), 60-64 (75%), 65-69 (70%), 70-74 (66%), $p<0.01$]. After multivariate adjustment, receipt of recommended care was associated with earlier stage: Stage I OR 1.95 (95%CI 1.53-2.49), Stage II OR 8.76 (95%CI 4.59-16.72), Stage III OR 2.88 (95%CI 2.11-3.93) when compared to Stage IV ($p<0.0001$). Conversely, older patients were nearly 30% less likely to receive recommended care [age>66 OR 0.72 (95%CI 0.58-0.89), $p<0.01$] even after controlling for pulmonary and cardiac comorbidities.
Conclusions: In the NLST, roughly three-quarters of NSCLC patients received recommended care. Older patients and those with stage IV were less likely to receive recommended care after adjusting for covariates.

Analysis of Breast Cancer Cases in Mirebalais, Haiti

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Background: Breast cancer survival rates in developing regions have remained low in contrast to increasing survival rates in developed regions. In Mirebalais, Haiti, anecdotal evidence from doctors at Hôpital Universitaire de Mirebalais (HUM) suggest poor cancer grading and late presentation. However, the data infrastructure is currently lacking to support this. The goal of this study is to establish and analyze a breast cancer dataset for HUM in conjunction with Partners In Health and Brigham & Women's Hospital to assess the patient population and typical presentation of breast cancer in Mirebalais, Haiti.
Methods: Pathology reports were compiled for all tissue extractions from clinically suspected breast cancer cases presenting to HUM oncology clinic from Jan. 2013 to Dec. 2015. Over 1000 benign and malignant cases were included. Variables obtained from the pathology reports included: Age, Malignancy Status, Cancer Subtype, Histologic Score, ER/PR/HER2 status when applicable.
Results: Preliminary analysis of the dataset shows a high number of patients presenting with malignancies (58% malignant, 40% benign). Furthermore, the HUM patient population shows markedly later presentation compared to Haitian-born breast cancer patients presenting to SEER hospitals in the US. 67% of HUM patients presented with poorly differentiated breast cancer (compared to 55%), while only 2% of HUM cases presented as well-differentiated (compared to 13%).
Conclusion: To date, research on breast cancer care in Haiti has been nearly non-existent. This project represents the first attempt to cohesively collect and analyze the breast cancer patient population in the Mirebalais region of Haiti. The results illustrate the importance of early detection in the treatment of breast cancer in developing regions. Future studies in Mirebalais should analyze reasons for delayed patient presentation including healthcare infrastructure, social stigma, and economic implications to increase early detection and improve patient outcomes.

OPHTHALMOLOGY

Comparison of Surgical Outcomes of Trabeculectomy, Ahmed Shunt, and Baerveldt Shunt in Uveitic Glaucoma

Audrey Chow, BA, Bruce Burkemper, PhD, MPH, Rohit Varma, MD, MPH, Damien Rodger, MD, PHD, Narsing Rao, MD, Grace Richter, MD, MPH

Purpose: Trabeculectomy (TE), valved Ahmed shunt (AGV), and non-valved Baerveldt shunt (BGI) are surgical interventions used to control glaucoma. We performed a retrospective observational study to compare surgical outcomes among these entities specifically in patients with uveitic glaucoma.
Methods: The records of 147 eyes (17 TE, 22 AGV, 108 BGI) from 147 patients with uveitic glaucoma at the University of Southern California Department of Ophthalmology were reviewed. Preoperative and postoperative intraocular pressure (IOP), medication use, visual acuity, complications, and time to failure were recorded. Similar to the Tube Versus Trabeculectomy and Ahmed Versus Baerveldt studies, failure was defined as postoperative IOP >21mmHg or <5mmHg with supplemental medication, reoperation, or loss of light-perception. Logistic regression, Kruskal-Wallis, Fisher's Exact, Wilcoxon, chi-squared and log-rank tests were used for statistical analysis.
Results: There was no significant difference in baseline demographic or ocular characteristics between groups. Mean IOP, percent IOP reduction, glaucoma medication use, and visual acuity at 6 and 12 months follow-up were similar in all groups. Overall there was a significant difference in postoperative hypotony rate across TE (53%), BGI (24%), and AGV (18%) groups (P=0.027); other complication rates were similar. BGI patients had significantly lower failure rates at 6 months (P=0.0063) and 12 months follow-up (P=0.0015), as well as lower cumulative failure probability compared to TE (P=0.0054) and AGV (P=0.0008) patients. Specifically, BGI patients were 67% less likely than TE patients to fail (odds ratio 0.33, 95% CI 0.091-0.96) and 73% less likely than AGV patients to fail (odds ratio 0.27, 95% CI 0.087-0.85) overall.
Conclusions: While there was no difference in mean IOP reduction between TE, AGV and BGI, there was a lower rate of failure (as defined above) in the BGI group compared to other groups. The AGV group had the lowest, and the TE group had the highest, rate of postoperative hypotony.

Outcomes of Choroidal Melanomas Treated with Eye Physics Iodine 125 Plaques

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Background: The purpose of this study is to review the University of Southern California experience using Eye Physics (EP) plaques and Plaque Simulator (PS) software to treat choroidal melanomas and compare the outcomes with published results of the Collaborative Ocular Melanoma Study (COMS).
Methods: In 2013, Berry et al published results for a retrospective case series of 82 patients treated for medium-sized choroidal melanoma from 1990 through 2010, using iodine 125 plaques and treatment simulation software developed at USC. Currently, further retrospective review is being completed to update the earlier study to include additional follow up and new patients treated through 2015. Primary outcome measures were local tumor control, globe preservation, and metastases. Secondary outcome measures were late radiation adverse effects including postoperative vision changes, optic neuropathy, radiation retinopathy, and cataract.
Results: In the 2013 study with 82 patients, globe preservation was achieved in 80 patients (97.6%). Metastases occurred in 9 patients (11%), retinopathy developed in 31 (38%), optic neuropathy in 12 (14.6%), and cataracts in 26 (31.7%). Currently, data collection and analysis is still in progress to update the study with patient information through 2015. However, on early impression with around 80 patients reviewed, it seems that the outcomes of treatment compare favorably with the results published in 2013. The data is not yet finalized, but so far it appears that 1 patient underwent enucleation following

brachytherapy; there have been 2 confirmed cases of metastases, 11 cases of radiation retinopathy, 5 of optic neuropathy, and 42 for cataracts.
Conclusions: The results of treatment for choroidal melanoma at USC using EP plaques and PS compare favorably with COMS data. This study is expected to further demonstrate that treatment at USC produces excellent tumor control and acceptable rates of ocular adverse effects.

Evaluation of inflammatory marker activity in patients with Sjögren's Syndrome and chronic dry eye

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Background: Current biomarkers used to diagnose primary Sjögren's Syndrome (SS), including anti-Ro/SSA, anti-La/SSB, or rheumatoid factor, are often also present in other systemic autoimmune conditions. Previous studies demonstrate lacrimal Cathepsin S (CTSS) activity levels are elevated in tears of Non Obese Diabetic (NOD) mice (a model for SS), as well as in patient tears. This study was performed to determine if additional tear protein levels were altered and could be used in addition to CTSS.
Objective: To further characterize tear composition of SS patients, four protein markers were measured in human subjects and compared to levels in non-autoimmune chronic dry eye syndrome (DES) patients.
Methods: Tear samples from female SS and DES patients were collected from LAC+USC's Rheumatology clinic and USC Roski Eye Institute's clinic, respectively. Healthy female patient controls were recruited from LAC and USC staff. One tear sample from each eye was collected using an anesthetized Schirmer's test, resulting in two samples per recruited patient. The activity of CTSS and the concentration of secretory IgA (sIgA), lactoferrin (LF), and Cystatin C (Cys C) were measured in proportion to total protein levels. One-way ANOVA and post-hoc analyses were performed to measure each marker's significance in predicting SS.
Results: Analysis of SS tear samples (n= 30), DES (n=16), and healthy controls (n=24) demonstrated a significant difference ($p<.001$) in all protein marker mean values between SS patients and DES or healthy controls. Compared to healthy controls, SS patient mean CTSS was 14.57 fold higher, whereas sIgA, LF and Cys C were 74%, 78%, and 78% decreased, respectively. Against DES patients, SS patient mean CTSS was 4.62 fold higher, while sIgA, LF and Cys C were 80%, 83%, and 65% decreased, respectively.
Conclusion: CTSS activity is elevated in SS patients while sIgA, LF, and Cys C levels are depressed in relation to both healthy patient controls and DES patients.

Analysis of retinal nerve fiber layer microvasculature in non-glaucomatous optic neuropathy using optical coherence tomography angiography (OCTA)

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Purpose: To demonstrate the degree of correlation between retinal microvasculature parameters and retinal nerve fiber layer (RNFL) thickness in the peripapillary region in non-glaucomatous optic neuropathy (NGON), using optical coherence tomography angiography (OCTA) and optical coherence tomography (OCT) respectively.
Methods: 6x6 mm2 images of the optic nerve head were obtained on patients with non-glaucomatous optic neuropathies and normal patients using the Angioplex spectral-domain OCTA and optic nerve scans for RNFL thickness were collected using the Cirrus 5000 SD-OCT (Carl Zeiss Meditec, Dublin, CA). Scans of signal strength of ≥6 (out of 10) were selected for the study. Semi-automatic segmentation of

the volumetric OCTA data was performed and en face projections of vasculature at precise retinal layers were produced using prototype software. En face vasculature images of the RNFL layer were quantified, and were used to measure three OCTA perfusion parameters globally and in specific sectors (quadrants and clock-hour sectors). Vessel area density (VAD) and vessel skeleton density (VSD) were the parameters used to assess microvascular density, while vessel complexity index (VCI) was used to assess vessel morphology. Correlations between RNFL thickness and microvascular density were performed using Spearman's rank correlation. Perfusion parameters of normal and NGON patients were compared using the Mann-Whitney U test.
Results: 25 NGON eyes and 10 normal eyes were assessed. NGON eyes had significantly lower VAD, VSD, and VCI global compared to normal eyes. Among NGON eyes, stastically significant positive correlations were found between both VSD and VAD perfusion parameters with RNFL thickness in all retinal quadrants. In addition, the majority of retinal clock-hour segments showed positive correlations between VSD and VAD perfusion parameters and RNFL. Finally, there was a positive correlation between VCI and RNFL thickness among the majority of retinal quadrants.
Conclusions: There was reduced peripapillary microvascular perfusion in NGON compared to normal eyes. Among NGON eyes, microvascular perfusion had a strong anatomic correlation with RNFL thickness. SD-OCTA imaging exhibits the ability to detect retinal microvascular changes and may be an important diagnostic modality when utilized in conjunction with OCT imaging.

Decreased levels of Cystatin C may contribute to increased activity of Cathepsin S in tears of Sjögren's Syndrome patients

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Goal: This study is part of a larger exploration of Cathepsin S and its inhibitor Cystatin C as potential biomarkers for Sjögren's Syndrome (SS). This study compared the concentration and activity of Cathepsin S and the concentration of Cystatin C in the tears and serum of female patients with SS with these levels in patients with rheumatoid arthritis (RA) or systemic lupus erythematosus (SLE) and with healthy controls.
Methods: 8 female healthy controls and 44 female autoimmune patients were recruited. Tear and blood samples were collected on the same day from each subject. A 5 minute anesthetized Schirmer's test was used to collect the tear samples. Proteins were eluted from the Schirmer's strips using a buffer and centrifugation. Cathepsin S activity was measured using a commercial assay. The concentrations of Cathepsin S and Cystatin C were measured using commercial ELISAs.
Results: Cathepsin S activity was greater in SS tears than in RA/SLE tears ($p<0.01$) and healthy tears ($p<0.001$). No difference was found in Cathepsin S activity between SS serum and healthy serum, but the activity was decreased in SS serum compared to RA/SLE serum ($p<0.01$). No difference in the concentration of Cathepsin S in the tears of SS, RA/SLE or healthy controls was found. The concentration of Cystatin C was lower in SS tears than in RA/SLE tears ($p<0.05$) and healthy tears ($p<0.05$). No difference was found in the concentrations of Cystatin C in SS serum and healthy serum, but the concentration was lower in SS serum than in RA/SLE serum ($p<0.01$).

Conclusions: We found that Cathepsin S activity was increased in SS tears but not in SS serum and that this increase in activity was not due to a change in Cathepsin S concentration in tears. We found that Cystatin C was decreased in SS tears but not in SS serum, which may cause the increased Cathepsin S activity levels in SS tears. We hypothesize that the Cathepsin S dysregulation in SS tears may be a marker of local lacrimal inflammation.

ORTHOPAEDICS

The Effect of Canal Fill on Pediatric Femur Fractures Treated with Titanium Elastic Nails

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Purpose: In treatment of pediatric femur fractures, traditional teaching recommends 80% canal fill for successful maintenance of reduction. However, this has not been studied in the use of flexible titanium elastic nails (TEN). Our purpose was to assess the impact of canal fill on maintenance of reduction and rate of malunion in pediatric femur fractures treated with TEN.
Methods: Retrospective data was collected on all pediatric patients treated with TEN for diaphyseal femur fractures at a single tertiary care institution over a ten year period. Patients with co-morbidities such as osteogenesis imperfecta, mucopolysaccaridoses, and dwarfism were excluded. Patients were subdivided into groups based on percent canal fill. Fractures were considered malunited if limb length discrepancy was >2 cm, angulation in the sagittal plane (anterior/posterior) was >15°, or coronal angulation (varus/valgus) was >10°.
Results: 66 patients met the inclusion criteria; mean age at time of injury was 6.6 years old (range 1.8 to 17.7). Of the 66 patients, 2 patients had <40% canal fill (group A); 4 patients had 40-60% canal fill (group B); 25 patients had 60-80% canal fill (group C) and 35 patients had 80-100% canal fill (group D). The shortening was as follows: A= 5.5 mm; B= 6.5 mm; C= 7.7 mm; D= 4.6 mm. There was no correlation between canal fill and shortening (p=0.32). The angulation in the sagittal plane was as follows in the groups: A= 0°; B= 0°; C= 3.9°; D= 4.6°. There was no correlation between canal fill and angulation in the sagittal plane (p= 0.26). The coronal angulation was as follows in the groups: A= 4°; B= -1.5°; C= -1.7°; D= -0.4°. There was no correlation between canal fill and coronal angulation (p= 0.28) amongst the subjects. Three patients fit malunion criteria. Percent canal fill for these patients were 40%, 67%, and 79%.
Conclusion: There was no correlation between percentage canal fill and shortening or malangulation. Most of the patients in this series with >80% fill with TEN healed within acceptable parameters.

Magnetic Resonance Imaging Detection of Meniscal Injuries in Pediatric and Adolescent Patients with ACL Tears

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Background: MRI is the gold standard for diagnosis of soft tissue knee injuries. Prior research in adult cohorts has demonstrated decreased sensitivity and negative predictive value of meniscal injury with concurrent ACL injury with MRI. The purpose of this study is to evaluate the efficacy of MRI in detecting meniscal injury in an adolescent and pediatric population with ACL injury.
Methods: Retrospective chart review was utilized to identify patients who had undergone arthroscopic ACL reconstruction by one surgeon between August 2012 and June 2016. Patients with time between MRI and surgery >90 days, missing operative note, age >18 years old, prior ACL reconstruction, missing MRI, concurrent fracture and prior meniscal surgery were excluded. Sensitivity, specificity, positive predictive value and negative predictive value were calculated and ANOVA, two-sample t-tests and Fisher Exact Test were conducted. Significance was set at $p<0.05$.
Results: We identified 84 patients who underwent arthroscopic ACL reconstruction in the given time period. The accuracy of MRI to detect meniscal injury with concurrent ACL tear decreased in the pediatric and adolescent population (Table 1). Lateral meniscus tears, specifically of the posterior horn, were more frequently missed than medial meniscal tears. Additionally, the most common tear type was a vertical tear. Pediatric and adolescent patients had a decreased PPV and increased NPV of MM tears and an increased NPV of LM tears compared to the adult population (Table 2). Females also showed significantly decreased sensitivity, specificity, PPV and NPV compared to males.

Conclusion: ACL injury decreases MRI sensitivity to detect meniscal injury. This knowledge may help orthopaedic surgeons pay special attention to potential meniscal injury, especially the lateral meniscus, in a patient with a known ACL tear. Additionally, the gender-specific difference in the efficacy of MRI points to the need for more gender analyses in orthopaedic-related research.

Table 1:		Arthroscopic Finding		
		Tear Present (+)	Tear Absent (-)	Total
MRI Finding	Tear Present (+)	42	3	45
	Tear Absent (-)	24	6	30
	Total	66	9	75
Sensitivity	63.60%			
Specificity	66.70%			
PPV	93.30%			
NPV	20.00%			

Table 2: Meniscal Injury with concurrent ACL injury			
MM:			
	Pediatric & Adolescent Cohort	Adult Cohort	p-value
Sensitivity	81.80%	70.20%	0.195
Specificity	86.30%	93.80%	0.209
PPV	79.40%	94.20%	**0.037**
NPV	88.00%	68.50%	**0.01**
LM:			
	Pediatric & Adolescent Cohort	Adult Cohort	p-value
Sensitivity	65.10%	71.40%	0.432
Specificity	100.00%	98.80%	1
PPV	100.00%	98.00%	1
NPV	48.80%	81.40%	**<0.001**

Management and Outcomes of Tibial Fractures Caused by Gun Shot Wounds

Geoffrey Marecek MD, Brock Foster MD, **Kavish Gupta**; Department of Orthopaedics, LAC+USC

Goal: There is currently a lack of high volume investigations pertaining to ballistic tibial fractures. Management of these injuries is uniquely complicated as they are frequently accompanied by extensive soft tissue damage, vascular compromise, nerve damage, infection and presence of foreign bodies. The goal of this study is to review a large series of ballistic tibial fractures to better characterize their complicating factors and compare treatment methods.
Methods: All tibial fractures secondary to gunshot wounds, presenting to LAC+USC Medical Center, were collected over a two year period. Treatment methods and outcomes were compiled into groups based on clinical and surgical management and compared.
Results: Pending

2015: 10 tibia gsw fx
2016: 9 tibia gsw fx

Conclusions: Pending

Tibial Morphology in Children with Myelomeningocele

Djani Robertson, Kyle Chadwick, Nicole Mueske, Sandra Shefelbine, Tishya Wren

Background: Children with myelomeningocele often have bone deformities, low bone density and load their bones differently due to walking abnormalities. We are interested in characterizing the shape of the bone along the length of the tibia. The degree of roundness is theoretically inversely related to the amount of loading. We hypothesize that children with myelomeningocele experience different bone deformity due to decreased or abnormal loading of bone as a result of decreased mobility.
Methods: Computed tomography images of the tibia for (#) children with and without myelomeningocele (control) were collected and analyzed. Each CT sequence was imported into OsiriX software. Using this software, the tibias of each subject were isolated from all other bone and tissue in each slice of the CT sequence. Using BoneJ, an ImageJ plugin, analysis of each tibia was performed. Finally, custom motion lab code will be used to analyze the circularity of bone in each of the subjects.
Results: Quantitative results are not currently available as data analysis has not been completed. However, qualitative analyses of CT images of the myelomeningocele and control groups demonstrates increased circularity of the tibia in the myelomeningocele group compared to the control group.
Summary/Conclusion: The qualitative results of the study so far provide evidence for our hypothesis that children with myelomeningocele have increased tibial roundness due to decreased loading of their bones. However, quantitative results and statistical analyses are needed to substantiate these qualitative findings.

A Nationwide Analysis of Recurrent Hip Irrigation and Debridement for Pediatric Septic Arthritis of the Hip

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Purpose: Irrigation and debridement (I&D) is the gold standard for treatment of pediatric septic arthritis of the hip. If the index surgery fails, multiple I&Ds may be required to clear the infection, resulting in substantial morbidity for this pediatric population. The purpose of this study was to identify the incidence of repeat I&D in pediatric patients diagnosed with acute septic arthritis of the hip.

Methods: The Kids' Inpatient Database (KID) was used to extract data for pediatric patients diagnosed with septic arthritis of the hip who underwent I&D of the hip joint from 1997 to 2012. Patients who underwent a single I&D were defined as a "success" while patients requiring repeat I&Ds were defined as a "failure." A two-sample Wilcoxon rank-sum (Mann-Whitney) test was used to compare continuous variables while adjusting for variance. Fisher's exact test or Chi-square analysis were performed to compare categorical variables.
Results: During the period examined, 3,341 (94.3%) children were successfully treated with a single I&D, while 203 (5.7%) children required at least one additional surgery. Univariate analysis found anemia, coagulopathy, and electrolyte disorders to be associated with repeat I&D. Patients who underwent multiple I&Ds had significantly longer lengths of stay (11.3 days vs. 6.9 days), higher likelihood of being discharged with home health (39% vs. 25%), and higher total overall cost ($58,400 vs. $31,900). Lastly, analysis of hospital variables demonstrated greater rates of failed I&Ds at smaller hospitals and teaching hospitals.
Conclusion: This is the first study, to the authors' knowledge, that evaluates the nationwide incidence of pediatric septic arthritis of the hip requiring multiple I&Ds. This information can be useful during preoperative discussions with a child's guardian.

Is there an Association between Psychological Factors and Developing Complex Regional Pain Syndrome after an Ankle Fracture?

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Introduction: Complex regional pain syndrome (CRPS) is a condition in which a patient experiences disproportional pain after an initial injury. Prior studies have demonstrated that patients with a history of psychological disorders may be at greater risk for developing CRPS; therefore, understanding whether a similar relationship exists in patients who sustain ankle fractures, a commonly encountered injury, may aid in clinical decision-making. We hypothesize that a prior psychiatric diagnosis will predispose patients to the development of CRPS after sustaining an ankle fracture.
Methods: The PearlDiver patient record database was used to isolate all patients with an ankle fracture, identified based on CPT code. Patients were separated into two cohorts, those with and those without a history of mental illness based on ICD-9 codes including: anxiety disorder, bipolar disorder, delirium, psychosis, depression, chronic pain syndrome, and fibromyalgia. The final step identified which patients, in both cohorts, developed CRPS after the initial injury. Odds ratios for the development of CRPS for each mental disorder were calculated. Analysis was also conducted comparing patients treated operatively versus nonoperatively (Table 2).
Results: Among a total of 163,529 ankle fracture patients from 2005-2015, 6.19% were diagnosed with CRPS. Of patients with mental disorders, 10.2% developed CRPS, while only 2.05% of those without a history of psychological disorders developed CRPS (OR 5.44, $p<0.0001$). All psychological diagnoses were associated with increased likelihood of developing CRPS after ankle fracture (Table 1). Patients with psychological disorders were less likely to be treated operatively (OR=0.877, $p<0.0001$). No significant difference in the incidence of CRPS was noted in psychiatric patients treated operatively versus nonoperatively (OR= 0.977, $p=0.3132$).
Conclusion: Understanding the link between prior psychiatric diagnoses and future occurrence of CRPS after ankle fracture will encourage awareness of this condition and patient education about the complications that may arise after management.

Table 1. Univariate Analysis with Odds Ratios of Complex Regional Pain Syndrome in Ankle Fracture Patients

Independent	Univariate OR	P-value
Mental Disorder[a]	5.44	p<0.0001
Anxiety Disorder[b]	5.08	p<0.0001
Depression	2.39	p<0.0001
Bipolar Disorder[c]	5.64	p<0.0001
Fibromyalgia	2.80	p<0.0001
Chronic Pain Syndrome	3.34	p<0.0001
Psychosis[d]	4.17	p<0.0001
Delirium[e]	5.60	p<0.0001

[a]Cohort included patients with at least one of the psychological disorders listed below

[b-e]Cohorts were identified using one of many associated ICD-9 Codes

Table 2. Univariate Analysis with Odds Ratios of Complex Regional Pain Syndrome Comparing Operative versus Nonoperative Treatment

	Operative		Nonoperative	
Independent	OR	P-value	OR	P-value
Mental Disorder[a]	5.57	p<0.0001	5.30	p<0.0001
Anxiety Disorder[b]	5.28	p<0.0001	4.89	p<0.0001
Depression	2.59	p<0.0001	2.23	p<0.0001
Bipolar Disorder[c]	5.99	p<0.0001	5.31	p<0.0001
Fibromyalgia	2.87	p<0.0001	2.73	p<0.0001
Pain	3.57	p<0.0001	3.15	p<0.0001
Psychosis[d]	2.96	P<0.0001	5.13	p<0.0001
Delirium[e]	6.41	p<0.0001	5.04	p<0.0001

[a]Cohort included patients with at least one of the psychological disorders listed below

[b-e]Cohorts were identified using one of many associated ICD-9 Codes

The Tibial Tubercle – Trochlear Groove (TT-TG) Distance is more strongly associated with Patellar Instability in Pediatric and Adolescent Patients than the Tibial Tubercle – Posterior Cruciate Ligament (TT-PCL) Distance

Kevin Carter BS, Joshua Yang BA, James L. Pace MD, Curtis VandenBerg MD

Purpose: The purpose of this study was to evaluate the value of the tibial tubercle-trochlear groove (TT-TG) and tibial tubercle-posterior cruciate ligament (TT-PCL) measurements on magnetic resonance imaging (MRI) in young athletes with patellar instability, and determine how these distances change with age.

Methods: Knee MRIs from March 2008 to May 2016 were assessed from children ages 8-18, including 93 control subjects and 72 patients with a history of at least one patellar dislocation. Patients with a history of skeletal dysplasia or imaging that failed to show the necessary landmarks were excluded. *T* tests were used to compare the collected TT-TG and TT-PCL values between the patellar dislocation and control groups.

Results: For ages 8-18 combined, the TT-TG distances were significantly different (6.0+/-0.7 control vs. 15.7+/-0.3, p=0.0005) between groups (P<.0005). The TT-PCL distance did not show significant differences (23.3+/-1.04 control vs. 27.5+/-5.8 study group, p=0.148) between groups. On average, the patellar dislocated patients had a TT-PCL distance that was 4.16 mm greater than the control group, while the TT-TG was 9.69 mm greater in the patellar dislocated patients. When patients were grouped according age, significant differences were noted with respect to TT-TG in the 11-13, 14-16, and 17-18 year old age ranges, while no differences noted in ages 8-10.

Conclusion: A lateralized tibial tubercle has a known association with patellar dislocations in the pediatric population making the TT-TG a viable tool in screening at risk children who are between the ages of 8-18. The TT-PCL measurement however did not show a strong association with patellar dislocations in this patient population

Significance: These findings support the use of the TT-TG measurement to guide medical decision making in pediatric patients being evaluated for patellar instability.

Incidence of peri-prosthetic fractures after femoral osteotomy in the care of patients with Cerebral Palsy

Jake Del Rosso, Meg Brown, Liam Harris, Robert Kay, Deardre Ryan.

Level 4 Retrospective

Introduction: Hip dysplasia is a common side effect of the spastic paraplegia which is associated with Cerebral Palsy. While Varus Derotational osteotomy has proven to be an effective treatment for hip dysplasia in these, patients, complication rates remain high, with incidence of periprosthetic fracture recently reported to be nearly 10%. Given the high rate of complications, factors associated with poorer outcomes are increasingly valuable to the treating surgeon. The purpose of this study is to characterize the incidence of periprosthetic fracture in our patient population, and identify risk factors associated with fracture, and poor surgical outcome.

Methods: A retrospective review of 981 patients treated at a single center was conducted using patients treated between 12/31/04 to 12/31/2014 . Inclusion criteria were age less than 18 years at initial operation, and at least 2 years of follow-up. Patient data was collected including age at surgery, sex, type of initial surgery, concurrent operations, hardware implanted, post operative immobilization time, duration of physical therapy, incidence of periprosthetic fracture, reoperation rate, and incidence of infection. Following data collection, analysis was conducted using Fisher's exact tests, student t-tests and ANOVA.

Results: 267 patients met inclusion criteria. Average patient age at initial surgery was 9.7 years (SD 7.15). There were 108 females and 161 males included in the study. Average duration of immobilization following surgery was 5.3 Weeks (SD 2.01) and average time of physical therapy was 0.42 weeks (SD 2.8 weeks).
10 patients were diagnosed with post-operative peri-prosthetic fracture. Mean time from index surgery to fracture was 14.74 weeks (SD 8.89, 4.25-31.23). 3 patients required subsequent reoperation. Females were significantly more likely to experience periprosthetic fracture (p=0.032). Age at surgery (p=0.1996), type of hardware implanted (p=1.00), immobilization time (p=0.3021) and duration of physical therapy (p=0.8451) were all not associated with increased rates of peri-prosthetic fracture.
Conclusion: Sex is strongly associated with increased rates of peri prosthetic fracture in patients with cerebral palsy undergoing varus derotational osteotomy. Type of hardware, immobilization time, and duration of physical therapy time are all not associated with increased rates of fracture. Age at surgery demonstrated a trend towards younger ages associated with increased rates of fracture, though this was not statistically significant and warrants further exploration.

Effects of Assistive Device Use, According to the Functional Mobility Scale, on Real World Walking Behavior in Children with Myelomeningocele

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Background: Myelomeningocele (MM) is the most common and severe type of spina bifida. The severity of the damage helps dictate the ambulatory abilities of children with MM. The purpose of this study was to investigate how functional independence and assistive device use impact real-world walking in patients with MM as characterized by the Functional Mobility Scale (FMS). We hypothesized that children who were more dependent on assistive devices would take fewer steps per day separated by more breaks or rest periods.
Methods: 53 ambulatory children with MM, classified into mobility groups: Always Independent, Mostly Independent, Crutch Users, and Walker/Wheelchair. The StepWatch Activity Monitor recorded the frequency of steps per unit time and the frequency of bouts (defined as a period of time in which sequential steps were separated by no more than 10 seconds).
Results: Average steps per day decreased as the use of assistance increased. Both the Crutch Users and Walker/Wheelchair groups walked significantly fewer average steps per day compared to the Always Independent (9681.9 ± 3087.6) and Mostly Independent groups (9473.4 ± 2977.0). The Crutch Users and Walker/Wheelchair groups had fewer number of bouts in each of the ranges from 50-500 compared to both the Always and Mostly Independent groups. No difference in average steps per day or any bout category were observed between the Always Independent and Mostly Independent groups (p>0.99).
Conclusion: It was found that the average amount of steps taken per day and the distribution into bouts of sequential steps vary depending on FMS grouping. There was never a significant difference between children who were Always Independent and children who were mostly independent. Interestingly, using crutches at any point had little effect on mobility compared to being confined to a walker/wheelchair.

Trends Analysis of Surgical Procedures for Cervical Degenerative Disk Disease and Myelopathy in Patients with Tobacco Use Disorder

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Purpose: This study defined the incidence and trends of surgeries performed for patients with cervical disc degeneration with and without tobacco use disorder (TUD).
Methods: This study utilized the Humana Inc. database between 2007-2013 to identify patients with cervical disc degeneration with or without myelopathy. *International Classification of Diseases, 9th Revision* (ICD-9) and Current Procedural Terminology (CPT) codes determined the initial diagnosis of disc degeneration, myelopathy status and TUD, whether patients received surgery, and TUD status at surgery.
Results: The prevalence of disc degeneration with myelopathy increased by 32.8% between 2007-2013, while disc disease with myelopathy and TUD increased by 91.6%. For patients without myelopathy the prevalence of disc degeneration alone increased by 65.4%, and disc degeneration with myelopathy increased by 148.7%. Of myelopathy patients, 1,717 (6.4%) had TUD and 1,024 (59.6%) received surgery, compared to 6,508 patients without TUD (26.1%). For patients without myelopathy, 11,337 (3.5%) had TUD and 787 (6.9%) underwent surgery, compared to 9,716 patients (3%) without TUD. Of surgical patients, 781 (76.3%) with myelopathy and TUD still had a TUD diagnosis at surgery, and 542 (68.9%) of patients without myelopathy still had a TUD diagnosis at surgery.
Conclusions: The prevalence of degenerative disc disease and TUD has increased more than disc disease alone. Patients with TUD were more likely to get surgery, and to have surgeries earlier than patients without TUD. Patients with TUD at the time of the diagnosis of their disc degeneration likely still had a TUD diagnosis at the time of surgery.

Incidence of venous thromboembolism as a result of cervical spine surgery and the effects of prophylactic antithrombotics.

Jeffrey Hu, Christopher Wang, Jeffrey C. Wang, Zorica Buser, Dept. of Orthopaedic Surgery, KSOM

Background: Cervical spine surgeries can result in a variety of complications. Although uncommon in those surgeries, venous thromboembolisms (VTEs), which include pulmonary embolisms(PEs) and deep vein thrombosis(DVTs), can cause significant morbidity and mortality. Prophylactic antithrombotic use is common in many surgeries, but not well studied in cervical spine surgeries. Our goal was to determine post-operative VTE incidence after cervical spine surgeries and whether prophylactic antithrombotics have an effect.
Methods: We conducted a retrospective study using PearlDiver's Humana healthcare database that provides de-identified information on over 45 million people. We searched for patients using ICD-9 diagnostic codes and CPT procedural codes. For procedures we looked at cervical spine surgeries, including anterior cervical discectomy and fusion(ACDF), posterior cervical fusion(PCF), discectomies, and laminectomies. For complications we looked at VTE occurrence within 7 or 30 days after surgery. We then looked at antithrombotic use within 24 hours of surgery. The chi-squared test and odds ratio will be used to determine whether there is a significant change in VTE incidence when antithrombotics are used.

Results: Of the 38,113 cervical spine surgery patients in the 7 day VTE group, 0.59% developed a VTE. Incidence of 7 day VTE in ACDFs only was 0.43% and PCFs only was 1.30%-1.49%. Of the 37,951 cervical spine surgery patients in the 30 day VTE group, 1.03% developed a VTE. Incidence of 30 day VTE in ACDFs only was 0.76% and PCFs only was 2.58%.
Conclusions: The evidence shows that cervical spine surgery VTE rates agree with spine surgery VTE rates in the current literature, and that PCFs have significantly higher rates of VTEs than ACDFs. Our goal now is to analyze whether prophylactic antithrombotic use significantly affects these rates.

Smoking: An Age-Dependent Risk Factor for 30-Day Readmission Following Elective Knee Arthroscopy

Behdod Katebian, Nathanael Heckmann, Braden McKnight, J. Ryan Hill, K Soraya Heidari, Amir Mostafi, George "Rick" Hatch III

GOAL: Knee arthroscopy is among the most commonly performed orthopaedic procedures performed in the United States. While complication rates remain low, there is newfound interest in identifying modifiable risk factors for perioperative complications. The purpose of the current study was to assess smoking as an age-dependent risk factor for complications following knee arthroscopy
METHODS: The American College of Surgeons National Surgical Quality Improvement Program database was queried to identify patients who had undergone a knee arthroscopic procedure between 2011 and 2014. Univariate analysis was used to evaluate demographics and medical comorbidities as risk factors for 30-day readmission, wound complications, thrombotic events, and total complications. Age was identified as a continuous variable, and a smoothing cubic spline plot was used to evaluate complication rates amongst smokers as a function of age. A multivariate analysis was performed to account confounding variables.
RESULTS: We identified 42,466 patients who had undergone knee arthroscopy; 35,466 (83.5%) were nonsmokers and 7,000 (16.5%) were smokers. Smoothing spline plot analysis identified smokers greater than 35 years old to have a statistically significant increased odds of readmission (OR 1.63; p less than 0.001). Smokers 40 years old were approximately 50% more likely to be readmitted than non-smokers (OR 1.49; CI 1.14-1.68); similarly, 60-year-old smokers were almost twice as likely to be readmitted (OR 1.98; CI 1.50-2.28). There were no significantly increased rates of other complications identified amongst smokers across all ages. On multivariate analysis, similar results were obtained after correcting for confounding variables.
CONCLUSION: Based on these results, smoking is a risk factor for readmission in patients older than 35 years old. Surgeons should take age into account when assessing the increased risk imparted by smoking and encourage smoking cessation, particularly in older patients, prior to elective arthroscopic knee surgery.

Bone Tunnel versus Anchor Repair of Patellar Tendon Ruptures

David Lehoang, James O'Dowd M.D, Raffy Mirzayan M.D

Goal: The patellar tendon attaches the patella to the tibial tubercle and is a critical component of the extensor mechanism which allows a person to straighten their knee. In order to surgically repair the tendon, commercially available anchors, rather than drill holes, have been recently used to re-attach the tendon. The newer technique uses bone anchors to attach the suture to the bone. Several biomechanical studies suggest that anchors are more effective than bone tunnels in cadaveric models. The purpose of this study is to assess the clinical outcomes of patellar tendon repair using the anchor procedure versus the bone tunnel procedure in a large series of patients surgically treated at Kaiser Permanente Southern California. The primary outcome is the occurrence of re-tears, re-operation, and other complications after the index procedure. We hypothesize that there will be a decreased rate of

re-rupture in the bone anchor group granted the superior mechanical properties previously demonstrated in cadaver models.
Study Design: This is a retrospective chart review of patients within Kaiser Permanente Southern California who have undergone patellar tendon repairs between 2006 and 2015 (n=400). I will be reviewing the patients' electronic medical records and collecting data including the type of patellar tendon repair, and the incidence of re-tear, re-operation, complications, and patient demographic data will also be analyzed for trends. The cost of the implants and the total operative time will be compared. I will perform data analysis with Microsoft Excel, and I will prepare the data for further analysis by the Resident and statistician.
Results: We are currently analyzing the data collected from patient charts and do not have results yet. However, we expect to find a decreased rate of re-rupture in the bone anchor group vs the bone tunnel group.
Conclusions: The expected results from this study would suggest the importance of using bone anchors to repair patellar tendons vs. the older bone tunnel method.

QUANTITATIVE ASSESSMENT OF FINE MOTOR CONTROL OF THE FIRST AND SECOND DIGITS AFTER EARLY CHILDHOOD POLLICIZATION

Jacob Lifton, Daniel Lorenzana, Nicole Mueske, Nina Lightdale-Miric, Tishya Wren

Introduction: Pollicization is a surgical method used to create a thumb from the next digit in cases of thumb hypoplasia. A prior study using the Strength-Dexterity (S-D) test found that pollicized subjects exhibit more instability than controls while compressing a spring between their first two digits. This study uses the Strength-Dexterity test to assess the first and second digits separately and together.
Methods: This study included 15 pollicized hands from 11 children who had undergone early childhood pollicization. Eighteen controls were also included. Subjects attempted to compress and hold an instrumented spring for at least 3 seconds, for three conditions: 1) first and second digits pinch together, and (2) first and (3) second digits individually compress a spring against a stable base. Phase portraits between force, force velocity, and force acceleration were created for each hold, and were characterized using Euclidean distance (ED). Compression force and hold variability (ED) were compared between groups using ANOVA. Univariate linear regressions were used to assess correlations between compression force and ED.
Results: Compression force was lower in pollicized hands compared to controls across all conditions (both: $p=0.001$, first: $p=0.02$, second: $p=0.04$). Pollicized hands also demonstrated lower hold variability (ED) than controls (both: $p=0.08$, first: $p=0.003$, second: $p<0.001$). ED correlated with compression force amongst controls for both digit ($p=0.005$) and first digit ($p<0.001$) holds. A similar trend was seen for second digit holds in pollicized hands ($p=0.07$).
Discussion: These findings are contrary to results of a prior study showing pollicized hands to have greater instability in fine motor movements, yet this may partially be explained by the overall lower compression forces seen in the pollicized hands. The lower compression forces may not have entered zones of instability, thus having less difficulty maintaining a steady spring.

Comparison of Osteoporosis Therapies in Thoracolumbar Fracture Patients

Adam Murrietta, Zorica Buser PhD, Christopher Wang, Anthony D'oro, Jeffrey C. Wang MD

Introduction: Osteoporosis is the most common bone disease globally and incidence rates continue to rise with the ageing population. Several anti-osteoporotic therapies are prescribed with the aim of decreasing fragility fracture risk. The preferred treatment of osteoporosis is often debated along with the efficacy of individual therapies. The present study aims to investigate and compare the efficacy of

individual anti-osteoporotic therapies in preventing thoracolumbar fractures and operative treatment at a population level.
Methods: International Classification of Disease-9 (ICD-9) codes were used to search the PearlDiver (PearlDiver Inc., Warsaw, IN, USA) Patient Record Database and identify patients who were diagnosed with osteoporosis between the years 2007 and 2015. National Drug Code(NDC) codes were used to identify cohorts of patients receiving anti-osteoporotic therapies. Therapy regimens included alendronate, ibandronate, risedronate, zoledronate, denosumab, teriparatide, raloxifene, and calcitonin. International Classification of Disease-9 (ICD-9) and Current Procedural Terminology (CPT) codes were used to analyze therapeutic cohorts and reveal the incidence of vertebral fractures and operative treatment.
Results: Preliminary data analysis revealed 328,262 patients prescribed anti-osteoporotic therapy. Of these patients, 72.56% (238,170) were in the alendronate group, 6.74% (22,126) in the ibandronate group, 9.01% (29,588) in the risedronate group, .26% (859) in the zoledronate group, 1.18% (3,867) in the denosumab group, 5.95% (19,528) in the raloxifene group, 1.06% (3,479) in the teriparatide group, and 3.24% (10,645) in the calcitonin group. Incidence of thoracolumbar fragility fracture in each cohort were as follows: alendronate = 5.58%, ibandronate = 6.03%, risedronate = 6.84%, zoledronate = 5.59%, raloxifene = 4.31%, teriparatide = 14.26%, and calcitonin = 15.63%. Osteoporotic patients receiving no anti-osteoporotic therapy experienced fragility fractures at an incidence rate of 6.8%. Further analysis will clarify fragility fracture rates and operative treatment rates for individual therapy cohorts.
Conclusion: The preliminary results of the study provide evidence that alendronate, ibandronate, zoledronate, and raloxifene are able to successfully lower rates of thoracolumbar fragility fractures. Patients prescribed teriparatide and calcitonin experienced thoracolumbar fragility fractures at a higher incidence rate than that of patients receiving no anti-osteoporotic therapy. Complete data analysis will indicate which anti-osteoporotic therapy has the greatest efficacy in reducing fracture and operative rate.

Biomechanical Analysis of Pediatric Athletes with Patellar Instability

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Background: Patellar instability (PI) is a common problem during growth (Fithian 2004) that needs objective information to guide treatment and return to activity decision-making. 3-D biomechanical evaluations give insight into how children with PI move during dynamic sport-specific tasks. The purpose of this study was to evaluate biomechanics during a vertical drop jump in the pediatric PI population. We hypothesize there will be differences in knee valgus and average knee power in the PI injured limb group vs. non-injured limb and control groups.
Methods: 8 pediatric athletes (14 ± 1.6 yrs) with unilateral PI were compared to 30 control pediatric athletes (13.7 ± 1.3 yrs) with no history of lower extremity injury. Each patient completed a vertical drop jump task, and data was collected using a motion capture system.
Results: Significant differences in power were seen at the knee ($p=0.0006$, $r=0.39$) and ankle ($p=0.0002$, $r=0.33$) and are attributed to the control vs. injured limb group ($p=0.0165$, $p=0.0398$). Significant differences were also seen in minimum knee varus ($p=0.0311$, $r=0.207$) and knee varus/valgus range ($p=0.014$, $r=-0.155$). Minimum knee varus was significant between the control vs. non-injured limb ($p=0.029$). Knee varus/valgus range was significant between the control vs. injured limb ($p=0.045$).
Conclusion: Pediatric athletes with PI have kinematic differences when performing a vertical drop jump task. In comparison to contralateral limbs and controls, there were asymmetries in knee and ankle power. These differences can be strategies to minimize impact on the injured knee plus strategies to control loading at the injured knee, suggesting protective measures that could be due to incompetent

patellar stabilizing structures. The evidence of kinetic and kinematic differences may explain the high re-dislocation rates seen in the pediatric PI group. Furthermore, intra-patient differences indicate there might be an increase in contralateral limb injury due to overloading the joint.

Subchondral bone radiodensity patterns in the glenoid fossa of human and non-human primate scapulae.

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Background: The success of Total Shoulder Arthroplasty (TSA) depends on the quality and density of the subchondral bone in the glenoid fossa (GF). Subchondral bone density can be assessed with CT scans and radiodensity patterns. Areas of highest radiodensity (*HiRD)* of subchondral bone in the GF are hypothesized to indicate locations of maximum glenohumeral joint compressive forces caused by normal rotator cuff muscle activity. To test this hypothesis, we investigated patterns of *HiRD* in the GF of humans as well as non-human primates with known but different rotator cuff muscle activity patterns.
Methods: *HiRD* subchondral bone patterns in the GF were visualized using computed tomography osteoabsorptiometry methodology (CT-OAM) on 20 human, 7 chimpanzee, and 9 gibbon isolated scapulae. A virtual 3D rendering of the scapula was created and a maximum intensity projection (MIP) map with 8 bins of false colors was superimposed on the renderings. Only black pixels, which constitute the *HiRD* within the MIP, were used to quantify the areas of highest density. The GF was separated into four zones (superior, inferior, anterior, posterior) for regional comparisons. Within-group differences between anterior-posterior and superior-inferior regions were determined using the Wilcoxon signed-rank test.
Results: All three groups showed *HiRD* subchondral bone in both the anterior and posterior regions of the GF. Humans and gibbons demonstrated significantly larger concentrations in the anterior region, whereas chimpanzees had a larger concentration in the posterior half. All three primates showed a significantly larger concentration of *HiRD* in the superior region.
Conclusion: This study shows that habitual (i.e., normal) rotator cuff muscle recruitment determines the *HiRD* patterns in the GF. Knowledge of rotator cuff muscle activity, both normal or pathological, can help predict locations of *HiRD* subchondral bone. Accordingly, preoperative knowledge of these regions can help determine the locations where implants in TSA can be fixed.

Incidence and risk factors of paralytic complications following cervical spine surgery

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Background information: C5 palsy, paraplegia, and quadriplegia are significant paralytic complications of cervical spine surgery that have tremendous effect on patient quality of life and the cost of healthcare. Paralytic complications after spine surgery are generally perceived to be rare occurrences; however, no study has conclusively established their incidence. Furthermore, little is known about the risk factors for these complications. Overall, there is a sizeable lack of knowledge regarding paralytic complications of cervical spine surgery.
Purpose: The purpose of this study is to use a nationwide patient database to elucidate the risk factors and incidence of paralytic complications after cervical spine surgery at the population level.
Methods: Patients who underwent cervical spine surgery between 2007 and 2015 were identified using International Classification of Disease, Ninth Revision (ICD-9) codes through PearlDiver, a nationwide patient record database based on the Humana Inc. insurance network. The patient records were analyzed to establish the incidence of paralytic complications and to determine whether pre-existing

medical conditions were risk factors for developing paralytic complications such as C5 palsy, quadriplegia, and paraplegia following cervical spine surgery.
Results: This study identified 40,937 patients who underwent surgery in the cervical spine between 2007 and 2015. Of those 40,937 patients, 635 (1.55%) developed a paralytic complication such as C5 palsy, quadriplegia, or paraplegia within 10 days after surgery. History of hypertension, diabetes, chronic obstructive pulmonary disease, myocardial infarction, heart failure, and cerebrovascular disease were significantly associated ($p<0.001$) with increased incidence of paralytic complications. Furthermore, the aforementioned risk factors were associated with an increased odds ratio, ranging from 1.6 to 4.8, of developing a paralytic complication.
Conclusions: Overall, this study accomplished its objectives of determining the incidence and risk factors of paralytic complications after cervical spine surgery. The elucidation of novel risk factors for debilitating paralytic complications will be valuable in both evaluating patients for surgery in the cervical spine and in patient education regarding the risks of spine surgery.

The Prevalence of Significant Injuries in CrossFit

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Background: CrossFit is a high intensity exercise routine that has exploded in popularity over the past decade, however, it has garnered a reputation as an injury prone activity. Specifically, CrossFit has been associated with an increased risk of rhabdomyolysis and has been be criticized for increasing the chance of injury by performing weightlifting movements under extreme fatigue.
Purpose : There has not been an established consensus on the injury risk in CrossFit as the current literature attempting to establish risk varies greatly. The purpose of this study is to investigate the significant injury prevalence caused by CrossFit participation. Additionally, this study investigated potential risks factors for injuries. Finally, the mechanisms and locations of injuries were also studied.
Methods: A cross-sectional survey was created using REDCap and was distributed via email to CrossFit affiliated gyms across the United States. Criteria was established to define a significant injury to exclude minor injuries. The data was analyzed by using the chi-squared test.
Results: Preliminary data shows an injury prevalence of 22.02% (27/168). Differences in injury prevalence based on gender, age, beginner's program participation, and BMI (<24.9,>25) were not statistically significant. The most common areas injured were the back (12/59) and shoulder (13/59), while the movements that caused the most injuries were deadlift (5/53) and clean (7/53). There were (2/168) cases of rhabdomyolysis and (6/168) cases of surgical reconstruction. Finally, (21/30) of weightlifting injuries occurred during movements that were performed under a heavy load.
Summary: Preliminary data reveals that the injury prevalence in CrossFit appears to be around 20%. Currently, there appears to be no demographic risk factors for injury. Also, participation in a beginner's program, which emphasizes mastering technique, does not appear to reduce the risk of injury. Lifting movements performed under heavy loads at lower repetitions cause a higher frequency of injury than that of lower load at higher repetitions. Avoidance of maximal loads during weightlifting exercises would likely decrease the incidence of injury.

OTOLARYNGOLOGY

Indications and Outcomes of Supraglottoplasty for Laryngomalacia in an Underserved Urban Population

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Purpose: Treatment for laryngomalacia, the most common cause of stridor in infants, ranges from watchful waiting to supraglottoplasty. Previous reports focused primarily on Caucasian populations; however, the applicability to a more diverse population is unclear. This study aims to review the indications and outcomes of supraglottoplasty within a predominantly non-Caucasian, underserved population.
Methods: Records of all children diagnosed with laryngomalacia between January 2010 and July 2016 at Children's Hospital Los Angeles were reviewed.
Results: Of the 50 cases identified, half were female, 82% Hispanic or African American, and 78% were on some form of government-sponsored health plan. Symptoms at diagnosis included stridor (70%), desaturation during feeding (10%), and failure to thrive (8%) with a mean age at symptom onset of 9.3 months and 50% symptomatic at birth. Comorbidities include GERD (40%) and OSA (38%). There was a higher likelihood of observation as treatment for those on government insurance (64%) versus private insurance (36%) [p=0.09]. Nine patients underwent supraglottoplasty (18%), all of whom had significant past medical history or concurrent comorbidities. Technique was evenly split between cold steel (44%) and CO2 laser (56%). No complications occurred. 89% of supraglottoplasty patients experienced post-operative improvement; 2 patients required subsequent tracheostomy and 2 patients required supplemental oxygen.
Conclusion: Within this population, observation with minimal intervention is most common, especially in those on government-sponsored health plans—perhaps due to unique factors related to healthcare access that require further investigation. In those who underwent supraglottoplasty, significant medical conditions existed, with some requiring treatment despite post-operative improvements.

Outcomes of Early Tympanostomy Tube Placement

Pedram Goel[1], Ido Badash[1], Beth Osterbauer, MPH[2], Jeffrey Hammoudeh, MD[3], Jeffrey Koempel, MD[2]
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Background: In patients born with orofacial clefts (OFC), including cleft lip and cleft palate, there is a high frequency of Eustachian tube dysfunction and otitis media with effusion (OME). Thus, tympanostomy tubes (TT) are commonly inserted into the tympanic membrane of these patients to allow for ventilation of the middle ear. Through investigating the outcomes of variable TT use, it may be possible to clarify the optimal timing of TT placement in order to maximize the otological benefits of myringotomies and minimize the risk of complications. The aim of this study is to investigate the short and long-term outcomes of OFC patients receiving tympanostomy tube placement within 3 months of life.
Methods: This is a retrospective review investigating the audiologic outcomes and otologic complications of patients receiving TT placement before 3 months of life and those receiving them later in life. Patient charts will be screened for inclusion and exclusion criteria. A database will be created containing the variables of interest from each patient and the data will be analyzed. ANOVA will be used for multivariate analysis comparing audiologic outcomes and otologic complications between patients who received a TT exceptionally early (before 3 months of life) or later. Unpaired T-test will be used to compare continuous variables between two groups, such as no TT versus TT before 3 months. Chi-

squared and Fisher's exact tests will be used for categorical variable comparison between groups. Multivariate logistic regression will be used for prediction of potential future audiologic outcomes in patients with TT placement.
Results: Once the data is analyzed, we expect that there is no increased risk for complications in patients receiving TT placement within the first 3 months of life. Further, we expect that these patients will be less likely to develop audiologic and otologic complications such as speech delays or language deficits.
Conclusion: We are still conducting data collection. However, it is expected that TT placement within the first 3 months of life does not increase the risk of complications and instead decreases the risk of audiologic and otologic complications. This study will not only help guide future therapeutic decision-making by otolaryngologists performing these operations, but may also better inform the parents of children born with OFC about the risks and benefits of available therapeutic options.

Measures of Sleep-Related Movement in Children with Sleep Disordered Breathing.

Divya Gowthaman, Sarah Staley, Beth Osterbauer, Jeffrey Koempel, MD, Debra M. Don

Background: Contemporary studies have shown that children with sleep disordered breathing (SDB) have a higher likelihood of suffering from behavioral and neurocognitive problems such as attention and learning deficits. These daytime impairments are hypothesized to be due to sleep fragmentation, however, measurements of sleep architecture have failed to demonstrate significant differences in children with SDB when compared to non-snorers. More recently, it has been suggested that movements during sleep may be a sensitive marker of sleep fragmentation. Although children with SDB often present with restless sleep, very little research has focused on nighttime body movements and their possible link to sleep disruption in this population.
Objective: The purpose of this study was to evaluate sleep-related movements in children during polysomnography and determine if there is a correlation relative to the severity of SDB.
Methods: The polysomnograms of 201 children with SDB were retrospectively reviewed. A composite movement variable was created from evaluation of PSG epochs. Parameters recorded included leg movements, proximal limb movements and changes in body position. Measurements of sleep architecture were also noted. Subjects were classified by apnea hypopnea index (AHI) into those with primary snoring, mild, moderate and severe OSA. Additional information such as age, gender, BMI and ethnicity were gathered.
Results: Data analysis is currently in progress. Thus far, a comparison of movement variables between groups demonstrates a possible correlation between the frequency of nighttime movements and AHI severity.
Conclusion: Our findings suggest that sleep-related movements could be specific indicators of sleep fragmentation in children with SDB.

Intact Hyoid Bone at Revision Thyroglossal Duct Surgery

Jonathan K Huang, Jeffrey A. Koempel, Beth Osterbauer

Background: A routine hallmark of the surgical management of thyroglossal duct cysts/sinuses or remnants (TGDR) is removal of the center of the hyoid bone. This surgery may be complicated by recurrence necessitating another procedure if there is inadequate resection of existing disease, including the center of the hyoid bone, at the time of the initial procedure.
Objective: Determine the incidence of an intact hyoid bone during revision TGDR surgery at a single children's hospital in a large metropolitan area.

Methods: We reviewed all charts of patients who underwent a revision TGDR surgery at Children's Hospital Los Angeles between 1997 and 2016. Demographic information and medical and surgical histories were recorded including the finding of an intact hyoid bone at the time of the revision procedure.
Results: A total of 70 children underwent a revision TGDR surgery. An intact hyoid bone was present in 81%.
Conclusions: An intact hyoid bone is a common finding in revision TGDR procedures. Routine resection of the center of the hyoid in any case of a suspected or known TGDR would reduce the incidence of a second surgery.

Speech and Communication in Patients With Facial Paralysis

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Background: Facial nerve paralysis can result in a variety of functional and aesthetic consequences, affecting oral competency, expression of emotions, speech, and psychological wellbeing. Patient-reported, quality of life assessment instruments are routinely used in both research and clinical settings to quantify the impact of these consequences on daily living.
Although problems with speech in facial paralysis are frequently noted by both patients and clinicians, there has been little research describing the how facial paralysis affects verbal communication. Facial paralysis specific, patient-reported assessment instruments that are most widely used today do not evaluate symptoms relating to speech.
Objective: To describe how facial paralysis affects verbal communication and quantify the impact of impaired verbal communication on quality of life.
Methods: A national survey of patients with facial nerve paralysis was conducted. All participants in this study completed a validated, patient-reported quality of life assessment instrument that measures the degree to which the patient's problems with speech affects his or her participation in various speaking situations. Results were correlated to a facial paralysis specific, quality of life assessment instrument that provided a more comprehensive assessment of facial paralysis severity. All results were compared to a control group of healthy individuals with no history of facial paralysis or speech impairment.
Results: We hypothesize that the facial paralysis group will report significantly lower participation in speaking situations than the control group. We expect these outcomes to show a strong correlation to facial paralysis specific, quality of life measures.
Conclusion: Deficits in speech is an important consequence of facial nerve paralysis and can have a significant impact on patient quality of life. Utilizing a patient-reported quality of life instrument specific to verbal communication is a reliable way to evaluate the impact of speech related symptoms on the daily lives of patients with facial nerve paralysis.

Cox-2 Overexpression in Sinonasal Inverted Papilloma

David Lam, Kevin Hur, MD, Bozena Wrobel, MD

Background/Purpose/Goal/Hypothesis: Inverted papilloma (IP) is a benign sinonasal neoplasm where the standard of care is surgical resection. However, IPs that extend intrancranially or into the orbit are unresectable and there currently is no effective medical treatment available. Cyclooxygenase-2 (Cox-2), an enzyme involved in inflammation, has been reported to be overexpressed in other head and neck benign tumors. In this study, we hypothesize that Cox-2 is overexpressed in inverted papillomas.

Methods: Resected IP specimens from 2000-2016 at Keck Medical Center will be assessed for Cox-2 overexpression through immunohistochemical staining. A retrospective chart review of the IP samples will also be analyzed for risk factors including age, race/ethnicity, smoking, history of chronic sinusitis, and number of previous sinus surgeries.

Results: 17 specimens were included in the study. Data analysis has not been completed, however, an overexpression of Cox-2 is expected in IP specimens. We also predict that smoking is also likely to be a risk factor for IP development and prognosis. Currently, it has been observed that 100% of the IP patients in the study had a confirmed history of chronic sinusitis.

Summary/Conclusion: The overexpression of Cox-2 in IP represents a possible target for medical therapy. Further studies are warranted to evaluate the efficacy of Cox-2 inhibition in sinonasal IPs.

PALLIATIVE CARE

Concurrent Palliative Care to Improve Quality of Life for Patients with End-Stage Liver Disease (ESLD) in the Outpatient Setting

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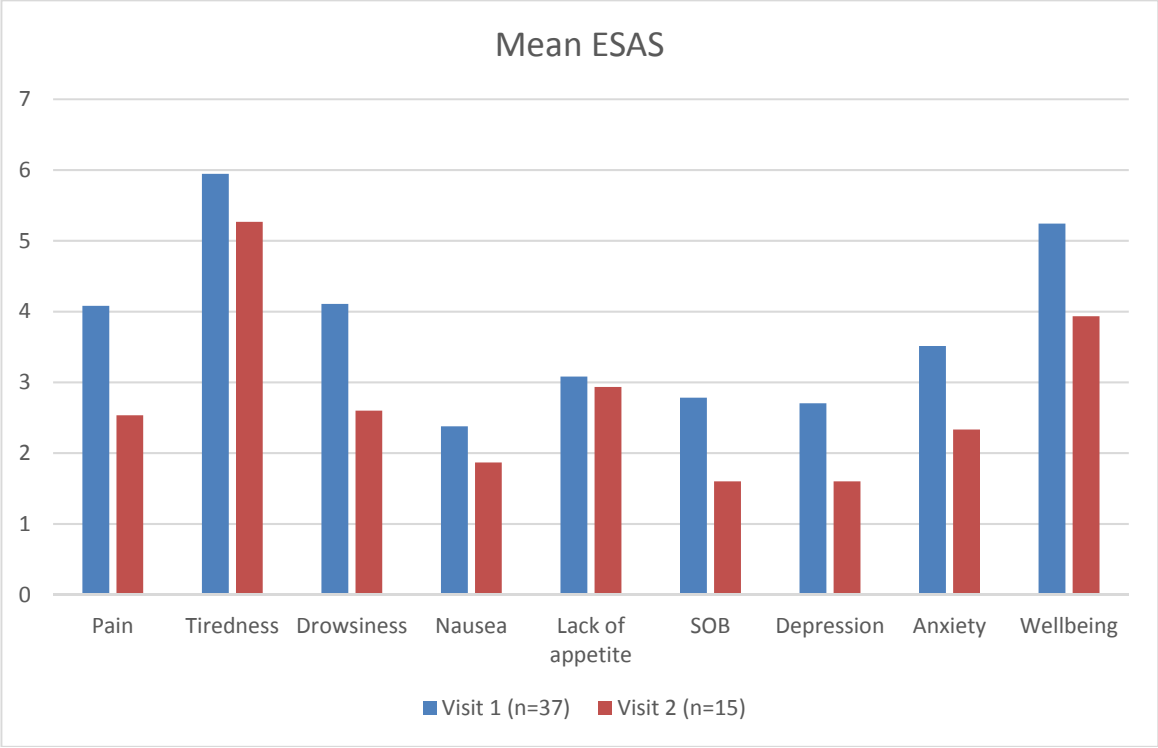
Background: Concurrent palliative care (CPC) refers to receiving whole-person care to relieve symptoms in addition to standard care. This approach is shown to improve quality of life for inpatient oncology patients, but has not been examined in the outpatient setting. We aim to assess the effectiveness of a CPC program for outpatient ESLD patients, who historically have heavy symptom burdens and poor outcomes.

Methods: CPC services are available for ESLD patients with a MELD score ≥20. Symptoms are assessed during the first and second visit. Primary outcomes are symptom improvement and appropriate documentation.

Results: 62 patients (mean age 51 [SD 11], 71% male) have enrolled since June 2016. 95% are Hispanic or Latinx, 74% speak Spanish as a primary language, 52% are undocumented immigrants. The etiology of ESLD for 76% of patients is alcohol use. Mean MELD score at enrollment is 24 (SD 4). 38 patients are still enrolled, 13 patients died, and 11 left the program. Of those no longer in the program, 100% had documentation of a comprehensive evaluation, social plan, and goals of care, and 46% completed an advance directive/POLST. At the time of enrollment, 13% of patients were eligible for a liver transplant, which increased to 31% after intervention. Symptoms improved between first and second visit (see figure).



Discussion: Preliminary data suggests that CPC services provides patients with symptomatic relief and engages them in conversations about their end-of-life care that increase autonomy. CPC services might also provide access to liver transplantation for those initially ineligible. This opposes the widely-held view of the medical community that accepting CPC services means forgoing curative treatments. Next, we will compare these outcomes to a retrospective group of ESLD patients at LAC+USC.

Analysis of the feasibility and acceptability of a concurrent palliative care and oncology clinic at Children's Hospital Los Angeles (CHLA).

Joshua Rice, BS; Alexa Manrriquez, BS; Debra Lotstein, MD

Background: The American Academy of Pediatrics has long recommended that palliative care be offered to children with life-threatening diseases at diagnosis and continued throughout treatment, whether the outcome ends in cure or death. Despite this, fewer than 60% of Children's Oncology Group centers offer palliative care services and a majority of children who do receive palliative care are referred very late in their illness.

Objective: To determine the feasibility and acceptability of a concurrent palliative care and oncology clinic at Children's Hospital Los Angeles.

Methods: A physician satisfaction survey was developed to gauge the feelings of select CHLA pediatric oncologists concerning the success of current palliative care treatment modalities, as well as the potential for future reforms, including a concurrent pediatric palliative care and oncology clinic. A retrospective chart review was performed for patients who participated in the trial run of a concurrent clinic at CHLA to determine what was accomplished during clinic visits, along with any potential impact on the frequency of emergency room visits, hospitalizations, hematology/oncology appointments, and palliative care visits. A phone survey was performed with patients who participated in the concurrent clinic to determine their level of satisfaction.

Results: Results of the physician satisfaction survey are currently pending responses from pediatric oncologists. Preliminary review of charts is inconclusive concerning the impact of the concurrent clinic on the relative frequency of hospital visits. They also indicate that clinicians' time spent with patients in the concurrent clinic was mainly allocated towards pain management and control, with minimal discussion of advanced care planning. The satisfaction survey of patients is still in progress.

Conclusions: As data collection and analysis are still underway, conclusions are currently undetermined.

PATIENT CARE QUALITY & SAFETY

Improving disparities in the time to treatment for non-small cell lung cancer at LAC+USC.

Antonio Hernandez Saenz, Sonia Lin M.D., Michael Hochman M.D, MPH, Sonali Saluja M.D.

Goal: A retrospective analysis of patients treated for non-small cell lung cancer between 2000 and 2016 at both LAC+USC and the Norris Comprehensive Cancer Center revealed a 12-day difference in the mean time from diagnosis to initial treatment. The current study aims to develop strategies for decreasing the time between diagnosis to therapy of non-small cell lung carcinoma at LAC+USC by at least 12 days.
Methods: The Plan-Do-Study-Act method will be used during implementation of this quality improvement study. Our quality improvement team will review survey based patient and physician feedback in order to identify both practical and effective measures in improving the access to timely care of patients with NSCLC at LAC+USC. The design of the study will include structured chart review to determine the effects of project implementation on the mean time (in days) from initial diagnosis to treatment.
Results: Expected results of project completion includes a minimum 12-day decrease in mean diagnosis to treatment of NSCLC patients at LAC+USC. Survey analysis is expected to identify bottlenecks in the workup of NSCLC that can serve as focused areas for development and improvement. Improved access to timely care may also result in a better patient experience and quality of care as outlined by established national measures
Implication of Research: Project implementation will elucidate feasible strategies for improving the access to timely care for patients with NSCLC at LAC+USC. Improved access to timely care may help establish a comparable length between initial diagnosis and treatment of NSCLC at LAC+USC and the Norris Comprehensive Cancer Center.

Impact of Electronic Medical Record on Resident Physician-Patient Interaction

Jean-Christophe N. Rwigema, MS2, Xiao Chen, MS1, Ian Jones, C. Thomas Vangsness, MD

Background and Goal: Transition from paper charts to electronic medical records (EMR) has vastly increased in the healthcare setting in an attempt to improve efficiency and reduce medical errors. Few studies have attempted to assess resident physician perceptions of EMR in Orthopaedic practice.[1,2] This study aims to better understand the impact that EMR has on physician-patient interaction in a large teaching hospital. The goal of this exploratory study is to assess the strength of correlation between resident and patient perceptions of EMR impact on doctor-patient communication via surveys. Results from this study may lead to improvements in clinical efficiency and quality of Orthopaedic resident training.
Methods: This study will utilize a cross-sectional cluster design. The surveys include questions that will evaluate how the presence of the EMR in the examination room affected perceived communication. No more than 500 total surveys will be collected, with a set minimum of 50. A standard 5-point Likert scale was used, with possible responses ranging from “very positive” to “very negative” (“no effect” response in the middle). Resident physicians will be given a general pre-visit survey that they will not have to complete again. The other surveys will be given to patients and resident physicians post-visit. The physician post-visit survey will consists of only 3 questions, and will be specific to the patient visit. All data sheets will be de-identified and entered into a master data bank. REDCap (Research Electronic Data Capture), a web-based application, will be used to store our data.
The association between patient demographics and ratings will be explored using spearman correlations and χ^2 tests, as applicable. The association of MD ratings and patient ratings will be explored using generalized estimating equations to allow for the nested data structure; each MD’s variance will be estimated. Effect sizes will be estimated to describe the size of the effects. Analyses will be performed using SPSS (v.24).

Results: Currently, data is being collected, and results are forthcoming. However, some initial trends show a contrast between resident and patient perceptions regarding EMR effect on aspects of relationship building, and attitudes towards time spent on EMR during interactions.

Spanish Pediatric Interpreter Usage at Night

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Background/Goal: Studies show that patients with limited English proficiency (LEP,) tend to have worse clinical outcomes and are less satisfied with their care. Our study seeks to determine if physician communication satisfaction differed between English speaking and LEP caregivers, and if time of admission or type of interpreter service affected this as well.
Methods: 326 caregivers were part of the prospective study, where a survey was used to determine satisfaction with physician communication. Participants were English and Spanish speaking caregivers of patients $\leq$ 18 years of age, who were admitted to either resident (56%), surgical (33%) or hospitalist (12%) care between July and December 2016. Participant responses were recorded as dichotomous variables (no improvement needed vs. some improvement needed.) There were 162 day-shift patients (7 am-7 pm), (82 Spanish speakers and 80 English speakers,) and 164 night-shift (7 pm-& 7 am,) patients (83 Spanish speaker and 81 English speakers.) All caregivers were surveyed within 24 hours of admission.
Results: Admission time was not found to influence caregivers' satisfaction. Spanish speakers were less likely to 1) report being satisfied with their physicians' communication (OR=.368, CI .193-.703, p=.002), and 2) feel their questions were answered by their doctor (OR .338, CI .204-.559, p<0.001,). Within Spanish speakers, those who used a certified in-person interpreter were more likely to understand their child's diagnosis compared to those that used an ad-hoc interpreter (66% vs. 39%; OR=2.97, CI 1.36-6.49, p=.006).
Conclusion: Spanish speaking caregivers were less likely to be satisfied with their physicians' communication, and within this group, those who used certified in-person interpreter were more likely to report understanding the patient's diagnosis and treatment, compared to LEPs who used ad-hoc interpreters.

PATIENT EDUCATION

Videos Informativos de Anatomía y Salud (VIDAS)

Chelsea Cohen, MSII, KSOM; Emma Montelongo, MD, Contra Costa Family Medicine Residency Program; Jo Marie Reilly, MD, KSOM

Purpose: The overall goal of this project is to determine whether brief educational videos are effective in assisting primary care physicians in the area of patient education. We hope to make incremental increases in patient understanding of women's health via linguistically and culturally sensitive educational videos that will empower women to make better choices about their care.
Methods: The study population for this project is women aged >18 years, who are Spanish-speaking or cite Spanish as their preferred language and who receive gynecologic care at USC-Eisner Family Medicine Center. We have conducted a needs assessment through focused interviews with patients. We then created two 3-4 minute videos about female reproductive anatomy and cervical cancer screening. The videos were created with culturally appropriate language and content in both Spanish and English. The endpoint of this phase of the study is to pilot the videos to 40 participants in their preferred language while they await their scheduled appointments at USC Eisner. Participants will complete a demographics survey as well as a knowledge-based assessment before and after viewing the videos.
Results: Results and statistical analyses still pending. The results of the surveys will be recorded in an encrypted Excel database and the results will be analyzed using STATA. A final analysis will be conducted at the end of the academic year, and the results will be presented to the clinic.
Conclusion: Upon completion of this phase of the study, we hope to have proven the effectiveness of such videos in patient education. The next phase of the study is to assess the utility of these videos in assisting primary care physicians during their typical clinic workflow. We hope to conduct a needs assessment among the physicians at USC Eisner, devise a method of introducing the education videos into their workflow, and then assess satisfaction among both the primary care physicians and their patients.

Educational intervention course to improve sleep and well-being in students at Francisco Bravo Medical Magnet High School

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Background: Teenage students, due to their shift in melatonin release time and especially those in competitive academics, are at risk for sleep deprivation, which can harm health, mood, and academics. We hypothesized that after an educational intervention, students would report increased sleep time per night, decreased depression, and improved knowledge regarding sleep.
Methods: A curriculum was created to teach high school freshman about sleep and its impact on health. Subjects were recruited through health class and underwent a 4-hour course, including a sleep behavior journal. Pre- and post-course surveys were given to measure subject depression, sleep hours, bed times, and knowledge about sleep. T-tests were used to analyze pre- to post-course change.
Results: Improvement of sleep time on school nights and weekend bed times were statistically significant. Subjects reported improvements in mood, tiredness, energy, and caffeine use. Students reported learning about how caffeine works, electronics effect on sleep, sleep effect on academics, and teenager melatonin clock shift. Their most common goal for change after this course was no electronic usage before bed, followed by no caffeine before bed, sleeping more, and going to bed at the same time every night. Before the course, 33% of subjects thought they slept enough, whereas 61% thought so after. Depression scores trended downward, as did the number of subjects in concerning territory (moderate or more severe depression).
Conclusion: Students were interested in learning about and improving their sleep. Education plus sleep habit change resulted in significant improvements in sleep hours and bed time consistency. A longitudinal follow-up survey would show whether the effects of this course persist over time.

PEDIATRICS

Hypotension is More Common Following Immediate versus Staged Silo Closure of Gastroschisis

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Background: Surgical repair of gastroschisis may place the abdominal contents under increased pressure and lead to adverse effects including cardiovascular insufficiency, respiratory compromise, and decreased organ perfusion. These adverse effects can potentially impact clinical outcomes.

Objectives: The purpose of this study is to describe the incidence of post-operative hypotension in neonates with gastroschisis and identify perioperative and baseline predictors of increased risk of hypotension.

Methods: This is a retrospective chart review of neonates admitted to Children's Hospital Los Angeles with diagnosis of gastroschisis between 2006 and 2016. Hypotension was defined as having had at least one occurrence of mean blood pressure below gestational age in numerical value within 12 hours following final surgical closure. Independent t-tests, Wilcoxon-Mann-Whitney test, Fisher's Exact test, and Pearson chi square were used to analyze the data.

Results: Among the 114 infants who underwent gastroschisis repair, 15 (13%) experienced post-operative hypotension. The hypotensive group included more non-Hispanic subjects (75% vs 47%, p=0.025) and more subjects born via cesarean section (80% vs 48%, p=0.025) than the non-hypotensive group (Table 1). Seven of 15 subjects (47%) with post-operative hypotension had undergone immediate repair rather than staged silo closure, as opposed to 17 of 99 (17%) in the non-hypotensive group (p=0.009). The hypotensive group had lower urine output postoperatively than the non-hypotensive group (2.6 ± 1.2 vs 3.9 ± 1.5 ml/kg/hr, p=0.004). Feeds were started earlier in the hypotensive group compared to the non-hypotensive group, but after adjustment for primary closure, there was no difference between the two groups. The two groups did not differ in days to reach full enteral feeds, length of stay, incidence of necrotizing enterocolitis, or mortality (Table 2).

Conclusions: Hypotension occurs commonly after gastroschisis repair and is associated with low urine output. Patients with hypotension were more likely to be non-Hispanic and delivered via cesarean section and to have had immediate repair rather than staged silo closure. These predictors may be of value in guiding management of this surgical population.

Table 1: Baseline Characteristics of Gastroschisis Repair Patients

Variable	**Non-Hypotensive (n=99)**	**Hypotensive (n=15)**	**p**
Gestational Age (weeks)*	37.1 (28.3 – 39.4)	36.1 (34.7 – 39.1)	0.7
Birthweight (kg)	2.43 ± 0.46	2.57 ± 0.51	0.3
Male (%)	50 (51)	10 (67)	0.2
Hispanic (%)	**74 (75)**	**7 (47)**	**0.025**

1-minute Apgar*	8 (1 – 9)	7 (2 – 8)	0.1
5-minute Apgar*	9 (4 – 10)	9 (4 – 9)	0.2
Cesarean section (%)	**47 (48)**	**12 (80)**	**0.026**
Bowel well-appearing (%)	86 (87)	12 (86)	0.6

* indicates variables presented as median (range) otherwise data are presented as mean ± SD or number (%).

Table 2: Perioperative and Clinical Outcomes of Gastroschisis Repair

Variable	**Non-Hypotensive (n=99)**	**Hypotensive (n=15)**	**P**
Required fluid boluses upon admission (%)*	76 (78)	12 (80)	0.7
Volume of fluid boluses upon admission (ml/kg)*	45 (10 – 150)	40 (10 – 90)	0.4
Immediate Repair (%)	**17 (17)**	**7 (47)**	**0.009**
Day of Closure*	8 (1 -21)	3 (1 -19)	0.07
Urine Output in first 24 post-operative hours*	**3.8 (1 -10.3)**	**2.6 (1 - 5.6)**	**0.004**
Required fluid boluses in first 24 post-operative hours (%)	36 (36)	8 (53)	0.3
Base excess in first 24 post-operative hours	-1.5 ± 4.0	-3.1 ± 3.3	0.2
Day of life feeds initiated*	**22 (8 – 170)**	**14 (8-51)**	**0.012**
Reached full enteral feeds at greater than median number of days (%)**	43 (47)	7 (58)	0.5
Total Parenteral Nutrition (days)*	31 (18-272)	34 (12 – 132)	0.7
Cholestasis (direct bilirubin ≥2mg/dL) (%)	36 (36)	4 (27)	0.3
Necrotizing Enterocolitis (%)	8 (8)	1 (7)	0.7
Invasive Mechanical Ventilation (days)*	12 (1 – 73)	8 (0 - 54)	0.1
Survived (%)	99 (100)	14 (93)	0.1
Length of Stay (days)*	35 (20 – 272)	40 (12 – 132)	0.9

* indicates variables presented as median (range) otherwise data are presented as mean ± SD or number (%).
** median to reach full enteral feeds was 33 days

Risk Factors Associated with Pediatric Testicular Torsion Salvage Rates

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Background: Testicular torsion is a medical emergency that necessitates rapid treatment in order to avoid consequences of ischemia. Published literature has identified that factors other than duration of symptoms may affect outcomes in pediatric testicular torsion cases. Although variables such as age, inter-hospital transfer, and race have been identified as potential risk factors for testicular salvage failure, there is disagreement among studies in whether these are all statistically significant.
Methods: A retrospective chart review was performed on testicular torsion cases that presented to Children's Hospital Los Angeles (CHLA) between August 2015 and September 2016. Patients between the ages of 12 weeks and 18 years old were included in the study.
Results: We identified 27 patients that had a surgical diagnosis of testicular torsion in the specified time period. We observed that testicular salvage was possible in 63% of these cases and that 37% of the patients in the study were transferred from an outside hospital. Preliminary data analysis has shown that patients below six years of age were more likely to undergo orchiectomy than those in age groups 6-12 or 12-18 (83.3% vs. 66.7% vs. 16.7%, p=0.01). Inter-hospital transfer and race were not found to have any effect on the outcomes of testicular salvage rates.
Conclusion: Our data has supported existing research that age is a significant risk factor in testicular torsion salvage rates. This finding may likely be attributed to a difference in symptom reporting between age groups. Further data collection is needed to determine whether other demographics and socioeconomic factors significantly affect the outcomes of pediatric testicular torsion cases.

Peri-operative outcomes of Congenital Central Hypoventilation Syndrome patients undergoing general anesthesia

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Purpose: Congenital central hypoventilation syndrome (CCHS) is a rare genetic disorder characterized by severe hypoventilation and autonomic dysfunction. Patients lack the necessary ventilatory responses to hypoxemia and hypercarbia and are thus prone to adverse events during the perioperative period. The objective of this study is to describe the perioperative outcomes of CCHS patients undergoing diaphragm pacer (DP) implantation under general anesthesia.
Methods: We conducted a retrospective analysis of 21 patients who underwent DP implantation surgeries at CHLA between January 2000 and May 2016. Data abstracted from charts included surgery duration, time to extubation, and perioperative courses.
Results: The mean surgery duration was 3.2 ± 0.5 hours. 19 patients were extubated to PPV via tracheostomy in the OR with a mean time to extubation of 4.0 ± 0.6 hours. Two patients, who did not have tracheostomies, were extubated to NPPV in PICU on post-operative day 1. Mean transition time to home ventilator or NPPV was 3.0 ± 2.7 days, and mean hospital stay was 5.0 ± 2.4 days. Anesthetic complications were experienced by 1 patient (4.8%) pre-operatively, 12 patients (57.1%) intra-operatively, and 17 patients (81.0%) post-operatively. Peri-operative complications are listed in Table 1.
Conclusions: CCHS patients are profoundly vulnerable to the cardiorespiratory effects of sedative and anesthetic agents. Therefore, they require vigilant monitoring and optimal ventilatory support in the perioperative period.

Table 1. Peri-Operative Anesthetic Complications

Complications	Frequency
Pre-Operative	
Hypoventilation with sedation	1 (4.8%)
Intra-Operative	
Bradycardia	3 (14.3%)
Hypotension	2 (9.5%)
Hypoxemia with 1 lung ventilation	5 (23.8%)
Bronchospasm	2 (9.5%)
Post-Operative	
Seizures	1 (4.8%)
Atelectasis	14 (66.7%)
Pneumonia	5 (23.8%)
Tachycardia	4 (19.0%)
Fever	3 (14.3%)
Urinary retention	3 (14.3%)
Nausea/vomiting	2 (9.5%)
Lactic acidosis	1 (4.8%)

Fitbits increase completion in a comprehensive pediatric weight loss program

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Background: Comprehensive behavioral family lifestyle intervention (CBFLI) programs result in the greatest, most sustained pediatric weight loss, but are time- and resource-intensive. Personal activity trackers (PATs) are economical and provide an accurate, objective measure of physical activity. We evaluated the effect of incorporating Fitbit PATs on CBFLI program completion.
Methods: Families who enrolled in the BodyWorks (BW) CBFLI program at Children's Hospital Los Angeles were recruited for the study and block randomized to either control (BW only) or intervention (BW+PAT). All adults in the intervention arm, as well as children ≥13 years old, received Fitbit Flex PATs. Physical activity was assessed for both groups using paper self-reported physical activity (SRPA) journals. Demographics were self-reported by parents; descriptive statistics were used for the analysis. Two independent samples-t-tests were conducted to examine the differences between the control group and the intervention group in terms of enrollment rates and completion rates for 7 cycles. Program completion was defined as attending at least 4 of 7 sessions.
Results: 115 families enrolled in the study. During enrollment, there were no statistically significant differences between the two groups, $t(12) = .38$, $p = .710$ (**Table 1**). Upon completion of the program, after 7 cycles there was a significant effect for program completion rates, with the BW+PAT group having a higher rate of completion (79.6%) than the BW only group (52.5%), $t(12) = -2.74$, $\boldsymbol{p < .05}$ (**Table 2**).
Conclusions: Families that received PATs completed BW at a higher rate than control families, suggesting that PATs may have an independent effect on program completion. Ongoing data collection will clarify if there are any differences in weight loss between control and intervention families at

program end as well as after program completion. Increased program completion may increase CBFLI cost-effectiveness and sustainability.

Table 1. Demographics of BW participants.

Characteristic	Value
Average household size	4.9
% Families living below 250% FPL	97.7
% Families living below 100% FPL	63.5
% Limited English Proficiency	68.3
% Who speak another language	84.8
% Spanish speakers	83.3
% Self-identify as Hispanic/Latino	85.6

BW = BodyWorks

FPL = 2016 Federal Poverty Level

Table 2. Completion rates of BW participants.

	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6	Cycle 7	ALL TOTAL	Mean (SD)
Families enrolled	14	27	14	20	17	12	11	**115**	
BW only	7	19	0	12	11	4	8	**61**	**8.71 (6.1)**
BW+PAT	7	8	14	8	6	8	3	**54**	**7.71 (3.3)**
% PAT	*50.0%*	*29.6%*	*100.0%*	*40.0%*	*35.3%*	*66.7%*	*27.3%*	***47.0%***	
Families completed	11	15	12	11	9	8	9	**75**	
BW only	4	9	0	5	7	1	6	**32**	**4.57 (3.21)**
BW+PAT	7	6	12	6	2	7	3	**43**	**6.14 (3.24)**
% PAT	*63.6%*	*40.0%*	*100.0%*	*54.5%*	*22.2%*	*87.5%*	*33.3%*	***57.3%***	
Completion rate	78.6%	55.6%	85.7%	55.0%	52.9%	66.7%	81.8%	**65.2%**	
BW only	57.1%	47.4%	-	41.7%	63.6%	25.0%	75.0%	**52.5%**	**0.44 (0.25)**
BW+PAT	100%	75.0%	85.7%	75.0%	33.3%	87.5%	100.0%	**79.6%**	**0.80 (0.23)**

BW = BodyWorks

PAT = Personal activity Tracker

Novel use of the Fitbit activity monitor and S+ device to measure sleep quality in children

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Background: Sleep disordered breathing (SDB) disorders represent a common problem affecting the pediatric population and can range in severity from primary snoring (PS) to obstructive sleep apnea (OSA). Even the least severe of these disorders (PS) in children has been implicated in the development of long-term neurocognitive and behavioral deficits. Polysomnography (PSG) has long been held as the gold standard for the diagnosis of SDB. Unfortunately, these are they not always easily accessible and can be time-, resource- and cost-intensive. The recent rise in commercially available technology has shown some promise in fulfilling the need for cheaper, more accessible alternatives by expanding options for field-based sleep monitoring and data collection. Here, we sought to test the validity and reliability of sleep data collected by both a wearable device (Fitbit) and a non-contact device (S+) as compared to polysomnography.

Methods: Subjects will be obtained from pediatric patients referred to ENT for a PSG and separated into those who snored (Target) and those who did not (Control). Individuals from both groups will wear a Fitbit device during their PSG and sleep with the S+ bedside device recording data throughout the night as well. Measurements to be taken for each patient include total sleep time, number of awakenings, wake after sleep onset, and sleep efficiency. These measurements will be compared between each device compared to the PSG.

Results: Results are pending.

Conclusion: The purpose of this pilot study was to determine whether commercial devices such as the Fitbit and S+ could reliably provide accurate measures of sleep. Depending on how well the data obtained from these devices compare to those gathered from the PSG, we may seek to expand the study to include further subjects. These devices may eventually be able to be used as a preliminary screening tool for SDB and, in doing so, help to alleviate the increasing demand for much costlier and less-accessible PSG studies.

Respiratory Tract Methicillin-Resistant *Staphylococcus aureus* (MRSA) in Pediatric Patients with Tracheostomy

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Background: In patients with cystic fibrosis (CF), detection of MRSA in respiratory culture is associated with decreased survival. Few studies have been completed on factors associated with respiratory MRSA in children with tracheostomy, another population with complex respiratory disease. We sought to analyze antibiotic resistance patterns of MRSA species infecting the respiratory tracts of pediatric patients with tracheostomy & determine the risk factors involved in acquiring an MRSA-positive respiratory culture.

Methods: We conducted a retrospective chart review on 297 patients ≤17 years of age who underwent tracheostomy placement at Children's Hospital Los Angeles (CHLA) between 1/1/2005 & 6/30/2014. We recorded MRSA isolate resistance patterns & used bivariable logistic regression to determine the relationship between patient risk factors & a post-discharge MRSA-positive culture.

Results: Of the 297 patients, 12% acquired a post-discharge MRSA-positive respiratory culture at a median time of acquisition of 342 days after tracheostomy placement. The odds of acquiring an MRSA-positive respiratory culture were higher for males (unadjusted OR=3.1; 95% CI=1.3-7.4) & Hispanic patients (unadjusted OR=2.3, 95% CI=.98-5.6). Of the MRSA isolates, 49% were susceptible to clindamycin, 97% to sulfamethoxazole/trimethoprim, & 100% to linezolid.
Conclusion: Preliminary analysis suggests that male gender is a risk factor for a post-discharge MRSA-positive respiratory culture in pediatric patients with tracheostomy. The antibiotic resistance patterns we found were similar to those seen in respiratory cultures of CF pediatric patients at CHLA. Further investigation should determine the clinical significance of MRSA respiratory tract acquisition in this population.

Resilience and its Impact on Arrest Rates after Adverse Childhood Experiences

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Background: Adverse childhood experiences (ACEs)—traumatic events occurring in youth—have been correlated with increased rates of arrest and incarceration. Resilience—the ability to adapt after traumatic experiences—may be a protective modifier on these poor outcomes. We hypothesize that resilience and ACEs are inversely related, and that high resilience may mitigate the risk of being arrested in those with high ACEs.
Methods: Participants aged 18-25 years were recruited from the inpatient wards at LAC+USC and given a questionnaire consisting of the Child and Youth Resilience Measure-12, questions on history of arrests/incarceration, and on ACEs. Data analysis was performed using rank regression for continuous outcomes and a logistic regression for dichotomous outcomes. Control variables included participants' gender, age, race/ethnicity, primary language, and country of origin.
Results: 62 participants were recruited and met inclusion/exclusion criteria. Resilience scores and high number of ACEs (≥4) were found to be inversely correlated (p=0.03). History of arrest was lower among adolescents with high resilience (p=0.045); however, no correlation between arrest history and high ACEs (score ≥4) was found in multivariate analysis (including resilience) (p=0.87). Increasing age was correlated with arrest history, however (p=0.0007).
Conclusion and Future Directions: We found a significant inverse association between resilience and arrest history, suggesting a potential target for interventions looking to reduce to the burden of incarceration. Additionally, while high ACEs were correlated with lower resilience, our findings did not confirm prior published findings correlating high ACEs and incarceration, suggesting resilience may be a potential confounder.

Methotrexate pharmacokinetics in obese pediatric patients diagnosed with acute lymphoblastic leukemia

Christopher Douglas; Etan Orgel, MD; Steven Mittelman, MD, PhD

Background/ Purpose/ Goal/ Hypothesis: Obesity is more prevalent in acute lymphoblastic leukemia (ALL) survivors compared to healthy controls and has been shown to be associated with poorer event-free survival. It has also been shown that obesity may influence chemotherapy drug pharmacokinetics. One of the key therapeutic agents given to pediatric ALL patients is Methotrexate (MTX). Although

nomograms are available for MTX dose clearance, data is limited on whether body fat percentage and/or body mass index (BMI) is associated with delayed clearance and MTX toxicity. We hypothesize that BMI and/or body fat % influences MTX pharmacokinetics, thereby increasing MTX toxicity and/or decreasing efficacy of chemotherapy in pediatric patients treated for ALL.
Methods: Previously collected data has been extracted and analyzed from a recently completed clinical trial. The study population included patients 10-21 years of age who were newly diagnosed with National Cancer Institute/Rome High-Risk B-Precursor ALL or T-cell and treated with similar frontline Children's Oncology Group regimens. The analysis includes 34 pediatric patients who received assessment of body fat percentage by dual-energy x-ray absorptiometry (DXA) and received four doses of high dose methotrexate during the interim maintenance phase of therapy. MTX was collected via venipuncture and levels were measured in serum via fluorescence polarization immunoassay. Data during the interim maintenance phase of therapy has been extracted, including the MTX dose and serum levels at 24, 42, and 48 hours after start of infusion, as well as other clinical data such as toxicities.
Results: Pending
Summary/ Conclusion: Based on previous studies, we speculate that BMI and/or body fat % will influence the pharmacokinetics of MTX.

Resource Utilization Patterns Using Non-Invasive Ventilation in Neonates with Respiratory Distress Syndrome

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Goal: The use of non-invasive ventilation (NIV) has increased in neonates with respiratory distress syndrome (RDS), however information on the subject is limited. Therefore, the objectives of this study are: (1) To describe the frequency of NIV and endotracheal intubation use in neonates diagnosed with RDS from 1997 to 2012 nationwide; (2) To describe resource utilization (length of stay [LOS], total hospital charges and costs) among NIV and endotracheal intubated groups.
Methods: Data was obtained from the National Healthcare Cost and Utilization (HCUP) KID database, for the years 1997-2012. Procedure and diagnosis codes were identified using ICD-9-CM codes. 1:1 matched propensity scoring (matching on baseline demographics and diagnoses) and multivariate regression analysis were used to describe differences between NIV and endotracheal intubated populations. Least squares linear regression was used to describe trends.
Results: A total of 595,254 patients out of 41,236,527 persons were identified with RDS. Of these patients, 12% received NIV exclusively and 51% were intubated. There was a statistically significant yearly increase in NIV use from 6% in 1997 to 17% use in 2012. Unadjusted LOS, total hospital charges and costs were significantly lower in the NIV group compared to the endotracheal intubation group. After matching, patients receiving NIV only were associated with shorter LOS [n=38,911 pairs]: (95%CI) 25 (25.3, 25.7) vs. 35 (34.2, 34.9) days, decreased group average costs [n=29,836 pairs]: ($/1k) (95%CI) 46.1 (45.5, 46.8) vs. 65.0 (64.1, 66.0), and decreased total hospital charges [n=38,911 pairs]: ($/1k) (95%CI) 130.3 (128.6, 132.1) vs. 192.1 (189.5, 194.6) compared to endotracheal intubated neonates. On multivariate regression, these trends persisted. NIV was significantly associated with decreased LOS (SE) 20 (0.26) days, decreased total hospital charges ($1/k) (SE) 76.54 (1.47) and costs ($1/k) (SE) 29.70 (0.78).

Conclusion: There was a three-fold increase in the use of non-Invasive ventilation within the 15-year study period among neonates with RDS. NIV use was associated with a significant reduction in total hospital charges and costs ($546 million). NIV was associated with decreased per patient length of stay, charges and costs when compared to intubated patients.

Metabolic and Metric Brain Differences in Preterm and Term Newborns with Congenital Heart Disease

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Objective: To better understand brain development in premature infants with CHD using short echo magnetic resonance spectroscopy.
Study design: Neonates with CHD undergoing clinically indicated MRI scans were recruited for this study. We compared term versus pre-term subjects with CHD, as well as a control group of pre-term patients without CHD. Short echo single-voxel MRS of parietal white matter, frontal white matter and grey matter were used to quantitate metabolites related to brain maturation and injury. Volumetric analysis was also performed to assess the effects of CHD on brain development.
Results: Elevated glutamate, asparatate and lactate levels may indicate increased damage in patients born prematurely with CHD. Reduced GABA, creatine and myo-inositol levels suggest possible further evidence of injury. Differences in brain size are evident as well, with the thalamus, cerebellum and biparietal diameter showing the biggest reductions.
Conclusion: Neonates with CHD often have delayed brain development and evidence of brain injury. Prematurity can exacerbate these problems. Future efforts should be made to study the effects of CHD and preterm birth to better understand how to address and potentially prevent neurodevelopmental anomalies.

Unplanned Extubation in Newborn Infants: Results of an Ongoing Quality Improvement Project

Aaron Hauck, Leo Langga, Kristi Kambestad, Narayan Iyer

Purpose of the Study: Previous research has shown that neonates are especially prone to unplanned extubation (UE). Currently, UE requiring reintubation is the 4th most common adverse event in neonatal intensive care units (NICUs) in the United states, and it is a costly drawback to the benefits NICU patients receive from intubation as it may lead to multiple adverse events. Studies over the last 30 years have shown UE rates ranging from .14 UEs/100 ventilation days to 5.3 UEs/100 ventilation days with no change in incidence over the past 5 years. Currently, there is no clear strategy in the literature that has been documented on good care practices in the NICU in order to lower the rate of UE.
Methods: Our goal through this study was that through a continuous quality improvement exercise, we would reduce our UE rates and maintain these gains over the long term. We prospectively collected data pertaining to every UE beginning in 2012 and started a regular Plan-Do-Study-Act cycle.
Results: Over this 4-year period there were 110 UE's with UE rates varying between 0 to 1.1 UE/100 ventilator days (Figure 1). The initial reduction in UE was not sustained with the UE rates increasing in the last 1 year of observation. Causes of UE changed over time with high endotracheal tube (ETT) being

more frequent between 2012-2014, while UE with ETT re-taping was more common in 2015-2016 (P value <0.05).
Conclusion: Initial gains in reducing UE rates have been hampered by new challenges, emphasizing the role of quality improvement as a long term, continuous process.

The Effect of Resilience on Depression after Adverse Childhood Experiences (ACEs) in Adolescents and Young Adults

Taisha Husbands, Hannah Marshall, Krista Ring, Julia Wang, Raeye Daniel, Ankit Shah, Randall Chan

Background: ACEs have been shown to be correlated with poor health outcomes, such as depression. ACEs and resiliency have both independently been shown to be associated with depression, but the correlation between ACEs and resiliency has not been thoroughly explored. We hypothesize that there is a negative correlation between ACEs and resilience in AYAs, but higher resilience may act as a mitigating factor for depression risk in AYAs with high ACEs.
Methods: Participants (n=61) from the general inpatient medical/surgical wards aged 18-25 years were given a survey that included the 10-question Center for Disease Control and Prevention/Kaiser ACE survey, the 12-question Child and Youth Resilience Measure, the Patient Health Questionnaire-2 among other questions. Regression was used to assess associations with outcomes with gender, age, race/ethnicity, primary language, and country of birth as control variables.
Results: An inverse correlation was found between high (≥4) ACEs and resilience (p=0.03). However, no significant correlation was found between risk of depression and either ACEs (p=0.86) or resilience (p=0.87), or the interaction between ACEs and resilience on depression (p=0.88). There appeared to be relationship with gender with males being at higher risk of depression, although this was not statistically significant (p=0.054).
Conclusions: High resilience does not appear to mitigate depression in AYAs with high ACEs as hypothesized. Interestingly, our study also did not confirm prior research linking ACEs and depression. An inverse correlation between ACEs and resilience was found, however, suggesting that those with high ACEs represent a vulnerable risk group unable to bounce back from trauma.

Evaluating a New Approach to Palliative Care at CHLA

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Background: Hospitalizations and invasive medical procedures can be traumatic and stressful for children with life-threatening conditions, caretakers and siblings. Although these children are excellent candidates for palliative care, they often do not receive these services. This project focuses on an attempt to address this gap in care and optimize the provision of palliative care at CHLA. The Comfort and Palliative Care Team (CPCT) hired two additional providers in order to implement a new staffing model—a two-team approach, one for inpatient and outpatient care. This approach was implemented in August 2016, and its goals, evaluated in this study, are two-fold: 1. Expand service delivery to increase inpatient palliative care capacity and patient satisfaction, 2. Expand service delivery to increase outpatient palliative care capacity, including the addition of a combined oncology palliative care clinic twice per month.
Methods: We administered the FAMCARE Scale, a 16-item survey that measures satisfaction with palliative care to parents or patients 18 years or older (n=32) before (May-July 2016) and after (November 2016) implementation of the model. To quantify changes in inpatient and outpatient clinical encounters, we extracted data from CHLA's electronic health record (EHR) at baseline and on a monthly

basis. Time from inpatient consult request to consult was sampled daily for a two-week period at baseline and quarterly for one year. We evaluated the time between (1) the first day each patient appeared on the Comfort and Palliative consult list to (2) the day a member of CPCT wrote a consult note in the EHR. We also tracked number of days until next available outpatient Pain and Palliative Care Clinic appointment.
Results: Number of inpatient encounters increased by 167%, 35 encounters (August 2015) to 93 encounters (November 2016). Average time from consult request to first inpatient consult visit decreased by 67%, approximately 72 hours in Q1 to 48 hours in Q4. Outpatient encounters increased above 5 (goal) for September and October 2016. Outpatient encounters from August 2015-August 2016 and November 2016 were between 3-5. Average time to next outpatient clinic appointment decreased below 4 weeks (goal) for Q1, Q3. Average time to next outpatient clinic appointment averaged more than 4 weeks for Q2, Q4. FAMCARE median overall score: pre-intervention, 90%; post-intervention, 89%. Target Areas (pre → post): Referrals to specialists (74% → 90%), Speed with which symptoms are treated (79% → 85%), Information provided about prognosis (80% → 85%), Family conferences (80% → 90%), Test and treatment follow up (86% → 75%), Test information (86% → 95%)
Conclusion: The data demonstrate evidence that CPCT expansion and implementation of a two-team approach increased inpatient capacity over the course of the year. The FAMCARE scale data identified 6 areas of improvement for the CPCT, 5 of which were improved upon in the follow-up survey. Overall, patient satisfaction did not worsen after implantation of the two-team model. Test and treatment follow-up remained unimproved, and the CPCT will focus on this area in the future. The data show challenges in sustaining increased outpatient patient volume. Barriers to improving outpatient care volume include high no-show rate, plateau in referrals from active combined clinics and holiday closures.

Hospital Admissions for Trauma and Resilience after Adverse Childhood Experiences

Hannah Marshall*, Krista Ring*, Julia Wang*, Raeye Daniel*, Taisha Husbands*, Ankit V. K. Shah, Randall Y. Chan
*equal contributors.

Background: Adverse childhood experiences (ACEs)—e.g. abuse or neglect–are a negative predictor of poor health outcomes such as heart disease and cancer. Resilience–the ability to recover from hardship—may mitigate the severity of some health and mental health outcomes.
Hypothesis: We hypothesize that adolescents and young adults with high ACE scores will have lower resilience and higher rates of admission due to trauma (e.g. car accidents, gunshot wounds).
Methods: Participants aged 18-25 years from the inpatient wards at LAC+USC were recruited. They were given a self-administered survey exploring demographics, ACEs, resilience, and secondary outcomes such as depression and history of arrest. Height, weight and reason for admission were abstracted from the medical record.
Results: Of 61 participants who met inclusion criteria, 54% has 2 or more ACEs, and 26.2% had 4 or more ACEs. Patients with 4 or more ACEs had significantly lower resilience scores compared to patients with less than 4 ACEs (3.02 vs 3.47; $p = 0.03$). There was no significant relationship between ACEs, resilience and trauma admissions. However, increasing age was observed to be correlated with likelihood of trauma admission ($p = 0.049$).
Conclusion: Our study showed a significant inverse correlation between ACEs and resilience, using a more comprehensive measure of resilience than previous studies. We did not find a correlative relationship between childhood adversity and trauma-related admissions, consistent with the limited prior published literature. The prevalence of high ACE scores seen in our sample of the Los Angeles

county population, however, underscores the need for greater practitioner awareness of ACEs in delivering care.

Summary of CHLA Door-to-OR Times in Cases of Pediatric Testicular Torsion

Nicholas McGlynn BS, Kevin Branch BS, Steve Kim MD, Juan Espinoza MD

Background: Rapid surgical intervention is critical to increasing the the probability of testicular salvage in cases of pediatric testicular torsion. If surgical detorsion does not occur within six hours of onset of symptoms, tissue viability rates drop. During surgery, if the testicle is deemed viable, orchiopexy is performed; if the testicle is deemed non-viable, orchiectomy is performed. This study aims to determine if average "door-to-OR" times differ in torsion cases that result in orchiectomy versus ones that result in orchiopexy at CHLA. Further, we look to identify if there are specific segments in the hospital timeline that differ in length between the two outcomes.
Methods: 28 cases of testicular torsion with subsequent emergent surgery were identified between years 2015 and 2016. A retrospective chart review was conducted to identify the procedure performed (orchiopexy [n=18] or orchiectomy [n=10]) and to record various timestamps in the hospital timeline. We then used t-tests to analyze if the length between these times significantly differed between the two outcomes.
Results: The overall mean time in cases of either orchiopexy or orchiectomy from triage to OR start was 3:43 (h:mm) [95% CI, 3:03,4:23]. The mean time from triage to OR start did not differ significantly in cases of orchiectomy versus orchiopexy (orchiectomy 3:14, orchiopexy 3.59, p=0.23). No significant differences were found in time of triage to first ER physician note, time from first ER physician note to ultrasound performance, time from first ER physicians note to first urology note, or time from initial urology note to OR start time.
Conclusions: Our review of 28 cases shows no significant differences in door-to-OR times between testicular torsion cases that result in orchiectomy versus orchiopexy. This suggests that other factors, such as mechanism of injury and time prior to arrival to our facility, may have a more significant role in determining tissue viability. Increasing our sample size through ongoing case review may provide additional insights.

Maternal Mental Health in Neurodevelopment of High Risk Infants

Jacqueline Morgen Medical Student; Dr. Douglas Vanderbilt, Advisor; Dr. Kelly Schifsky, Fellow; Dr. Alexis Deavenport-Saman, Advisor

Goal: A newborn receiving intensive interventions (e.g. cooling, ventilation, ECMO) can potentially affect maternal mental health, mother-child attachment, and the child's ultimate neurodevelopmental outcomes. We conducted a prospective longitudinal study to determine whether there is greater incidence of Post Traumatic Stress Disorder and Depression in mothers of High Risk Infant Survivors (HRIS) who received intensive interventions and whether developmental assessments of HRIS would reveal poorer developmental scores for those whose mothers suffered most.
Methods: HRIS and their mothers (n=45) were recruited at their 1-month follow-up-post-NICU at the High Risk Infant Care Clinic at Children's Hospital Los Angeles. Mothers completed a waiver, family history questionnaire, depression screening, and PTSD screening. At the 6-month follow-up appointment, mothers completed a depression screening, a PTSD screening, StimQ, and Social/Emotional and Adaptive Bayley Scales of Infant Development, and a professional conducted a Cognitive, Language, and Motor Bayley Scales of Infant Development assessment of the child. Longitudinal and cross-sectional comparisons were made.

Results: We have collected 1-month data from 45 subjects and 6-month data from 12 subjects. We are still actively recruiting patients for 1-month time points and following up for 6-month time points. We will begin data analysis soon.
Conclusion: We are expecting our data will show a higher incidence of maternal PTSD and Depression in mothers whose newborns underwent intensive interventions in the NICU. Further, we expect that the children of mothers who had worse PTSD and Depression scores will tend to have identifiable developmental deficiencies upon their evaluations at 6-8 months old. With this information, we hope to be able to improve mother and HRIS outcomes by supporting intervention strategies including counseling and more attachment-fostering activities for infants and parents early on in their NICU stay.

Patient needs assessment in inner city asthmatic children

Margarita Popova, Kenny Kwong, M.D.

Background: Chronic asthma is treated most effectively by utilizing disease-specific systems such as LAC+USC's mobile asthma program, the Breathmobile Program. Yet 30% of patients engaged in this program fail to achieve asthma control. There may be extrinsic factors that contribute towards failure to achieve disease control in 100% of patients. The aim of this study was to identify these barriers among inner city asthmatic children enrolled in the Breathmobile Program.
Methods: A 30-question survey instrument assessing patient satisfaction and needs was given to inner city asthmatic children enrolled in the Breathmobile program. Results were analyzed to identify unmet needs of these patients.
Results: 369 surveys were returned from 10/26/16-02/09/17. Rate of return was 44% (843 patient visits during this time period). Patients were enrolled in 3 Breathmobile units operating in South Los Angeles, San Fernando Valley, and East Los Angeles. Patients ranged from 4 to 18 years of age and were diagnosed with intermittent, mild, moderate, and severe asthma.
Seven questions that addressed patient satisfaction (on a scale of 0-3) and 22 questions that addressed specific needs (on a scale of 0-10) were statistically analyzed. Patients were generally satisfied with their experience at the Breathmobile Program (mean responses for the seven questions ranged from 2.60-2.88). Five questions about specific needs were identified as having the lowest scores: paying for medications (mean=6.97), getting a spacer/aerochamber (mean=8.89), getting a nebulizer (mean=8.08), making an emergency appointment (mean=8.53), and finding parking for the appointment (mean=8.55).
Conclusion: Extrinsic factors may contribute to preventing inner city children from achieving asthma control. While there were 4 areas directly involved in disease care that were identified, 1 area in regards to parking availability was found to be an unmet need among these patients. Rectification of these patient needs may result in better asthma control in these patients.

Resource Utilization for Neonates with Trisomy 13 in California

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Background: While it is recognized that Trisomy 13 and Trisomy 18 in neonates is associated with significant mortality, there is limited information regarding health care resource utilization and predictors of length of stay (LOS) and total hospital charges.

Objective: (1) To determine if health care resource utilization differed for survivors versus non-survivors (2) To identify predictors of LOS and total hospital charges
Design/Methods: We studied data sets of Linked PDD/birth cohort from the California Office of Statewide Health Planning and Development (OSHPD) for the years 2006-2010. Trisomy 13 and Trisomy 18 patients were identified using ICD-9-CM codes (758.1 and 758.2); survival to discharge was determined based on OSHPD disposition codes. Bivariate tests were used to compare characteristics of survivors and non-survivors. Multivariable (MV) analysis was completed to identify predictors of LOS and total hospital charges.
Results: 2,523,368 observations were identified based on the population from 2006-2010. Out of 76 patients identified as Trisomy 13 and 115 patients as Trisomy 18, mortality was 27.6% and 20.9%, respectively. Comorbidities were assessed including cardiovascular, gastrointestinal, genitourinary, musculoskeletal and neurologic diseases. Statistically significant differences were observed for several variables for survivors versus non-survivors outlined in the table. On MV analysis, adjusting for gender, ethnicity, DNR, insurance and co-morbidities, >96 hours of mechanical ventilation was associated with an increased LOS both for Trisomy 13 (18.0 ± 5.3 days) and Trisomy 18 (36.8 ± 6.9 days). Private coverage was associated with an increased LOS (SE) for 10.8 (4.9) days compared with Medi-Cal for Trisomy 13 patients. The utilization of mechanical ventilation was associated with increased total hospital charges (SE) for 399k (85k) dollars with Trisomy 13 patients and 365k (59k) dollars with Trisomy 18 patients, adjusting for gender, ethnicity, DNR, insurance and co-morbidities.
Conclusion: For Trisomy 13 non-survivors, there was statistically significant more use of mechanical ventilation. Trisomy 18 non-survivors had statistically significantly more Hispanic, more DNR order, less home-based admission source than survivors. Independent of other predictors, mechanical ventilation increased LOS and total hospital charges for both Trisomy 13 and 18 patients. We identified several factors that could affect health care delivery for these high-risk populations.

The Effect of Adverse Childhood Experiences and Resilience on Substance Abuse in Adolescents and Young Adults

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Background: Adverse childhood experiences have been shown to have a dose-response relationship with substance abuse. Studies on resilience, or the ability to adapt despite trauma, have identified factors such as parental support, social engagement, and self-efficacy that are protective against the effects of ACEs. The relationship between ACEs and resilience and the effects of resilience on substance abuse is unclear.
Methods: Surveys administered included the 12-question Child and Youth Resilience Measure; the CRAFFT survey to screen for drug and/or alcohol abuse; as well as the 10-question CDC / Kaiser ACE survey. Associations were assessed using rank regression for continuous outcomes and logistic regression for dichotomous outcomes with gender, age, race/ethnicity, primary language and country of birth as control variables.
Results: Participants 18-25 years were recruited from an inpatient ward and 62 met inclusion/exclusion criteria. Using a 10-point scale, 26.2% of patients reported ≥4 ACEs. Patients with ≥4 ACEs had significantly lower resilience compared to patients with < 4 ACEs (3.02 vs 3.47; $p = 0.03$). The CRAFFT scores of low and high ACE participants were not found to be different ($p = 1$). Although not significant, a trend towards inverse correlation was noted between resilience and use of illicit drugs ($p = .157$).

Conclusion: AYAs with more adverse childhood experience exhibit lower resilience. Although ACEs were not correlated with alcohol or drug use in AYAs, resilience may be protective against drug use. These findings highlight the importance of further research into how trauma affects substance abuse in young people and the possible benefits of developing resilience interventions.

Evaluating Safety of Endotracheal Intubation in Infants Admitted to LAC+USC Medical Center Neonatal Intensive Care Unit.

Francesca Ross B.S., Fiona Wertheimer DO, Manoj Biniwale MD

Background: Infants in the Neonatal Intensive Care Unit (NICU) undergoing intubation may have high rates of adverse events, but there is limited research available about the factors contributing to these adverse events in this population. This study aims to identify factors that correlate with adverse events associated with intubation.
Methods: A retrospective chart review was conducted to collect data through medical records from infants admitted to the NICU at LAC+USC Medical Center who had intubations performed in the NICU, Emergency Department and delivery room from December 2014 to June 2016. The primary outcome was to identify intubations with adverse events, and variables associated with these events including number of intubation attempts, personnel performing intubations and medications received prior to intubation.
Results: To date, 99 intubations have been evaluated. Gestational age of patients ranged from 22-41 weeks, with a mean of 29.76 weeks. Weight at the time of intubation ranged from 340 - 4420 g, with a mean of 1821.56 g. Adverse events documented included cardiopulmonary resuscitation (CPR) with medications, oral/airway bleeding, chest rigidity, esophageal intubation, hypotension, hypoxia and bradycardia.
There were 26 intubations associated with at least one adverse event (26.3% of total intubations). Seventeen of the 26 adverse events were associated with more than one intubation attempt (65.28%), and 10 of the 26 adverse events were associated with premedication administration (38.46%). The most common adverse events were bradycardia (10 occurrences), oral/airway bleeding (9 occurrences), hypoxia (8 occurrences) and CPR with medications given (8 occurrences).
Conclusions: These preliminary results show that a significant number of neonatal intubations are associated with adverse events. Multiple intubation attempts and the administration of medications prior to intubation are the most common factors associated with adverse events. Data collection from previous years and multivariate analysis is ongoing.

Language Barriers Impact Access to Services for Children with Autism Spectrum Disorders

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Purpose. Racial and ethnic disparities in accessing health care have been described in children with autism spectrum disorder (ASD). The purpose of this study was to examine the influence of current ethnic and acculturation differences, with an emphasis on parental primary language, on involvement in ASD-specific services within the developmental disabilities and school systems of a culturally diverse state. We hypothesized that (1) Hispanic children with ASD and children with ASD whose parents' primary language was not English were less likely to be enrolled in state disability programs and

received fewer hours of direct ASD-related services per week; and (2) Hispanic children with ASD and children with ASD whose parents' primary language was not English were less likely to have social skills goals and communication skills goals listed in their IEP; both when compared to non-Hispanic children and children of primary English speaking parents, respectively.

Methods. Data for this study were collected through a retrospective chart review. To examine the associations between ethnicity, primary language, and outcomes, a series of multiple regression analyses were conducted. Logistic regression was used to model the relationship between predictors of interest and binary outcomes, and linear regression was used to examine effects on number of hours of direct services per week.

Results. Parental primary language being English was significantly associated with a higher likelihood of their child's IEP containing social skills goals (OR=4.81, p=0.001), and communication skills goals (OR=11.00, p=0.007) and with accessing a greater number of hours of services from the CA DDS (β=0.24, p=0.03) while controlling for demographic factors. Neither ethnicity nor parental primary language significantly affected whether a child was enrolled in direct services from the CA DDS. Hispanic ethnicity alone did not significantly affect any measured outcome.

Summary. Our results show that, on balance, children of parents whose first language is not English utilize less ASD-related intervention services and are less likely to have ASD-specific goals listed in their IEPs. This discrepancy may reflect the heightened challenge faced by parents whose primary language is not English to advocate for direct services and specific, appropriate IEP content for their child. Considering community-wide goals of equity and cost reduction, more research must be conducted to understand the origin of acculturation differences and how they affect the global treatment of children with ASD.

Understanding the mechanism of PID1 growth inhibition

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Hematology/Oncology Department, KSOM

Background: PID1 (**P**hosphotyrosine **I**nteraction **D**omain containing **1**) is known as an inhibitor of insulin receptor signaling and disruptor of mitochondrial function. The Epstein lab showed that PID1 is a growth suppressor in brain tumors (medulloblastomas and gliomas, PMID: 24300787). The mechanism proved unrelated to insulin receptor signaling and remained unknown. We hypothesized that PID1 modulates signaling of another cell surface receptor.

Methods: To test our hypothesis we used mouse embryo fibroblasts (MEFs) expressing native PID1 or lacking it. Using flow cytometry and biotinylated ligand complexed to Alexa Fluor® 647 Streptavidin we analyzed MEF fluorescence as a measure of binding and uptake of the ligand. We also analyzed the cells by immunofluorescence microscopy.

Results: My poster will demonstrate the mild differences in fluorescence between cells expressing PID1 and those lacking it. Work is currently underway to further dissect these differences.

Conclusions: The mild difference in fluorescence between cells expressing PID1 and those lacking it suggest that PID1 may modulate this receptor's signaling, but that this may not be the main mode of its growth-suppressive effect. Experiments in the Epstein lab will build on this work to further dissect the mechanism.

Resource Utilization in the United States for Neonates with Hypoplastic Left Heart Syndrome

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Purpose: Hypoplastic left heart syndrome (HLHS) causes significant neonatal mortality, but little is known regarding health care resource utilization for survivors. The two objectives are to determine if health care resource utilization differed for survivors versus non-survivors and to identify predictors of length of stay (LOS) and charges.
Methods: Data from the national Health Care Cost and Utilization Project, Kids' Inpatient Database were abstracted for neonates ≤ 28 days old at admission with HLHS using ICD-9-code 746.7 for 1997-2012. Survival to discharge was determined by the data element "died during hospitalization." Surgical admissions were identified by Stage 1 palliation as either Norwood with modified Blalock-Taussig shunt (BTS) ICD-9-code 39.0 or as Norwood with Sano modification (SANO) ICD-9-code 35.92. Hospital costs were adjusted for inflation. Bivariate tests compared characteristics of survivors and non-survivors. Multivariate (MV) analysis identified predictors of LOS and hospital cost.
Results: We identified 3,174 surgical admissions for HLHS during 1997-2012 with a neonatal mortality of 23%. Bivariate analysis showed significant differences between survivors v. non-survivors. On MV analysis among survivors, adjusting for gender, hospital size, comorbidities, and year, use of extracorporeal membrane oxygenation (ECMO) was associated with increased LOS (SE) 26±3 days. Private insurance was associated with shorter LOS 6±2 days compared to Medicaid. Hospital regions in the midwest and south were associated with increased LOS compared to the northeast, 9±3 days and 13±3 days respectively.
Conclusions: ECMO use was associated with longer LOS for HLHS survivors. More non-survivors required ECMO, however daily hospitalization cost incurred by non-survivors was less than survivors. Disparities in LOS among survivors between hospital regionalization and insurance may underlie differences in healthcare delivery in this high risk population.

Impact of Resilience on Obesity in Adolescents with Adverse Childhood Experiences

Julia Wang, Raeye Daniel, Taisha Husbands, Hannah Marshall, Krista Ring, Ankit Shah, Randall Chan

Background: Experiencing adverse childhood experiences (ACEs) correlates with poor health outcomes later in life, including obesity. Resilience—the ability to cope with trauma—is thought to potentially mitigate the effects of high ACEs. Any possible impact of resilience on the relationship of high ACEs and obesity is unknown.
Hypothesis: High resilience in adolescents and young adults mitigates the negative effects of high ACEs on obesity.
Methods: LAC+USC inpatients aged 18 to 25 were recruited from general medical and surgical wards. Participants answered questions that included ACEs, the Childhood and Youth Resilience Measure, and demographic information. Height, weight, blood pressure, and reason for admission were taken from the medical record. Data was analyzed using rank regression for continuous outcomes and logistic regression for dichotomous outcomes with gender, age, race/ethnicity, primary language, and country of birth as control variables.

Results: In total, 61 participants were recruited. Participants with ≥4 ACEs had significantly lower resilience (p=0.03) and were more likely to be obese (p=0.047). While not statistically significant, resilience appeared to lower risk of obesity in participants with ≥4 ACEs (p=0.054).
Conclusion: There is an inverse correlation between ACEs and resilience among adolescents and young adults, and resilience may possibly reduce the effect of high ACEs on likelihood of obesity. These findings suggest further study is needed, with a possible potential to investigate whether interventions to increase resilience may have an impact.

PUBLIC HEALTH

YouHeaL: A multi-level empowerment program to train minority youth as peer health educators to address obesity in South Los Angeles

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Background: Youth obesity is a health crisis disproportionately affecting Hispanics and African-Americans. In South Los Angeles (S. LA) 29% of 10-15-year-olds are obese, exceeding national averages. Obesity prevention that targets diet and exercise is often not effective. Sustainability and scalability to larger populations are limits of current programs.

Methods: Using the USC Minority Youth Leaders in Action (MYLA) as a model, we applied a Freirean Empowerment Education approach to develop the Youth Health Leadership Program (YouHeaL): a three-phase, community-based, culturally-tailored intervention to be implemented weekly for one year in S. LA. The evidence-based program trains predominantly minority youth to empower peers to address individual and social determinants of obesity through serving in the following sequential roles:

Phase 1: Local Community Health Promoters (CHP) who implement original obesity-prevention projects

Phase 2: Peer Health Mentors (PHM) who organize, train and accompany peers to serve as CHPs

Phase 3: Peer Health Leaders (PHL) who train and accompany CHPs to serve as PHMs (Figure 1)

Our goal is to demonstrate the capacity of a novel health empowerment approach to multiply the initial participation of 10 youths into a self-sustaining, capacity-building program with 70 participants within one year. Interest forms were distributed to high school students at New Designs Charter School University Park. The YouHeaL program's effectiveness will be assessed as described below.

Results: 106 out of 400 students (27%) completed an interest form. Upon starting the YouHeaL program, we anticipate some CHPs and PHMs will enter the next phase while others continue in their current role. We expect to find decreases in tricep skinfold and waist circumference, increases in self-efficacy and empowerment scores, and improvements in dietary intake and physical activity after each phase.

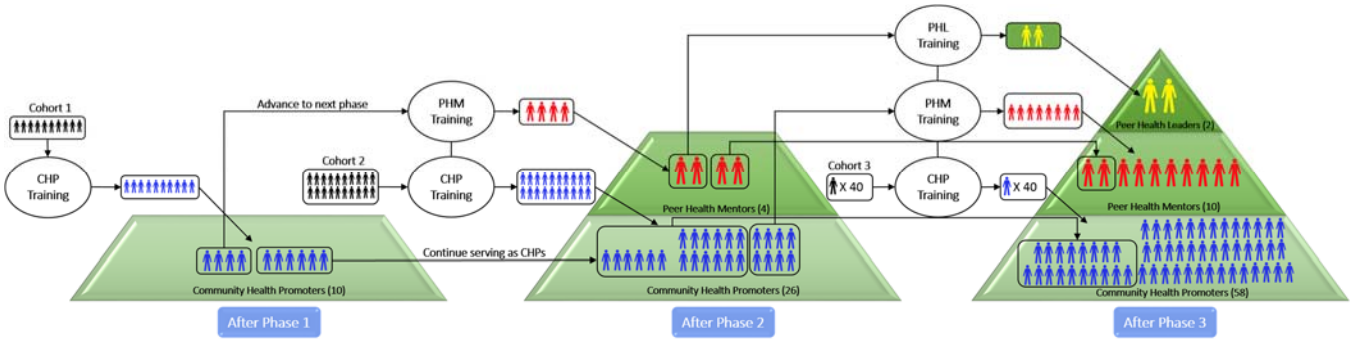

Figure 1: The educational model of the YouHeaL intervention depicts the progress of youth participants through CHP, PHM and PHL roles as they, in-turn, take community action and train addition youth cohorts

Cholera Outbreak Investigation in Sebeta, Ethiopia

Detti Belina, Yoseph Worku, Michael Cousineau, St. Paul's Medical Millennium College Medical College Department of Public Health, Keck School of Medicine Department of Public Health

Goal: An outbreak of Cholera occurred in the city of Addis Ababa, Ethiopia and subsequently in the towns surrounding the capital city including Sebeta this past Summer of 2016. We are working towards identifying the risk factors that propagated the spread of the disease and potential sources of the outbreak.
Methods: We interviewed cases and controls in the community of Sebeta at treatment facilities and homes to ascertain various risk factors for Cholera infection. We also visited several areas looking for potential sources of infection with the Department of Water including restaurants, homes, public areas, and more. We are still in the process of compiling our data collected by different departments and are working to analyze data to understand the factor influencing disease contraction.
Results: We are currently working towards analyzing the risk factors that predispose residents to Cholera infection. Some of the risk factors include travel history, eating outside of the home, various drinking water sources, water treatment method, latrine usage, hand washing practices, and community awareness.
Conclusions: So far the data we have seen indicates certain risk factors are indicated in Cholera infection. We are still in the process of data compilation and analysis, but we expect that individuals who maintain hygienic practices in the home (hand washing, sanitary latrine, etc.) and with more education are less likely to become infected with Cholera.

Review of Well-Child Visits in Low Volume Department of Public Health Medical Clinics

Amrit Dosanjh [Medical Student, Keck School of Medicine], Michael Cousineau [Advisor and Professor, Keck School of Medicine and the Price School of Public Policy]

Goal: This study was performed with the Maternal, Child, and Adolescent Health section of the Department of Public Health (city name retracted for anonymity), focusing on the well child visits in a with a low volume of pediatric patients. There is concern that family physicians in community clinics with few pediatric patients may face challenges in providing a high quality of care, especially given the acuity of their adult patients. The goal of this study is to identify ways to support these physicians in order to improve quality of care.
Methods: Charts of all pediatric visits from one community clinic from Jan-Oct 2015 were pulled and assessed to identify those that were well child checks. From these, several categories of data were assessed, including, but not limited to: insurance type, vaccination schedule adherence, tobacco exposure, developmental milestones, nutrition screening, blood pressure, physical exam, and growth issues. This data will be analyzed to assess quality of care and utilized to perform a root cause analysis of lapses in care.
Results: Out of 141 well child visits, 54% of patients were brought up to date on immunizations. 54% of overweight patients were not counselled about their weight gain. One clinician did not record any family history during their well child checks (Physician 1, n=7). Some results varied more by provider. For example, Physician 1 recorded 100% of responses for nutrition and physical health screening questions in children under 5 years old, while Provider 3 recorded answers 33% of these questions.
Conclusions: These data show that providers at this clinic would benefit from support in providing pediatric care. Many of the patients were often given the type of care that would be provided to an adult. Some ways to improve the quality of care would be to provide training sessions addressing the specific concerns that arose in this study or to publicize the hotline already present in this system for physicians who need help to call a colleague to discuss the case.

Assessing the Inclusion of NCD-Related Content into UN Development Assistance Framework Documents.

Jessica Farmer, Keck School of Medicine at the University of Southern California; James Murray, Maxwell School of Public Administration & International Affairs at Syracuse University; Dudley Tarlton, United Nations Development Program (UNDP).

Background: The burden of non-communicable diseases (NCDs) in low- and middle-income countries (LMICs) has steadily increased over the past decades. To address this issue, UNDP advocates for multisectoral cooperation among diverse national sectors such as health, agriculture, and trade. UNDP provides guidance in the development of the country's UN Development Assistance Framework document (UNDAF), a strategic agreement between the UN country team and the national government. This project developed and applied a rating system for the level of NCD-related content in current UNDAFs and a generation prior. The system can be used to assess the trends in NCD policy and help guide development of future UNDAFs.
Methods: We defined and ranked categories of UNDAF NCD content from least to most robust. Point values were weighted to reflect the relative importance of the categories, a process informed by relevant UNDP and WHO recommendations. We then applied the rating system in a review of current generation UNDAFs (start year 2012 or later) that referenced NCDs (n=62). We also reviewed the generation immediately prior (n=25) to assess trends.
Results: The mean score for NCD-related content in the current generation of UNDAFs was 4.1 ± 3.8, with scores ranging from 0.0 to 16.7 out of the possible 18. Of the countries (n=22) with current and previous generations of UNDAF, the current mean was 6.6 ± 5.1 compared to the previous mean of 1.9 ± 2.2. A paired t-test on the groups showed a statistically significant average difference in scores of 4.7 points (95%CI 2.5 to 7.0), $p<0.01$.
Conclusions: Though there is a high degree of variability of NCD content in LMICs' UNDAFs, it is encouraging to see a trend of increased amount and quality of content discussed and incorporated into results frameworks over time. The rating system that was developed in this project may be further adjusted to better reflect best practices in NCD policy-making and used to guide development of future frameworks.

Does absolute humidity predict influenza outbreaks in South Africa?

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[a]Keck School of Medicine at USC, [b]USC Institute for Global Health, [c]UCLA Joint Institute for Regional Earth System Science & Engineering, [d]NASA Jet Propulsion Laboratory (JPL), [e]National Institute for Communicable Diseases (NICD), South Africa, [f]Centers for Disease Control and Prevention.

Background: Multiple studies have shown an association between influenza outbreaks and anomalously low absolute humidity in North America. Scientists at JPL have developed a SIRS-type outbreak prediction model using surface humidity from the Atmospheric Infrared Sounder (AIRS) and flu incidence data. The goal of this study is to validate this model.
Hypothesis: We hypothesize that anomalously low absolute humidity predicts influenza outbreak onset in South Africa.
Methods: Influenza data from three databases *(Table 1)* was standardized and plotted by year and province. Three provinces (Gauteng, Kwazulu-Natal, West Cape) demonstrated adequate coverage of influenza cases by at least one database. Near-surface water mass mixing ratio from AIRS was used as a proxy for absolute humidity. Humidity anomaly values were calculated for 2003-2015.

Results: Flu peak timing and seasonal trends were comparable between databases across season and province. Outbreak count averages from 2006-2015 for each province demonstrated a bimodal peak distribution around epidemiologic weeks 24 and 33 (*Figure 1*). Average humidity values for 2003-2015 were lowest in July and August. KZP and GAP demonstrated substantially more climatic variability between summer and winter than WCP *(Figure 2).*

Conclusions: This study is not concluded. Next, we will associate absolute humidity anomalies with outbreak timing. Our current results agree with published work on influenza epidemiology and climate research in South Africa. A reliable flu prediction model will augment outbreak prevention strategies, especially in under-resourced countries that struggle with high flu mortality rates.*Table 1. Database sources and provinces covered. *2009 was excluded for all analyses.*

Database	Provinces Covered	Years Available*	Source
Google Flu Trends	GAP, KZP, WCP	2006-2015. 2007-2015 for KZP	Shared by Google. Publicly available.
Viral Watch Program	GAP, WCP	2006-2015	South African NICD
Corporate Warehouse Database	GAP, WCP	2006-2015	South African NICD

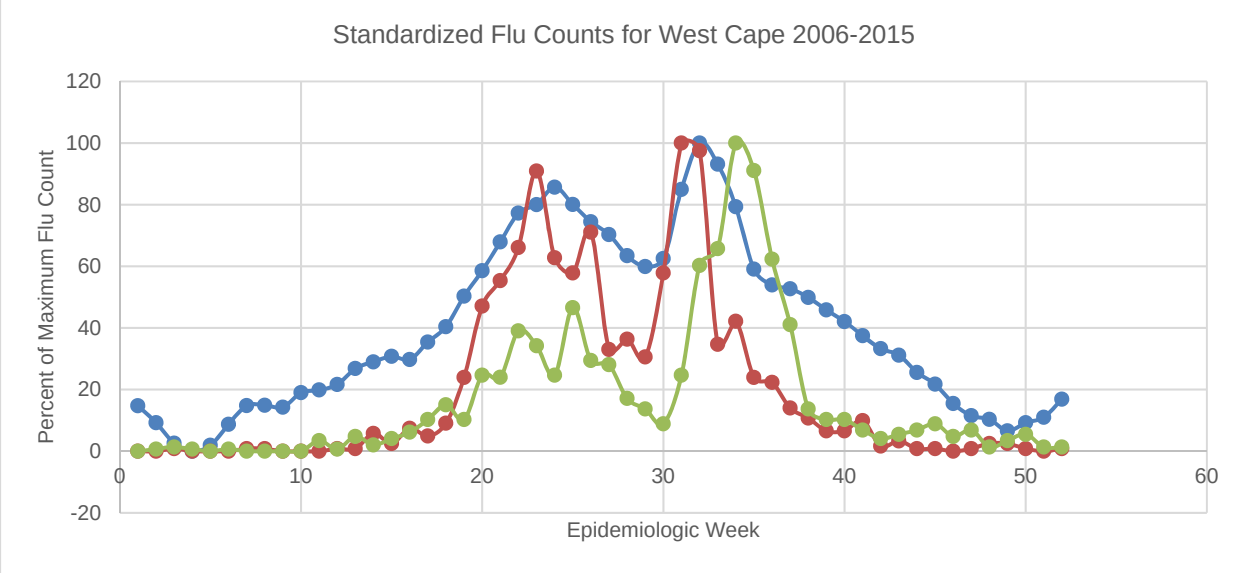

Figure 1. Flu counts in WCP were averaged and standardized over a 9-season period for the GFT (blue), VWP (orange), and CWD (gray) databases.

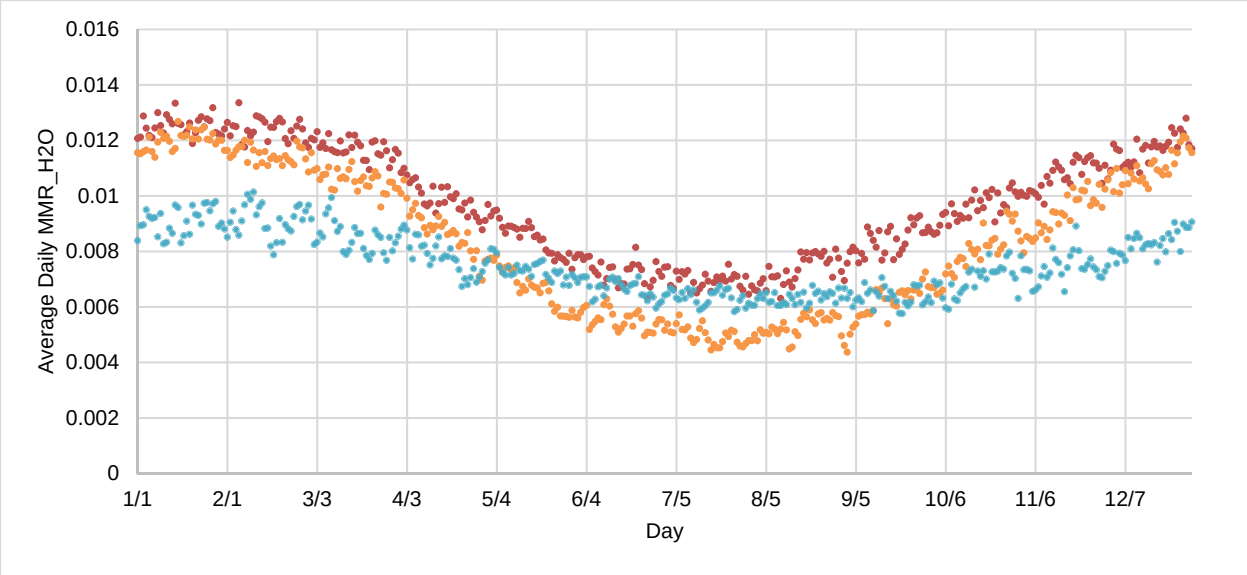

Figure 2. Average daily humidity values for GAP (green), WCP (blue), and KZP (orange) from 2003 to 2015.

Point-of-Care Serum Testing to Identify Iron Deficiency Anemia in Bocas del Toro, Panama

Dominic Rodriguez, Ben Tiano, Dr. Elahe Nezami

Background: Iron deficiency anemia (IDA) remains one of the most preventable yet disabling malnutrition-related ailments around the world. IDA affects women and children with a greater burden than men due to its association with low birth weight, hindered cognitive and muscular development, and increase in maternal and infant mortality. Marginalized populations such as that of Bocas del Toro, Panama, lack the adequate resources to address this issue with even as simple a solution as iron-fortified foods. The presence of parasites and tropical diseases that exacerbate anemic symptoms makes it even more critical to develop a sustainable, feasible, and effective solution to this issue. This project aimed to implement an efficient monitoring system for diagnosis and treatment of IDA, with the primary goal of gaining a better idea of IDA prevalence in this population.

Methods: All female patients seen at Floating Doctors' clinic between the ages of 14 and 60 were evaluated for IDA using a HemoCue machine, a portable and reliable method of testing. Pregnancy status was also noted. After hemoglobin levels were assessed, compliant patients with the direst deficiency were treated immediately with iron supplements, and pregnant women were given prenatal vitamins containing iron. A statistical analysis of IDA prevalence both among the general Ngabe population that was assessed and among pregnant Ngabe females was performed for comparison with the same respective populations in industrialized nations.

Results: Overall prevalence of IDA among evaluated Ngabe females (n=192) was 67%, compared to general industrialized nations' prevalence (females) of 10.3%. Prevalence among pregnant Ngobe women (n=34) was 85.3%, compared to 22.7% for pregnant women of industrialized nations. Further statistical analysis is awaiting completion.

Conclusion: There is a much higher prevalence of IDA both among the general Ngabe female population and among pregnant Ngabe women compared to the respective populations of industrialized nations. The HemoCue is proven to be an effective tool for future analysis of the Ngabe population moving forward.

REPRODUCTIVE HEALTH

Risk Factors for Wound Seroma after Gynecologic Surgery

Monika Alem BA, Begum Ozel, MD

Background/Purpose: A seroma is defined as a collection of fluid in a wound other than pus or blood. They often occur after mastectomies and operations in the groin. Seromas are significant because they delay healing and run the risk of evolving into an abscess with infection. Additionally, they cause patient discomfort and inconvenience. Reduction in seroma formation could potentially reduce morbidity, prevent additional procedures, and improve patient experience. The purpose of our study is to identify risk factors for seroma formation in the general setting of all gynecologic surgery, a topic that remains largely unexplored.
Methods: We are conducting a chart review retrospectively to May 2015. We only included cases that involved gynecological surgery through an abdominal incision. Primary outcome of interest was wound seroma. Secondary outcome of interest was wound infection. Univariate and multivariate analyses will be performed to identify independent risk factors. Risk factors considered include age, surgical variables (surgery type, wound class, incision type, electrocautery, retractor type, subcutaneous closure, etc), comorbidities (diabetes mellitus, hypertension, lupus, and other rheumatologic disorders), previous cesarean section, tobacco use, antibiotic prophylaxis, BMI, HgA1c, several pre/post-operative lab values (hemoglobin, white blood cell count, serum glucose level), and others.
Results: Thus far, there has been data collected on 120 cases, 14 of which had wound seroma formation. The data has not yet been analyzed but we are currently expecting that a positive past medical history of diabetes mellitus and higher post-op day 1 glucose and BMI values will be most strongly positively correlated with wound seroma formation. Depending on our findings, we will be able to make recommendations on how clinicians can use positive risk factors to predict which gynecologic surgical patients may be at highest risk for wound seroma, for whom they may then want to consider aggressive prophylactic measures.

"A significant inverse association of air pollution exposure with fecundity in Ulaanbaatar, Mongolia"

James Harding, Badrach Jargalsaikhan*, Colleen Azen, David Warburton
The Saban Research Institute, Children's Hospital Los Angeles, Keck School of Medicine, University of Southern California, *Urguu Maternity Hospital Ulaanbaatar and the National Mongolian School of Medical Sciences.

Background: Ulaanbataar, Mongolia (UB) is one of the coldest and most polluted cities in the world during the winter season from November to February each year. We analyzed the impact of ambient pollution levels on the number of births at Urguu Maternity Hospital Ulaanbaatar (UMHUB) in order to test the hypothesis that the excessively high winter pollution levels in UB are exerting adverse physiological effects on fecundity – i.e., on the ability of women to conceive and then successfully deliver a child.
Methods: The medical records of 10,715 women residing within UB city limits and admitted for delivery to the UMHUB from Jan 2014-Dec 2015 were examined retrospectively. By subtracting the gestational age (GA) at delivery from the date of birth for each infant, we derived a per month Delivered-Infant "Conception Rate" (DICR) as a measure of successful fecundity. Monthly average daily levels of air pollutants for the corresponding period in UB were collected from Government of Mongolia Air Quality Monitoring Stations.
Results: The number of delivered infants conceived in a given month (DICR) was correlated inversely with levels of NO_2 ($r = -0.72$, $p<0.001$), PM_{10} ($r = -0.69$, $p<0.001$), and $PM_{2.5}$ ($r = -0.65$, $p<0.001$), and the strongest inverse correlation was with SO_2 levels ($r = -0.84$, $p<0.001$). As atmospheric concentrations of SO_2 rose from November to January, we found a corresponding decline in the DICR, which could be

modeled as a dose-response curve using linear regression (R^2= 0.98, p <0.01). Furthermore, the DICR was correlated inversely with cumulative exposure to $PM_{2.5}$ pollution estimated during the first month of pregnancy (r = -0.65; p< 0.05), whereas there was no inverse association of DICR with cumulative $PM_{2.5}$ exposures over the first trimester nor over all of gestation.

Conclusion: Comparison of delivery rates versus severity of mean air pollution concentrations for all measured pollutants in UB showed that when the daily pollution levels were high during an infant's month of conception, there were eventually significantly fewer infants being born successfully at the maternity hospital UMHUB.

SURGERY

DIAGNOSTIC UTILITY OF MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY.

Olivia Grant, Elizabeth Benjamin MD, Desmond Khor, Monica Wong.

Background: Gallbladder disease is one of the most common and costly diagnoses in the hospital inpatient setting. One of the most serious complications of gallstones is Choledocholithiasis, commonly known as common bile duct stones (CBDS). Magnetic resonance cholangiopancreatography (MRCP) has become a common diagnostic tool for patients with suspected CBDS. MRCP is much less invasive than the 'gold standard' Endoscopic Retrograde Cholangiopancreatography (ERCP) but both are comparable in accuracy. As a result, the use of MRCP before ERCP is becoming more common. Though some cost-benefit studies exist, formal indications for its use on patients with suspected CBDS are lacking.
Objective: The aim of this study is to determine the impact of MRCP on patient management, timing of procedures and overall hospital length of stay in CBDS. Secondary objectives include determining what clinical findings indicate the use of MRCP and the predictive factors of a positive result.
Methods: This was a retrospective study of patients with suspected biliary disease admitted to LAC+ USC Medical Center between January 2010 and December 31, 2015. Patients were identified using diagnosis codes for 'cholelithiasis' and 'choledocholithiasis'. Additional variables including imaging, operative, and laboratory data were collected using chart revision.
Results: Data is still pending. We currently predict that the efficacy of MRCP over ERCP is dependent on the probability of patient having CBDS. In cases where suspected prevalence of disease is low and further intervention is not needed, MRCP would be the diagnostic tool of choice. We also hope to determine what predictive factors would indicate the use of MRCP vs ERCP as a first-line diagnostic tool in patients with suspected CBDS.
Conclusion: The practical implication of this study would be useful in hospital settings to both providers and patients to shorten time to treatment in patients with emergent CBDS and help eliminate costly and unnecessarily invasive diagnostic testing.

Do Varying Surgical Methods Contribute to Maxillary Relapse After Orthognathic Surgery?

Stephen Park, Artur Fahradyan MD

Purpose: Orthognathic surgery is a corrective craniofacial surgery that is often indicated in patients with cleft lip/palate (CL/P) or congenital malformations of the mandible and/or maxilla. In some unfortunate cases, a patient may suffer post-surgical relapse of the maxilla to its original position. Although relapse rates in cleft and non-cleft populations are well documented, the factors that contribute to relapse are not well understood. This study examines if surgical factors such as the type of surgery performed or the degree of surgical advancement are associated with relapse rates in orthognathic patients.
Methods: Medical records of patients with a history of skeletal class III malocclusion undergoing maxillary advancement with either a Le Fort I procedure (single-jaw) or a Le Fort I procedure with simultaneous bilateral sagittal split osteotomy (bimaxillary) were retrospectively reviewed. Along with basic demographic data, the following variables were collected: presence of clinically significant relapse, history of CL/P, type of surgery performed, and degree of surgical advancement.
Results: Out of 136 patients, 11.0% had clinically significant relapse that required reintervention. There was no significant difference in relapse rates between single-jaw vs. bimaxillary surgery groups. However, there was a significant difference in relapse rates between the cleft (15.1%) and non-cleft (4%) groups. The degree of surgical advancement was calculated in 58.8% of patients. Within this group, there was no significant Pearson correlation between the degree of maxillary advancement and clinically significant relapse.
Conclusions: Our data suggest that neither the type of surgery performed (single-jaw vs. bimaxillary) nor the degree of surgical advancement contribute to the rate of clinically significant relapse. In addition,

our data confirm previous studies' data that suggest that there is a higher rate of relapse seen in CL/P patients.

Hiatal Hernia Recurrence Rate and Durability after Magnetic Sphincter Augmentation

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Background: Excellent short-term outcomes have been demonstrated following concomitant hiatal hernia repair (HHR) and magnetic sphincter augmentation (MSA) in patients with gastroesophageal reflux disease (GERD) and large hiatal hernias. The goal of this study was to determine the efficacy and durability of this approach with respect to hiatal hernia recurrence, need for secretory medications, and control of reflux symptoms.
Methods: A retrospective review was conducted on prospectively gathered data in all patients who underwent MSA and formal HHR at our institution between May 2009 and December 2015. Large hiatal hernias were measured intra-operatively and defined as those hernias measuring ≥3 cm. All patients underwent magnetic sphincter augmentation and formal hiatal dissection with posterior cruroplasty. Patients were followed for hiatal hernia recurrence with postoperative videoesophagram (VEG) and/or esophagogastroduodenoscopy (EGD) at 6 months and yearly thereafter. Primary endpoints include hiatal hernia recurrence, proton-pump inhibitor (PPI) elimination rate, and GERD Health-Related Quality-of-Life (HRQL) scores.
Results: 41 patients were identified who underwent HHR of a large hiatal hernia with concomitant MSA. Mean pre-op DeMeester score was 52.4 (± 5.5) and mean hiatal hernia size was 4.0 cm (range 3-7 cm). Twelve patients (29.3%) were diagnosed with Barrett's esophagus preoperatively. There was a significant decrease in GERD-HRQL score (2.8 vs. 19.6, p=0.036) with a PPI elimination rate of 92.7%. All patients underwent VEG (43.9%) and/or EGD (56.1%) to evaluate for hernia recurrence over a mean follow-up time of 15.1 months. One asymptomatic recurrence (2.4%) was diagnosed with a VEG at 11 months post-op.
Conclusion: Magnetic sphincter augmentation with a full hiatal dissection and posterior cruroplasty appears to be a durable and effective approach with a low hernia recurrence rate in patients with gastroesophageal reflux and a large hiatal hernia.

Outcomes of Soft Tissue Reconstruction for Traumatic Lower Extremity Fractures with Compromised Vascularity

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Background: Traumatic lower extremity fractures with compromised arterial flow are limb-threatening injuries which often require soft tissue reconstruction. The purpose of this study was to determine the effects of arterial injury on flap survival and amputation rates following lower extremity salvage.
Methods: A retrospective review of 158 extremities with traumatic fractures requiring flap coverage, including 26 extremities with arterial injuries, was performed at LAC-USC between July 2007 and December 2015. Angiogram reports and provider notes were reviewed for documented traumatic arterial injuries. The primary outcomes were rates of amputation and flap failure. Comorbidities associated with arterial injuries were also investigated.
Results: 26 extremities had documented arterial injuries (16.5%), with some extremities sustaining multiple injured arteries. The most commonly injured arteries were the anterior tibial (46.2% of

extremities with arterial injuries), posterior tibial (42.3%) and peroneal artery (42.3%). Patients with arterial injuries had a larger flap surface area (255.1 cm^2 vs 144.6 cm^2, p=0.02) and a greater number of operations (4.7 vs. 3.8, p<0.01) than patients without vascular compromise. Patients with vascular injury were more likely to require fasciotomy (OR: 6.5, CI: 2.3-18.2) and to have a nerve injury (OR: 16.6, CI: 3.9-70.0), fracture of the distal third of the leg (OR: 2.9, CI: 1.15-7.06) and intracranial hemorrhage (OR: 3.84, CI: 1.14-12.93). Following reconstruction, patients with arterial injuries had a higher rate of amputation (OR: 8.5, CI: 1.3-53.6) and flap failure requiring additional surgery (OR: 4.5, CI: 1.5-13.2). **Conclusion**: These results suggest arterial injuries may be associated with worse outcomes following lower extremity reconstruction, including increased rates of amputation and flap failure. Additional research is still necessary to determine the impact of arterial injuries on long-term outcomes.

Locoregional Anesthesia for Traumatic Fracture Reduction

Aaron Strumwasser, M.D. and **Samantha Chau (M.D. Candidate)**

Background/Hypothesis/Goals: Locoregional nerve blocks have been proposed as a useful adjunct to traditional anesthesia for traumatic fracture repair. However, existing data is controversial regarding its benefit. We hypothesize that locoregional blockade is effective for selected uncomplicated fracture patterns for planned definitive repair.
Methodology/Research Design: This study is comprised of a retrospective review of all traumatic orthopedic injuries occurring at LAC+USC medical center between the years of 2011-2015. We currently have 225 patients in our database with isolated lower extremity traumatic fractures undergoing surgical reduction. Data collection is still ongoing. Patient information abstracted from the medical record includes vital signs on arrival, patient demographics (age, gender, mechanism of injury, injury severity score) and type and duration of anesthesia received for treatment of their fractures. Outcomes to be analyzed are hospital recidivism for fracture-related complications, HLOS, and cost. An F-test will be used to compare sample variances and an unpaired Student's t-test or Chi-squared will be performed to compare variables between groups. A p value of less than or equal to 0.05 will be considered statistically significant.
Results/Conclusions: Data collection is still ongoing, as is data analysis. Based on the results we have now, I have detected a statistically insignificant reduction of HLOS by 3 days when using adjunct regional anesthesia. With further data collection, we anticipate being adequately powered to detect a statistically significant reduction of this manner.

Efficacy of fundoplication in managing GERD in patients with scleroderma esophagus

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Introduction/Objective: Scleroderma is a rare, autoimmune connective tissue disorder characterized by hardening and tightening of skin and connective tissue. GERD is a common complication of scleroderma caused by the hardening of the lower esophagus, especially the lower esophageal sphincter. The current standards for permanent management of GERD are fundoplication or Roux-en Y gastric bypass. Although fundoplication has been the classic standard of treatment, there is currently debate surrounding its risks and effect on patient quality of life.
Method: Retrospective chart review of patients was done from the Keck Hospital database. The inclusion criteria is a history of a laparoscopic fundoplication and a diagnosis of GERD and scleroderma esophagus. Information obtained includes: demographics, comorbid conditions, pre-operative and post-operative symptoms on follow up, and surgical complications.

Results: Of the 168 patients with GERD who underwent Nissen fundoplication, 14 met the inclusion criteria. Average operative age: 51.3 years old, average time to most recent follow-up: 0.24 [range: 0.66-31.4]

The 3 most common pre-operative symptoms include heartburn, regurgitation, and dysphagia. The heartburn resolved post-operatively in all 13 patients. The regurgitation resolved in 10/11 of the patients. The dysphagia resolved in 5/8 of the patients. One patient without pre-operative dysphagia, reported dysphagia post-operatively.

Figure 1. Less Common Symptoms	
History of reflux	5
Vomiting	4
Nausea	3
Aspiration	3
Cough	2
Bloating	2
Hoarseness	2
Weight loss	2
Bowel issues	1
Sore throat	1
Joint pain	1

The symptoms resolved in all patients except for one with bloating.

Two patients had operative complications: one was converted to an open Toupet fundoplication, and another failed the partial fundoplication.

Conclusion: Our data showed that Toupet fundoplication is effective in managing GERD symptoms in patients with scleroderma esophagus. Further follow-up must be done via phone surveys.

Vectra 3D Imaging for Quantitative Volumetric Analysis of the Upper Limb: A Feasibility Study for Tracking Outcomes of Lymphedema Treatment

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Background: Secondary lymphedema of the upper limb is a common sequela following lymphadenectomy during oncologic surgery. The gold standard for evaluating treatment outcomes in upper limb lymphedema is limb volume measurement. However, current techniques lack sensitivity to localized changes. In this study, the Vectra 3D imaging system was used to accurately and precisely obtain volume measurements of the upper limb in patients with lymphedema.

Methods: A feasibility study was performed in 11 patients with lymphedema and 22 upper extremities; 24 arms were evaluated in total. Three-dimensional images were taken of the upper extremities and Vectra 3D software was used to calculate the volume of the hand, forearm, and upper arm. These measurements were compared to traditional circumference (tape) and water displacement measurements.

Results: The twenty-four arm volumes ranged from 1517 to 4050 cc. The Vectra 3D provided precise volume measurements (average standard deviation ±1.0% of total volume). Measurements of the forearm and upper arm correlated with circumference measurements (R^2 = 0.991) and were in good agreement, with the mean difference between measurement techniques being 2.8±2.0% (Figure 1A). Three-

dimensional measurements of hand, forearm, and upper arm correlated with water measurements (R^2 = 0.990) and had a mean difference between measurement techniques of 2.6±2.1% (Figure 1B).
Conclusions: The Vectra 3D system provides precise and accurate data comparable to the most commonly used technique to estimate limb volume (tape measurement) and gold-standard water volume measurement. It also offers several advantages, including time efficiency and obtaining localized measurements with high spatial resolution.

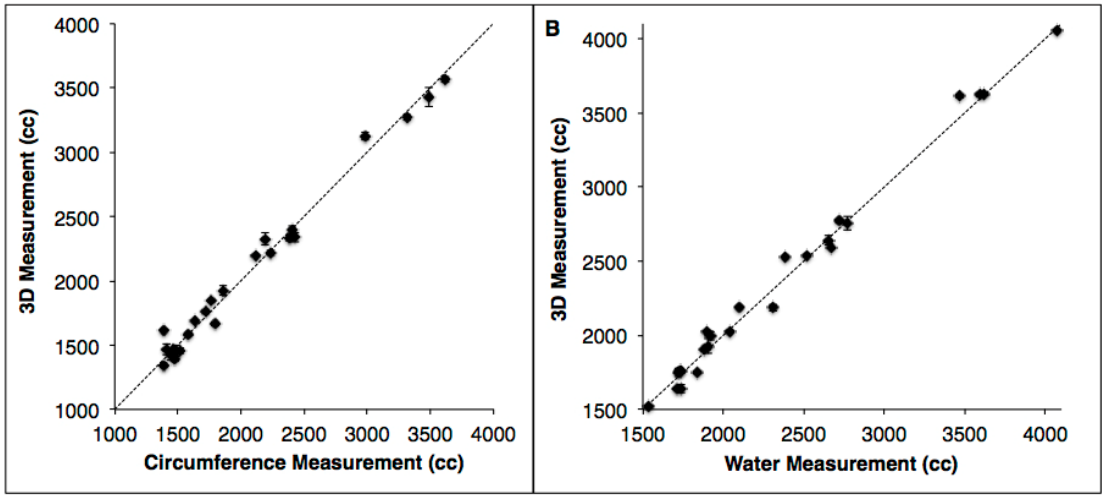

Figure 1: Comparison of **A)** Vectra 3D to circumferential measurements of the forearm and upper arm and **B)** of Vectra 3D to water volume measurements of the hand, forearm, and upper arm (dashed line, y = x).

An Epidemiological Examination of the Occurrence and Origin of Intraoperative Acute Care Surgery Consultations

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Background: Acute care surgeons have a variety of responsibilities in a level 1 trauma center, including responding to intraoperative consultations. Data describing these specific consultations, including what role acute care surgeons perform, has not previously been collected or analyzed.
Objective: To describe the incidence and outcomes of intraoperative consultations placed to the acute care surgery service and what function acute care surgeons have in an intraoperative consultation.
Methods: Sixty-five intraoperative consultations to acute care surgery were identified and reviewed from January 2011 to December 2016. Demographic data, day and time of consultation, referring service, and the original procedure performed were collected. Outcome data, including consultation findings, surgical data, and ACS intervention were also included. Any consultations that occurred pre-operatively, post-operatively, or were placed by the emergency service were excluded.
Results: Of the 65 consultations placed, acute care surgery intervened in 40 of the cases (61.5%). Gynecology was the most frequent referring service (42; 64.6%), followed by urology (12; 18.5%), neurosurgery (6; 9.2%), orthopedic surgery (3; 4.6%), surgical oncology (1; 1.5%), and plastic surgery (1; 1.5%). The primary reason for the consultation varied between incidental intraoperative findings in 36 cases (55.4%), intraoperative iatrogenic injury in 21 cases (32.3%), and pre-surgical preparation in 8 cases (12.3%). A majority of patients were female (54; 83.1%) with an age range of 21-64 and a median

age of 45. Mean procedural operating time was 4.1 hours, and mean total procedural anesthesia time was 5.5 hours.
Conclusions: The frequency of acute care surgery intervention and relative success in intraoperative consultations suggests that, while not a primary responsibility, acute care surgeons provide a valuable resource for other surgical services to utilize intraoperatively.

Overutilization of helicopter transport in the minimally burned – a healthcare system problem that should be corrected

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Background: The aim of this study was to identify minimally burned patients transferred to the University of Arizona Medical Center (UMC) who did not benefit from helicopter transport in order to establish a potential means of cost savings to the health care system.
Methods: A 6-year (2010 – 2016) retrospective analysis of all burn patients presenting to the UMC was performed. Excluded from the study were patient who had missing data and those who were dead upon arrival to the ED or trauma center. Patients were then separated into two groups: helicopter transfer and ground transfer. A subanalysis was performed between minimally burned patients, defined as patients with <20% total body surface area (TBSA) burns and no ICU/OR requirement; groups were compared for severity of burns (degree), ED disposition, hospital length of stay, and use skin grafting.
Results: Of 770 transferred burn patients, 10.4% were transferred via helicopter. Preliminary data indicated that patients transferred by helicopter were more severely burned ($p = 0.001$), based on %TBSA, and had longer hospital stays ($p = 0.019$).
Of those transported by helicopter, 45.0% were minimally burned and 50.0% of these patients were admitted to the hospital from the ED. In comparison, 63.6% of patients transferred by ambulance were minimally burned, 98.2% of whom were admitted to the hospital from the ED. There was no difference in hospital length of stay ($p = 0.576$) or mortality between these two groups.
Conclusions: Over two thirds of burn patients transported via helicopter were minimally burned. Steps should be made and policies put in place to identify patients who do not benefit from helicopter transport and who may be safely transferred by ground transport in order to reduce transport cost without compromising the medical care of patients.

The Clinical Features and Consequences of Palpable Ductal Carcinoma In-Situ

Robert M. Tungate, MS2

Introduciton: Palpable ductal carcinoma in-situ (pDCIS) has not been well-characterized in medical literature. Identification of characteristics of DCIS significantly correlated with probability of recurrence and disease-free survival period has important consequences in its therapeutic management.
Methods: A retrospective electronic medical record review of adult female patients aged 18-80 with newly-diagnosed DCIS on core biopsy and noninvasive disease who received treatment at two neighboring tertiary academic care centers between 1/1/2006 and 12/31/2013 was conducted. Variables associated with pathology, recurrence, surgical management, and prognosis are being evaluated in the setting of pDCIS vs. asymptomatic DCIS in this cohort using independent t-tests for continuous variables, chi-squared tests for categorical variables, and Kaplan-Meier analysis for comparison of survival.
Results: 712 patients (N=712) with palpable ductal carcinoma in-situ in the absence of invasive disease were identified. Tumor grade, size, histological architecture, surgical margins, presence of hormone receptors, location are being assessed along with demographic factors, BRCA status, and family history

of breast malignancy in all eligible cases for statistical correlation with palpability. Data are being refined and analyzed and results for this study are still pending.

Discussion: Since treatment protocols for DCIS are predicated on aggressiveness and likelihood of recurrence of illness, a correlation between pDCIS and other markers of aggressiveness could be clinically discriminating. Additionally, the standard for diagnosis of DCIS is stereotactic core-needle biopsy (SCNB). Randomized, controlled clinical trials have suggested that SCNB significantly underestimates the incidence of invasive disease in suspected DCIS. Elucidation of symptoms of DCIS, such as palpability, could stand to compensate.

HEALTH TECHNOLOGY & ENGINEERING

A Mobile Application Utilizing Virtual Physician Avatars as a Tool for Patient Education in

Atrial Fibrillation

Ketetha Olengue, Ari Shapiro, Arno Hartholt, Andrew Keibel, Ben Nguyen, Leslie Saxon

Background: Patient education is an essential component of successful management of atrial fibrillation (AF). Patients and cardiologists struggle with how to provide continuous, in-depth patient understanding of AF management.

Methods: The USC Virtual Care Clinic has created an interactive virtual avatar of a board-certified electrophysiologist using speech recognition and artificial intelligence (AI). This virtual subspecialist is capable of providing continuous information in response to patient's questions regarding their AF condition through a mobile application.

Results: The application builds on three core capabilities: content generation (over 1,700 unique AF answers were recorded based on sub specialist expertise, standardized guidelines and patients' FAQs), avatar creation (rapid avatar whole body and face recognition scan of physician powered with speech recognition technology to allow dynamic dialog with patients) and the ability to receive data from biosensors. See Figure 1 for results.

Figure 1

Conclusions: We have developed a voice recognition AI engine that provides a virtual human physician and is available on-demand to patients through a mobile application. Our intent is to study this method

of content delivery in a clinical trial supported by Apple's ResearchKit. Our methodologist allows for any specialist to have a virtual human avatar.

Improving oral nutritional supplements for oncologic patients

Jack Yi, Michelle Connor, Kyohei Itamura, Dr. George Tolomiczenko

Background: Nutritional support for patients undergoing chemotherapy is readily available as high-energy and high-protein formulas from Nestle (*Impact, Peptamen*), Abbott (*Prosure, Vital*), and Homel Health. Oral nutritional support improves patients' nutritional status, which serves as a strong predicator of positive cancer outcomes. Unfortunately, few pre-packed oral nutritional products are universally tolerated by all patients for prolonged periods. In the discovery phase, our group will first assess commercial nutritional supplement formulations that patients previously used or currently use while receiving medical treatment for taste, gastrointestinal side effects, functional nutritional components, and product accessibility. In designing our product, we improve and tailor our nutritional supplement formulation around user feedback.
Methods: We are currently conducting an exploratory study in which structured interviews, performed by research staff, will be used to collect data. The interviews will follow a pre-determined survey that includes open response and scaled questions. Participants will be interviewed once to gather data regarding nutritional status, current nutritional supplement use, and ideal nutritional supplement use and characteristics.
Approach: In the next phase, we will explore formulations based on plant, milk, and animal products. More research is needed to identify how functional ingredients, such as omega-3 fatty acids, interact with recommended daily dietary nutrients in terms of palatability.
Status: We are collaborating with a physician team, dietitians, pharmacists, nutritionists, and chefs on building the formulation. Our current focus is to identify a recipe that balances calories, protein count, fortified components, and palatability. The objective is to provide patients with an oral nutritional supplement that improves nutritional status while agreeing with their palates.
Acknowledgements: Health, Technology, and Engineering

Machine Learning Enabled Diagnosis of Retinopathy of Prematurity (ROP)

Ja-yoon Uni Choe, Ayush Jaiswal, Tom Lee MD, George Tolomiczenko PhD, MPH, MBA

Background: Over 50,000 premature infants in developing countries go blind due to a disease called retinopathy of prematurity or ROP. This blindness is highly preventable if the infant is seen within 24-48 hours of symptom presentation. However, in many countries there are too few specialists who can properly examine and diagnose infants at risk.We can prevent blindness by designing a machine learning algorithm that can help a specialist or a neonatologist reach and help many more such children to intervene and prevent their developing serious retinopathy of prematurity (ROP).
Methods: We are working with retinal scans that Dr. Lee has collected. We will boost the accuracy of our predictive algorithm by collaborating with Dr. Michael Chiang (Oregon Health Sciences University) and Dr. Kalpathy-Cramer (Harvard University) who have created a repository of over a thousand unique ROP cases and looked at disease progression. Once we finalize the data sets, we will analyze the retinal scans by vascularization pattern, pixels and color for more severe ROP stages.
Results: While we have not achieved our results yet, we fully expect that the machine learning algorithm will be able to accurately differentiate stage 3 or higher ROP from lower risk cases. The sensitivity and specificity achieved in staging ROP cases will allow care providers to detect and prioritize more patients and save more lifetimes of vision than they can without our technology. Our work thus far has earned

USC's Student Innovator Award for Global Impact Prize and placed us second in the Min Social Entrepreneurship Competition in 2015-2016 academic year.
Summary: As timely diagnosis is the key to preventing blindness due to ROP, we believe that machine learning algorithm that's assistive can help specialists to address the condition. We plan to partner with Armenian Eyecare Project to further test and strengthen our algorithm in Armenia.

Longitudinal patient cohort for the evaluation of digital health solutions

Katherine J. Choi, Mona Sobhani PhD, Benjamin Nguyen, Leslie Saxon MD

Purpose: Digital health connected hardware and software, engagement tools like virtual human agents, and virtual reality technologies are emerging as promising modalities for providing enriched patient engagement. However, there is a paucity of well-conducted research that involves patient feedback on these tools. Further, it is unknown how patient characteristics and demographics are associated with patient engagement in digital health platforms.
Methods: To address this, we will recruit a patient cohort (*n*=100) from the Keck Medical Center of USC that are representative of the ethnically diverse patient population of Los Angeles, to act as a focus and testing group for digital health solutions developed by USC Center for Body Computing and its partners. The study duration will be one year, and will commence July 2017. This digital health care model will utilize technology such as digital storytelling and remote monitoring, to improve patient outcomes and health care efficiency. In order to do this, we will select patients to ensure diversity of ethnicity, primary language, age, chronic disease state, technological proficiency, and education level. This cohort will be randomly assigned each month to a digital health solution, and will be asked to submit feedback via online questionnaires. Examples of technologies to be assessed include: virtual human agents to deliver medical content, disease management solutions enabled by digital technologies, and virtual and augmented reality experiences to enhance patient education and understanding. We will examine the impact of personality, diagnoses, technological ability, age, and socioeconomic status on how patients respond to digital health solutions.
Results and Conclusion: We expect to gain valuable insights on how patients respond to digitally presented medical information. Beyond the first study, this established cohort will be utilized to test subsequent solutions, such as body worn or smartphone enabled sensors with mobile applications for continuous engagement.

Monitor for Nocturnal Tonic-Clonic and Tonic Seizures

Joshua Engle; Terry Sanger MD, PhD; George Tolomiczenko, PhD, MPH, MBA

Background: Epilepsy is the most common neurological disorder with over 3 million people affected in the US alone. Current methods for detecting seizures outside a hospital are inadequate and better solution is needed. We are developing a nighttime seizure monitor for tonic-clonic seizures and tonic seizures.
Methods: The metrics we are monitoring are motion detection, dry EMG sensors, heart rate, heart rhythm, SP02, and chest rise and fall. To test the sensitivity/specificity of our device, we will test our device against the standard 32 lead EEG model of detecting seizures. Monitoring will be done with 30 patients admitted for video EEG monitoring. Patients will wear our device and EEG electrodes concurrently. Monitoring will take place in an Epilepsy Monitoring Unit (EMU).
Results: We anticipate our sensitivity/specificity of detecting tonic-clonic/tonic seizures will be comparable to traditional EMU methodology.
Conclusion: Dependent on future results. If anticipated results achieved, a better remote system for detecting both tonic-clonic and tonic seizures will be realized.

Facilitating Management of Difficult Airways

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Background: Difficult intubations can occur in almost any health care setting and in anesthesia cases alone have been reported at an incidence of approximately 6%. Intubation complications can occur even when an experienced heath care professional uses a variety of methods of airway placement and visualization. When multiple attempts do not result in airway intubation it is recommended to stop, as more than three or four intubations increase the incidence for edema and trauma within the airway. These side effects can cause airway obstruction. Typical patients that present with difficult airways include those with micrognathia, mandibular fracture, partially obstructed laryngeal lesions, cervical spine injuries or instabilities, rheumatoid arthritis, a history of head and neck radiation, trismus, and craniofacial abnormalities. In particular, we are interested in facilitating intubation in small airways so that we can increase the safety of pediatric procedures.
Proposed solution: Our proposed solution is a medical device that will improve airway visualization, reduce the economic cost associated with intubation, increase the efficiency of existing devices, improve the current management of difficult intubations, and increase the ease with which inexperienced practitioners can perform difficult intubations.
Methods: Development is ongoing and we expect proof of concept within the next two months. Our team is currently interviewing engineers to assist in developing a 3D model of our prototype. Once our prototype has been adjusted we will proceed to initial testing to see if our device can meet the goals laid out in the proposed solution.
Results & Conclusions: After initial testing has validated our concept we will move on to broader clinical testing. We are aiming to develop a device that is both easy to build and use, which can be applied to a variety of clinical circumstances. The ability to facilitate ease of intubation is in clinical need and we believe that this device will benefit many patients and physicians.

The Renovation of the Hospital Patient Gown

Sona Shah, Uni Choe, Elly Nam, Joycelyn Yip, Ayush Jaiswal, Xuechen Huang, George Tolomiczenko

Background: Recent developments in medicine have moved forward the framework of patient-centered care in the American Health System. While many aspects have improved in order to provide patients with greater control, one of the simplest but most critical components has not--the patient gown. Despite strides made in technology and treatments, patients routinely suffer from uncomfortable design and style.
Methods: We have worked with health care professionals and fashion designers to determine how we can optimize the patient gown to meet the needs of both health care providers and patients. We have also surveyed patients to determine what they desire out of their apparel experience during their hospital stay.
Approach: Our approach is to create a gown that is breathable, insulated, anti-microbial, and functional which provides the patient with increased coverage while allowing physicians better access to perform examinations. We plan on selling both direct-to-consumer through online platforms and hospital gift shops, as well as to hospitals and clinics through purchasing catalogues.
Objective: The goal of our team is to empower patients with a new patient gown design that emphasizes dignity, comfort, and functionality, providing them with an improved patient experience.
Status: We are currently collaborating with Keck Hospital of USC and Norris Comprehensive Cancer

Center. After speaking with the Patient Family Advisory Council regarding their priorities and experiences, we teamed up with a designer to create our first prototype. Currently, we are working with engineers to make our gown design compatible with multiple wearable technologies to allow for the integration of various medical devices, and are in the midst of patenting our design.