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We are pleased to have you join us for the 13th annual Medical Student Research Symposium of the Johns Hopkins University School of Medicine. As clinicians in training, we are fortunate to work among faculty who conduct a broad range of investigation that yields advances in the knowledge of human health. For the past thirteen years, we have been privileged to have an event that presents the extensive endeavors that students take to advance this mission at the school.

The mission of the Johns Hopkins University School of Medicine is to educate medical students, graduate students, and postdoctoral fellows in accordance with the highest professional standards; to prepare clinicians to practice patient-centered medicine of the highest standard; and to identify and answer fundamental questions in the mechanisms, prevention and treatment of disease, in health care delivery and in the basic sciences.

The Medical Student Research Symposium is a forum for medical students at Johns Hopkins to present their own research to the greater Hopkins community. It is an opportunity for students to participate in the exchange of intellectual ideas in a professional format and meet faculty who relish the pursuit of better science and more effective medicine. Our mission is for the Medical Student Research Symposium to foster the development of young researchers who will aid in the advancement of scientific medicine for years to come.
The Scholarly Concentrations (SC) program is a faculty-mentored scholarly experience for medical students. This program provides the infrastructure and mentoring necessary for students to produce a scholarly project in an area of individual interest and encourages the acquisition of attitudes and skills for lifelong learning and scholarship.

The SC program offers the following five areas of study:

**Basic Science**
Sarah Wheelan, MD, PhD

**Clinical Research**
Meredith Atkinson, MD
Kelly Gebo, MD, MPH
Sapna Kudchadkar, MD, PhD
Steve Sozio, MD, MHS

**HEART: Humanism, Ethics, Education and the Art of Medicine**
Joe Carrese, MD, MPH
Gail Geller, ScD, MHS

**History of Medicine**
Nathaniel Comfort, PhD
Marta Hanson, PhD

**Public Health Research**
Eric Bass, MD, MPH
Bhakti Hansoti, MBChB, PhD, MPH, FACEP

The overall goals of the SC program are to promote intellectual curiosity, appreciation of scholarly inquiry, flexibility, passion for discovery, openness to new ideas, and the ability to work both independently and collaboratively.
MSRS Program Schedule

12:00 - 1:45 PM  Podium Presentations

2:00 - 2:45 PM  Poster Session A

2:45 - 3:30 PM  Poster Session B

4:00 - 5:00 PM  Oral Presentations

5:15 - 6:00 PM  MSRS Award Ceremony

*featuring*

Keynote speaker,  
*Dr. Lisa Cooper*
Keynote speaker
Lisa Cooper, MD, MPH

Lisa Cooper, MD, MPH
James F. Fries Professor of Medicine
Bloomberg Distinguished Professor, Equity in Health and Healthcare
Director, Johns Hopkins Center for Health Equity
Director, Johns Hopkins Urban Health Institute

Dr. Lisa Cooper is a Liberian-born general internist, social epidemiologist, and health services researcher. As the Director of the Johns Hopkins Urban Health Institute, Dr. Cooper leads the Institute in its mission to advance health and health equity across Baltimore City. Dr. Cooper is also the James F. Fries Professor of Medicine and Bloomberg Distinguished Professor for Equity in Health and Health Care in the Johns Hopkins University Schools of Medicine, Nursing, and Public Health. She is the director of the Johns Hopkins Center for Health Equity, where she and her transdisciplinary team work with stakeholders, from healthcare and the community implement rigorous clinical trials, identifying interventions that alleviate racial and income disparities in social determinants and health outcomes.

Dr. Cooper was one of the first scientists to document disparities in the quality of relationships between physicians and patients from socially at-risk groups. She then designed innovative interventions targeting physicians’ communication skills, patients’ self-management skills, and healthcare organizations’ ability to address needs of populations experiencing health disparities. Dr. Cooper has received several honors for her pioneering research, teaching, and mentoring, including a 2007 MacArthur Fellowship, membership in the National Academy of Medicine, the Association of American Medical Colleges Herbert W. Nickens Award Herbert W. Nickens Award for outstanding contributions to social justice in medical education and equity in healthcare in the United States and the American Public Health Association Helen Rodríguez-Triás Social Justice Award. She has also been recognized by several community organizations locally and nationally for her community engagement and advocacy to address health disparities.
Acknowledgements

The MSRS Organizing Committee would like to thank the following people for their support putting this website and event together. Without their help, this day would not have been possible.

Faculty Judges
The Office of Student Affairs
The Scholarly Concentrations Faculty
Dr. Mary Catherine Beach
Delena Dodd
Mark Dodd
Rick Herrmann
Robert Kearns
Lorraine Spencer
A Proposed Device to Determine a Quantitative Endpoint for Transarterial Embolization from Real-Time Pressure Measurements

Prateek Gowda BS, Nicholas Durr PhD, Clifford Weiss MD

**Background:** Transarterial embolization (TAE) is a standard-of-care treatment for tumors in which embolic particles are locally injected via a catheter to occlude blood flow and induce ischemia in the target tissue. Physicians currently rely on subjective visual cues to determine procedural endpoint, contributing to highly variable outcomes, including the accumulation of embolic particles in healthy tissue, known as off-target embolization. To address this concern, we describe a novel catheter that measures real-time intravascular pressure and associates the measurement with a quantitative endpoint for TAE.

**Methods:** To assess the functionality of our prototype, we constructed a hepatic vascular flow model to characterize the relationship between blood flow, intravascular pressure, and volume of embolic agent. The model included a vascular tree and mesh filters that simulate vascular beds. Pressure changes from serial tris-acryl gelatin embolic agent injections were measured in real-time directly adjacent to the catheter, using a fiber optic pressure sensor integrated into our prototype. Outflow rate was measured to quantify the reduction in flow through the model after each injection.

**Results:** We observed a logistic relationship between intravascular pressure and volume of embolic agent inject, with a stepwise increase in pressure for each bolus of embolic agent injected until a plateau was reached. Repeated injections beyond the plateau pressure did not change intravascular pressure. A quadratic relationship between pressure and flow rate through the vasculature was found, as indicated with a linear coefficient of determination of 0.996 between pressure and squared flow. The incidence of the plateau also corresponded with a stop in flow.

**Conclusion:** Our findings demonstrate that real-time catheter pressure measurements can be used as a surrogate marker for vessel occlusion and flow cessation. This approach has the potential to standardize and optimize TAE, reducing the likelihood of incomplete or off-target embolization, and improving patient outcomes.

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**Cyclohexanone Contamination of Medical Plastics is Associated with Worse Congenital Heart Surgery Outcomes**
Background: Cyclohexanone is an industrial solvent used as a coupling agent in medical plastics, including cardiopulmonary bypass (CPB) circuits shown to have cardiovascular effects in animal models. Effects of neonatal perioperative cyclohexanone exposure on hospital-based outcomes have not been explored.

Methods: The study was a secondary analysis of 107 neonates at a single center enrolled between 2012-2016 in the NHLBI-funded Corticosteroid Therapy in Neonates Undergoing Cardiopulmonary Bypass trial. Blood samples were collected preoperatively, post-CPB, and 12 hours postoperatively, and concentrations of cyclohexanone and its metabolites were quantified using mass spectrometry. Using the geometric mean of cyclohexanone concentrations, the effects of an interquartile range (IQR) increase in concentration on hospital-based outcomes was assessed using adjusted linear and Poisson regression, for continuous and dichotomous outcomes, respectively. Estimates were reported as % differences (linear regression) or relative risks (Poisson regression) with 95% confidence intervals.

Results: In adjusted analyses, an IQR increase in mean cyclohexanone concentration was associated with greater duration of mechanical ventilation (40.1%; 95% CI [7.34%, 82.9%]), ICU stay (20.1%; 95% CI [1.36%, 42.2%]), and hospital stay (20.8%; 95% CI [3.28%, 41.3%]), and less time spent alive and out of the hospital 90 days post-surgery (-17%; 95% CI [-30.9%, -0.36%]). An IQR increase in mean cyclohexanone was associated with a 61% (adjusted RR [aRR]: 1.61; 1.19, 2.17) greater risk of the trial primary morbidity-mortality composite outcome (death, cardiac arrest, ECMO, renal or hepatic insufficiencies, and lactic acidosis). An IQR increase in mean cyclohexanone metabolites was associated with a 29% (aRR: 1.29; 1.07, 1.55) greater risk of developing low cardiac output syndrome.

Conclusion: Circulating cyclohexanone in neonates was associated with unfavorable hospital-based outcomes following cardiac surgery with CPB, suggesting that medical plastic contamination contributes to morbidity. Therefore, reducing exposure to cyclohexanone perioperatively may improve congenital heart surgery outcomes.

Single-use versus Reusable Endoscopes for Percutaneous Biliary Endoscopy with Lithotripsy: technical metrics, clinical outcomes, and cost comparison
Sharon Pang BA, Ryan England MD, Alex Solomon MD, Kelvin Hong MD, Harjit Singh MD

**Background**: Percutaneous biliary endoscopy (PBE) is increasingly used by interventional radiologists to visualize and treat biliary pathology. Advances in technology have introduced single-use endoscopes to complement reusable endoscopes; however, data comparing the two technologies is limited. In this study, we compared the technical metrics, clinical outcomes, and costs between single-use and reusable endoscopes used in PBE.

**Methods**: In this IRB-approved, retrospective study, 67 PBE procedures were performed on 34 patients (62% male; mean age 65.9) for gallstone removal from 10/2014 to 2/2020, using either reusable Olympus (n=17 patients, 28 cases) or single-use LithoVue endoscope (n=17 patients, 39 cases). Device metrics, technical and clinical success, complications, and cost-per-case were compared. Technical success was defined as biliary system access and identification of pathology, and clinical success required at least partial stone removal.

**Results**: Mean procedural time was similar between single-use (mean ± SD; 136.4±44.6 minutes) and reusable (135.5±51.2 minutes; p=0.5) endoscopes, while mean fluoroscopy time was significantly lower with single-use endoscopes (11.7±8.4 minutes) compared to reusable (17.6±11.8 minutes; p=0.01). Technical and clinical success with single-use endoscopes was 95% (n=37) and 90% (n=35), respectively, similar to reusable endoscope use at 93% (n=26) and 75% (n=21), respectively (all p > 0.05). One minor complication of gallbladder perforation occurred while using a reusable scope, whereby the biliary tube was replaced without further complications. Cost analysis demonstrated a lower cost-per-case for single-use endoscope ($1500/case) compared to reusable endoscope ($2391/case; difference of $891/case), which was primarily due to costs for repair.

**Conclusion**: This study supports disposable endoscopes as a safe and effective alternative to reusable endoscopes for patients undergoing PBE. Additionally, disposable endoscopes demonstrated significantly decreased fluoroscopy time compared to reusable endoscopes, offering the potential for lower patient radiation exposure, as well as a lower cost-per-case, which may lower financial barriers to starting or expanding PBE in an interventional radiology practice.
The impact of seasons and weather on falls and physical activity among older adults with glaucoma: a longitudinal prospective cohort study

Hursuong Vongsachang AB, Aleksandra Mihailovic Sc.M, Pradeep Ramulu MD PhD

Background: Identifying environmental risk factors is important to prevent falls in elderly with visual impairment. We examined the relationship between seasons and weather conditions on falls and physical activity in older patients with visual field loss.

Methods: Older patients with glaucoma from the Wilmer Eye Institute were recruited for a three-year longitudinal study (2013-2018). Minute-to-minute steps and physical activity minutes were recorded for 7 days consecutively in the baseline year using an accelerometer. Participants recorded the occurrences of falls and injurious falls using a monthly calendar over the three-year period. Daily average temperature and precipitation data were merged with corresponding study dates (National Centers for Environmental Information). Seasons were assigned to study dates based on Northern Hemisphere astrological dates. We analyzed the association between seasons and weather with 1) the odds of falling and having an injurious fall and 2) average daily steps and activity minutes, using multivariable logistic regression models incorporating generalized estimating equations and multivariable negative binomial models, respectively. All models adjusted for demographics, comorbidities, polypharmacy, and visual sensitivity.

Results: Across 240 participants, there were 408 falls over 7605 person-months, of which 162 were injurious (40%). Spring season was associated with a 26% decreased likelihood of falling (vs. Autumn, OR=0.74, p=0.03). Every ten-degree Fahrenheit increase in average daily temperature was associated with 13% higher odds of having an injurious fall (OR=1.13, p=0.04). Injurious falls were more likely to occur outdoors on days with higher average temperatures (by 10F) and during Summer months (vs. Autumn) (OR=1.23, p=0.03 and OR=2.48, p=0.04, respectively). Temperature, precipitation, and seasons were not significantly associated with daily average steps and activity minutes.

Conclusion: Warmer weather may be associated with conditions that lead to injurious falls among older individuals with visual impairment. Further research is needed to understand the relationship between warm weather and injurious falls.

Development and Validation of a Machine Learning Model for Classification of Next Glucose Reading in Hospitalized Patients
Background: Inpatient glucose management can be challenging due to various evolving factors that influence a patient’s blood glucose (BG) throughout hospital admission. Providers could benefit from the use of clinical decision support tools that predict the trajectory of a patient’s BG reading to more effectively adjust the antihyperglycemic regimen. The purpose of our study was to predict the category of a patient’s next BG reading based on electronic medical record (EMR) data.

Methods: EMR data from 184,361 admissions, containing 4,538,418 BG readings from five hospitals in the Johns Hopkins Health System were collected over a 4.5 year period. The outcome was category of next BG reading: hypoglycemic (BG ≤ 70 mg/dl), controlled (BG 71-180 mg/dl), or hyperglycemic (BG > 180 mg/dl). A LogitBoost machine learning algorithm that included a broad range of clinical covariates was used to predict the outcome and validated internally (within one hospital) and externally (between different hospitals).

Results: Our machine learning model achieved 86.2% (95% CI: 86.1%-86.2%) accuracy on internal validation and 80.4%-83.2% on external validation. On internal validation, the positive likelihood ratio (+LR) for prediction of controlled, hyperglycemic, and hypoglycemic outcomes were 2.39, 12.3, and 47.4, respectively; the negative likelihood ratio (-LR) for a prediction of controlled, hyperglycemic, and hypoglycemic outcomes were 0.087, 0.385, and 0.994, respectively. From a safety standpoint, only 0.23% of hyperglycemic observations were predicted to be hypoglycemic. On external validation, the +LR for prediction of controlled, hyperglycemic, and hypoglycemic outcomes ranged from 2.23-2.79, 6.30-8.46, and 23.1-62.7, respectively; the -LR for a prediction of controlled, hyperglycemic, and hypoglycemic outcomes were 0.126-0.164, 0.323-0.418, and 0.982-0.993.

Conclusion: A machine learning algorithm accurately predicts the category of a patient’s next BG reading. Further studies should determine the success of implementing this model into the EMR to decrease the rates of hypoglycemia and hyperglycemia in hospitalized patients.
Background: A strong patient-physician relationship favorably impacts health outcomes among patients with chronic pain (CP), yet this relationship is often fraught with conflict and misunderstanding. Limited evidence suggests that physician self-disclosure (PSD) enhances this relationship when used appropriately. This study investigates how CP patients experience or desire to experience PSD and how it may influence the patient-physician relationship.

Methods: An online Qualtrics survey was distributed via Epic MyChart to 11,258 patients who had received care at a Johns Hopkins-affiliated pain clinic between 2013-2020. The survey asked patients about prior experiences of PSD, their evaluation of these experiences, and their preferences regarding PSD. Using standard statistical analyses, we explored associations among patient characteristics and survey responses.

Results: Among 918 respondents, 325 (35.4%) reported experiencing PSD, including “small talk” (58.5%), the physician’s own CP (25.2%), hardship involving family/friends (23.1%), health challenges other than CP (19.4%), and hardship unrelated to health (6.2%). Patients, on average, rated these experiences between 7.2-8.0 on a scale from 0 (great harm) to 10 (great benefit). 379 of 934 respondents (40.6%) indicated they would benefit most from seeing a physician who has had CP themselves. 556 of 924 respondents (60.2%) indicated they would want their physician to self-disclose their own CP. More patients self-identifying as White compared to Black reported experiencing PSD (37.1% vs. 25.0%, p<.01). Regarding desire for physicians to self-disclose their own CP, more patients never experiencing PSD responded ‘yes’ (63.3% vs. 58.2%) or ‘no’ (9.2% vs. 3.7%), whereas more patients who experienced PSD responded ‘unsure/it depends’ (38.2% vs. 27.5%) (p<.001).

Conclusion: CP patients commonly experience PSD. Despite rating these experiences highly, patients who experienced PSD were more unsure about desiring their physician to self-disclose CP compared to patients never experiencing PSD. We aim to explore these findings further via in-depth, semi-structured interviews with a subset of survey respondents.
**Background:** In 1965, breakthroughs in newborn surgery reduced the neonatal mortality rate for spina bifida to 20%, from 60-100% in the years prior. However, comorbidities and outcomes still varied widely. In 1971, U.K. pediatrician John Lorber proposed a set of criteria, based on presumed quality of life, to determine which newborns were suited for surgical treatment versus nontreatment—and eventual death. This paper examines a public debate between Lorber and Hopkins neurologist John Freeman, who accused Lorber of implementing “passive euthanasia.” This work is situated within the broader U.S. disability rights movement, with the goal of exploring historical approaches to prevention, treatment, and cure.

**Methods:** I analyzed archival materials at the Chesney Medical Archives from various collections, including Freeman’s. Materials included correspondence, publication drafts, conference programs, popular media, presentations, funding records, and informational pamphlets. I also conducted oral history interviews. Primary scientific and disability literature and secondary historical literature on disability contextualize my research.

**Results:** Medical approaches to spina bifida can be split into two main categories: prevention or management. Prevention took the form of folate supplementation or selective abortion, while management meant a series of corrective surgeries throughout patients’ childhoods. In agreement with Freeman’s critiques, I argue that Lorber’s selection criteria functioned as a variant of prevention, anchored in denying treatment to patients with poor prognoses. A decade later, similar research in the U.S. garnered significant backlash; physicians, popular press, and advocates alike questioned whether these pediatricians were “playing God in the nursery.”

**Conclusion:** The debate between Freeman and Lorber illustrates how Western medicine conceptualized disability in the 1970s and 1980s. Physicians’ biased assumptions about patient prognosis and quality of life greatly influenced this discourse. By highlighting the tension between prevention and management, this paper demonstrates how the medical impulse towards prevention and cure—commonly conceptualized as gain—can also represent great loss.

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Incidence and risk factors of symptomatic neuroma formation following sarcoma resection
Background: When a nerve is injured and unrepaired, free nerve endings regenerating from the proximal stump form an aggregate of disorganized neural growth, called a neuroma. Frequently, neuromas result in debilitating pain. While the incidence and risk factors of symptomatic neuroma formation are well characterized in amputees and other patient populations, these data have not been studied in patients undergoing sarcoma resection. When sarcomas are resected, both cutaneous and large-caliber mixed motor-sensory nerves can be sacrificed and left unrepaired. This study aims to characterize the incidence and risk factors of symptomatic neuroma formation in patients undergoing sarcoma resection without prophylactic intervention.

Methods: We performed a retrospective cohort study of 316 patients who underwent sarcoma resection at Johns Hopkins Hospital between 2014-2019. We collected data from medical records including chemo/radiotherapy, resection characteristics, neuropathic pain and medications. We conducted surveys to assess symptomatic neuroma formation and impact on quality of life for patients who were not evaluated for neuroma post-operatively. Cumulative incidence and relative risk ratios with 95% confidence intervals were calculated.

Results: Of 146 eligible patients, 47.9% reported neuropathic pain and/or were prescribed neuromodulating pain medication post-operatively. Patients who received perioperative radiotherapy were 32% more likely to report neuropathic pain than those who did not (CI: 1.0-2.1). Patients with resections >10 cm were 216% more likely to report neuropathic pain than those with smaller resections (CI: 1.4-3.4).

Conclusion: Preliminary results demonstrate that almost half of patients undergoing sarcoma resection in this cohort reported post-operative neuropathic pain suggestive of neuroma development. Perioperative radiotherapy and larger resection size were associated with increased risk of post-operative neuropathic pain in this cohort, pointing towards additional risk factors for symptomatic neuroma formation in this patient population. These results shed light on the magnitude of this previously overlooked problem and may help guide prophylactic surgical interventions meant to prevent this complication.

Pollution and skin cancer: a national cross-sectional perspective
Background: Air pollution is a significant public health concern globally. However, current understanding of the adverse effects of air pollutants on skin health is limited. There is little known about how air pollution is affected by photoprotection practices or how it impacts keratinocyte carcinoma development.

Methods: We combined data from the NHANES 2009-2010, 2011-2012, and 2012-2013 survey cycles and restricted analysis to adults aged 20-65 years old. After recoding for missing data and skip patterns, sample weights were created to represent the general noninstitutionalized U.S. population. 6-year mobile examination center interview weights were used. Eight polycyclic aromatic hydrocarbons (PAH) metabolites were examined to represent pollution exposure. 30,468 individuals were included after merging demographics, medical conditions, and PAH data.

Results: In linear regression models, decreased concentrations of 2-Hydroxyfluorene, 1-Hydroxypyrene, 2-Hydroxyphenanthrene, and 3-Hydroxyphenanthrene were significantly associated with skin cancer in both crude and adjusted models (all p < 0.05). Multinomial logistic regressions found that participants with skin cancer were associated with increased odds of staying in the shade (OR 3.58, 95% CI 0.81 - 15.91) and wearing sunscreen (OR 5.44, 95% CI 2.54 – 11.68.) However, participants with skin cancer were also associated with increased odds of having at least one sunburn in the past year (OR 1.20, 95% CI 0.85 – 1.71) and decreased odds of wearing a long-sleeved shirt when outside (OR 0.90, 95% CI 0.25 – 3.26.)

Conclusion: Our study found that skin cancer is significantly associated with decreased levels of urinary 2-hydroxyfluorene, 1-Hydroxypyrene, 2-Hydroxyphenanthrene, and 3-Hydroxyphenanthrene. We also found that skin cancer is paradoxically associated with both increased and decreased odds of practicing different skin protection methods when outside in the sun. Further studies are needed to explore why environmental exposure to PAH is not associated with skin cancer risk and which photoprotection practices play a more significant role in this relationship.

Clinical characteristics and quality of life burden in aquagenic pruritus: a global questionnaire-based study
Background: Aquagenic pruritus (AP) is a rare pruritic dermatosis characterized by intense itching following water exposure and often results in patients avoiding water contact. Limited epidemiologic studies describe the characteristics of AP and its impact on quality of life. Our objective was to characterize the demographics, itch, and quality of life of AP patients using a descriptive cross-sectional study design.

Methods: An anonymous, online Qualtrics survey was developed and delivered via a Facebook AP support group in July 2019. The survey assessed symptoms associated with AP, but also utilized established quality of life measures including the Dermatology Life Quality Index (DLQI), the 5-D pruritus scale and the Pittsburgh Sleep Quality Index (PSQI).

Results: A total of 106 respondents from 16 countries completed the survey. The mean (SD) age of respondents was 41.4 (14.2) years with the majority being female (79.3%), and Caucasian (82.1%); 45.3% of respondents were Fitzpatrick skin type 3 and 31.1% were type 2. Itch was symmetrically distributed with the greatest prevalence reported on proximal ventral surfaces, including the thighs (90%, n = 99) and upper arms (80%, n=90). The top five triggers associated with itch onset included bathing, sweating, humidity, rain, and friction over the skin. Prickling was the most common sensation felt along with itch (n=80, 75.5%). AP patients had a mean (SD) DLQI of 11.1 (7.0), 5D pruritus score of 13.9 (2.8) and a PSQI of 8.4 (3.6).

Conclusion: Compared to published mean DLQI scores of psoriasis patients, the mean DLQI score in this study suggests that AP patients have a significantly decreased quality of life. With a better understanding of AP itch distribution, severity, and quality of life, physicians can provide tailored care for this subset of itch patients.

Risk factors for the development of acne in healthcare workers during the COVID-19 pandemic
Background: The COVID-19 pandemic has led to significant changes in work hours and environment for healthcare workers, with many subject to prolonged contact with tight-fitting masks. Dermatitis, acne, and the exacerbation of previous skin conditions have been described amongst health care workers due to these circumstances. “Maskne” is defined as acne as a side effect of mask use. Existing literature about maskne during the pandemic is limited. Prevention recommendations include using gentle soap, barrier creams, cloth masks when not using respirators and limiting use of makeup. The objective of this study is to assess if the risk of developing maskne is elevated in healthcare workers with a history of acne during the ongoing COVID-19 pandemic.

Methods: A cross-sectional survey was administered to forty 3rd and 4th year medical students and resident physicians at Johns Hopkins Medicine, and data analysis was completed in January 2021. Descriptive statistics and analytical comparisons of demographics between respondents reporting maskne were reported using chi-squared analysis. Characteristics of the history of acne were assessed based on the duration of acne and period of onset. The study was approved by the Johns Hopkins Institutional IRB.

Results: 67.5% of participants developed maskne. The most common prevention methods were the use of mild cleanser and moisturizer. Surgical masks and respirators were the most prevalent mask types at work. The duration of acne history was a significant risk factor (p=0.05), but none of the other risk factors studied, including acne history overall, were significant.

Conclusion: The results of this study indicate that a longer duration of acne history, particularly one of 6-10 years, is a significant risk factor for maskne development, but all other risk factors, including the presence of any acne history overall, were not significant. These results suggest that targets for intervention should be broad, given increasing COVID-19 infection burden in 2021.
Background: The effect of the COVID-19 pandemic has led to increased isolation of families at home and potentially decreased access to the healthcare system. We therefore evaluated the effect of COVID-19 on rates of compliance with recommended post-injury follow-up. We hypothesized that this isolation may lead to detrimental effects on adherence to proper follow-up for children with burn injuries.

Methods: We queried the registry at an ABA-verified Level 1 pediatric burn center for patients aged 0-14 years who were treated and released from March 30 to July 31, 2020, which represents the height of the pandemic. As a control, we searched the registry for patients treated during the same time frame from 2016 to 2019. Patient and clinical factors were compared between the COVID and non-COVID cohorts. Predictors of follow-up were compared using chi-squared and Kruskal-Wallis tests. Multivariable logistic regression was used to evaluate for predictors of compliance with follow-up.

Results: A total of 401 patients were seen and discharged from the pediatric ED for burn injuries. Fifty-eight (14.5%) of these patients were seen during the pandemic. Burn characteristics and demographic patterns did not differ between the COVID and pre-COVID cohorts. Demographics, including age, gender, race, and ethnicity did not differ between patients with 2-week follow-up and those without. The rate of compliance

Conclusion: Despite concerns about decreased access to healthcare during the pandemic, the experience at our Level 1 pediatric burn center, including rates of follow-up for those managed as outpatients, appears unchanged.
**Background:** While images in plastic surgery literature reflect lighter skin types, the content of online patient education resources is unknown. Implicit bias may impact health outcomes for patients of racial and ethnic minorities. Thus, we aimed to determine if online breast augmentation images represent the diversity of our US patient population.

**Methods:** A google search was conducted for location-specific online breast augmentation images based on previous literature. Cities studied were: Baltimore, Dallas, Chicago, Miami, New York City, Los Angeles, and Atlanta. Before/after images in the first 20 websites for each city were analyzed; three independent reviewers assigned images a Fitzpatrick skin type I-VI. The top 10 pages of before/after augmentation images on the patient-published blog Realself were analyzed for comparison. Conflating race with Fitzpatrick types can be problematic and inaccurate, so we analyzed images by groupings (I-II, III-IV, V-VI). Demographic data and nationwide ASPS data were collected to compare before/after content to the general population and breast augmentation patients. A descriptive analysis of Fitzpatrick distribution was conducted using Microsoft Excel and STATA.

**Results:** Overall, 109 websites and 3549 images were analyzed. The most commonly represented Fitzpatrick types were I-II, ranging from 80.4% (Miami) to 90.7% (Los Angeles). Types III-IV were less represented, from 8.7% (Los Angeles) to 18.4% (Miami). The highest proportion of V-VI images observed was only 1.7% (Atlanta). Of 299 Realself images, 91.6% were types I-II. In contrast to the highly represented I-II category, 2019 census data show vast diversity; in fact, most residents in each city self-designate as non-white, ranging from 62.9% (Atlanta) to 90.2% (Miami).

**Conclusion:** Online patient education images consistently represented lower number Fitzpatrick skin types, despite census data clearly depicting diversity. This leads us to believe that the images do not accurately reflect either the diversity of our cities or our breast augmentation patients. To deliver equitable care, it is imperative that plastic surgeons create inclusive and representative online resources.

**Racial and Gender Diversity Within U.S. Residencies: Trends from 2011 to 2019**
Background: The proportions of underrepresented minorities (URMs) and women in medicine lag behind those of the U.S. population. Although URMs comprise ~33% of the population, ~13% of physicians are URM. There are also disparities in gender among physicians, with men outnumbering women by ~28%. While previous studies have examined diversity trends within select specialties, there is a dearth of literature studying trends across all specialties. We examine trends in the proportion of URM and women residents from 2011—2019 across all specialties and investigate differences between surgical and non-surgical specialties.

Methods: Data on the proportion of URM and female residents in all specialties was extracted from the Accreditation Council for Graduate Medical Education (ACGME) yearly reports. Linear trends were analyzed with the chi-square test for trend.

Results: There was a statistically significant decline in the percentage of URMs in surgical specialties (percent change [Δ%] -0.149, 95% confidence interval [CI] -0.206 to -0.091), a significant increase in the percentage of URMs in non-surgical specialties (Δ% 0.081, 95% CI 0.049 to 0.123), and a significant increase in the percentage of female residents in surgical specialties (Δ% 0.337, 95% CI 0.240 to 0.433). Plastic Surgery and Integrated Plastic Surgery experienced the largest percent increase in URM and women respectively: (Δ% 1.135, 95% CI 0.597 to 1.674), (Δ% 1.063, 95% CI 0.454 to 1.672). Conversely, Obstetrics & Gynecology and Pathology experienced the largest percent decrease in URMs and women respectively: (Δ% -0.419, 95% CI -0.567 to -0.271), (Δ% -0.693, 95% CI 1.005 to -0.381).

Conclusion: Our study emphasizes the need to increase recruitment of URMs and women in medicine, especially in surgical specialties. Findings from this study can inform much-needed initiatives to address barriers to entry for diverse applicants within specialties that lack diversity and/or have shown minimal improvement over time.
Background: Though the resident selection process has been well described, the methods by which programs determine which applicants are granted interviews are not clear.

Methods: An online, anonymous survey was conducted through Qualtrics and circulated to residency program directors from all medical specialties at Johns Hopkins Hospital. Questionnaire items consisted of multiple choice, free response, and 5-point Likert scales related to program director demographics, residency program characteristics, the process used to invite applicants for an interview, and the interview selection criteria. Descriptive statistics identified possible trends across different residency programs.

Results: The response rate was 79% (19/24). 63% of residency programs received up to 600 total applications. 58% of programs have a separate screening committee, distinct from the interviewing committee. 53% divide applications among multiple committee members and 63% utilize a standardized rubric. Most programs (79%) have multiple independent reviewers for each application (mean number of reviewers 2.4 ± SD 1.1; range 1-5). A common trend observed is that reviewers evaluate applicants using a three-point scale (no interview, maybe, definite interview). The most important factors (>4.0 on Likert scale) were grades in rotations of the application field (4.32 ± 1.03) and the Medical Student Performance Evaluation (4.05 ± 0.83). Following initial screening, the program director (45%), program director conjointly with another faculty (35%), or a screening committee (20%) ultimately decides who receives an interview.

Conclusion: Given the increasing number of applications that residency programs must review, exploring best-practices for interview selection across different specialties may be beneficial for program directors.

Knowledge and Attitudes of U.S. Medical Students Regarding the Care of Asian American Patients
Sharon Pang* BA, Hursuon Vongsachang* BS, Thomas K. Le BS, George Q. Zhang MPH, Taibo Li MEng, Jason T.C. Lee MSc, Shari M. Lawson MD MBA
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**Background:** Few studies have analyzed cultural competency (CC) training in medical students regarding Asian American (AsAm) patients. This project surveyed U.S. medical students on their knowledge of and attitudes towards AsAm patients to assess predictors of CC and areas of improvement in medical training.

**Methods:** This cross-sectional survey, adapted from previously validated and published surveys, was distributed online to medical students who had completed at least one clinical rotation at nine medical schools throughout the U.S. The survey measured self-rated knowledge, comfort, cultural competency, and explicit biases towards AsAm patients. Scores from the first three domains were analyzed in a multivariate regression model, including sociodemographic characteristics and past clinical, curricular, and social experiences with AsAm. Responses about explicit bias were reported descriptively.

**Results:** There was a total of 688 respondents. Asian race, AsAm-prevalent hometown, AsAm-related extracurricular activities, Asian language fluency, and population health course completion predicted increased AsAm knowledge (all p<0.001, except population health course p=0.033). Social interactions with AsAm increased comfort with AsAm patients (p=0.005). Third- and fourth-year status, more frequent exposure to AsAm patients on rotations, and prior travel to an Asian country were predictors of increased CC toward AsAm (all p<0.05). Importantly, CC course completion was a significant predictor in all domains (all p<0.05). Regarding explicit bias, more than 1/3 of students felt that AsAm patients were more compliant than Caucasian patients. Students also believed that Caucasian patients were more likely to receive perceived p

**Conclusion:** This study supports that experience with AsAm prior to and during medical school and CC courses may increase medical student knowledge, comfort, and CC with AsAm patients. Future research is needed to develop strategies to improve student physicians’ comfort in interacting with AsAm patients.

Developing an anti-prejudiced bystander training for medical students
Background: Learner mistreatment is a prevalent issue in academic medicine, with consequences to the well-being and academic success of medical trainees. Mistreatment contributes to the propagation of bias in medical education and patient care. Such bias is reinforced through the “hidden curriculum”. The purpose of this study was to design a curriculum which employs strategies of bystander intervention to mitigate the effects of mistreatment and improve institutional culture regarding this issue.

Methods: We surveyed all Johns Hopkins medical students to document and understand experiences of learner mistreatment. Informed by these results, we created a 1.5-hour scenario-based curriculum which was piloted with the first-year class. All first-year students were asked to collaborate on intervention strategies for 6 cases where derogatory behavior was witnessed by a medical student. This was followed by a guided discussion with the class on appropriate and effective responses. This curriculum was evaluated by a post-session survey of the first-year class.

Results: Our survey response rate was 20% (n=98/480). Among respondents, 44% experienced derogatory comments based on personal characteristics. Many students reported witnessing such behaviors directed to team members (52%) and patients (41%). Students were often hesitant to intervene due to the power dynamic between learners and educators. Our curriculum was viewed positively by students in post-session survey (n=109/120), ranked by the majority as “excellent” (53%). A wide majority of students felt that the session improved their skills related to responding to learner mistreatment (94%) and derogatory behavior (92%).

Conclusion: Bystander training offers a valuable and evidence-based approach to challenging learner mistreatment, a problem that needs to be addressed given the personal and professional harms posed by discrimination in the medical environment. Next steps include more widespread dissemination across other healthcare professional populations at Johns Hopkins Medicine, as well as integration longitudinally across the medical student curriculum.
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**Background:** Substance use, intimate partner violence (IPV), and depression frequently co-exist in the setting of HIV and act independently and synergistically to increase the risk of adverse HIV outcomes and mortality. There is an urgent need for identification, referral when indicated, and appropriate management at the healthcare systems level.

**Methods:** In this study, we measured the prevalence of substance use, IPV, and depression in women living with HIV visiting the Johns Hopkins adult HIV clinic for gynecologic care using existing validated screens available in the electronic medical record (SBIRT, Abuse Assessment Screen, and PHQ-2/9). We assessed the individual and combined associations of these factors on CD4 count, viral load, no-show (N/S) appointment rates for HIV care, and number of reported ED visits.

**Results:** Out of 116 women, 16.7% screened positive for depression, 33.6% for IPV past and present, and 29.3% for substance use. In unadjusted models, women who screened positive for IPV more likely to have a N/S rate >20% (p=0.002, OR= 3.52) compared to women who screened negative. Women who screened positive for depression were more likely to have a N/S rate >20% compared to women who screened negative (p=0.006, OR= 4.71). Lastly, women who screened positive on any of the three screens were more likely to have N/S rate >20% compared to women who screened negative on all screens (p=0.001, OR=3.87). There were no significant differences in viral load, CD4 count, and number of ED visits in women who screened positive on any screen compared to those negative on all screens.

**Conclusion:** The association between substance use, interpersonal violence, depression, or a combination of these factors on health visit adherence highlights the increasing need to develop system level interventions that promotes earlier identification and management of these conditions to alleviate disease burden.
Impact of Multidisciplinary Intraoperative Teams on Thirty-Day Complications after Sacral Tumor Resection

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Background: Surgical resection is a key element in the management of sacral tumors, but has a high associated morbidity owing to the complex regional anatomy. Consequently, patients may benefit from multidisciplinary collaboration. We investigate the impact of multidisciplinary intraoperative teams on surgical complications in patients undergoing sacral tumor resection.

Methods: We retrospectively reviewed all patients with primary or metastatic sacral tumors managed at a single comprehensive cancer center between 2013 and 2020. Student’s t-test and multivariable regression were used to compare perioperative complication rates between those treated by a single spinal oncologist and those treated by a spinal oncologist and at least one other surgical specialty. A stepwise multivariable linear regression was used to identify predictors of a multidisciplinary operation.

Results: 107 patients underwent 132 operations for sacral tumors. 92 operations involved multidisciplinary teams, including 54% of metastatic tumor operations. Patients receiving multidisciplinary management had higher BMIs (29.8 vs. 26.3kg/m2; p=0.008), larger tumors (258 vs 55cm 3; p<0.001), and higher ASA scores (3 vs. 2; p=0.049). Only larger tumor volume (OR=1.007/cm3; p<0.001) and undergoing treatment for a malignant primary tumor (OR=23.4; p<0.001) or benign primary tumor (OR=29.3; p<0.001) were predictive of multidisciplinary management.

While operations involving multidisciplinary teams were longer (467 vs. 231min; p<0.001) and had higher blood loss (1698 vs 774mL; p=0.004), thirty-day complication rates were similar (37 vs. 27%; p=0.39). On multivariable analysis, only larger tumor volume (OR=1.004/cm3; p=0.005) and longer surgical duration (OR=1.002/min; p=0.03) independently predicted higher thirty-day complications.

Conclusion: We report a single-center experience with multidisciplinary management of sacral tumors. We find that although patients managed with multidisciplinary teams had larger tumors and worse baseline health, thirty-day complication rates were similar. The results suggests that the use of multidisciplinary teams may help to mitigate surgical morbidity in those with high baseline risk.
Background: Subependymomas are low-grade CNS tumors whose clinical and radiographic features and post-surgical outcomes are incompletely characterized due to their rarity.

Methods: Adult patients (≥18 years) diagnosed with histologically confirmed subependymoma or mixed subependymoma-ependymoma surgically treated at Johns Hopkins between 1992 and 2020 were identified. Patient demographics, radiographic features, tumor characteristics, clinical and management data were collected. A literature review of the PubMed database was conducted from inception until July 2020.

Results: Forty-eight patients with subependymoma were identified through institutional chart review; of these, 8 (16.7%) had mixed subependymoma-ependymoma tumors. The mean age at diagnosis was 47.9±14.0 years, and 26 (54.2%) patients were male. Forty-one patients (85.4%) had intracranial subependymoma and 7 (14.6%) had cervical or thoracic spinal tumors. The most common presentation was headache (n=20, 41.7%) and 16 (33.3%) tumors were diagnosed incidentally. Fifteen patients (36.6%) had hydrocephalus. Suboccipital craniotomy with or without C1 laminectomy was the most common surgical approach for intracranial tumors (n=26, 63.4%). Gross total resection was achieved in 33 (68.8%) cases and 2 patients had adjuvant radiotherapy. Most patients had no major post-surgical complications (n=34, 70.8%), and only 6 (12.5%) had recurrence.

The literature review included 34 papers and 537 patients. Of 394 patients where tumor location was reported, 339 (86.0%) were intracranial and 55 (14.0%) spinal, with the lateral ventricle the most common location (n=144, 36.5%). Similar to our institution, headache was the most common presenting symptom (n=192, 37.1%) and 112 (21.7%) patients were diagnosed incidentally or at autopsy among the 517 patients whose presenting symptoms were reported. Extent of resection was reported for 285 patients; gross total resection was achieved in 218 patients (76.5%). Fifteen of 285 patients (5.3%) had recurrence.

Conclusion: Our retrospective case series and literature review demonstrate that subependymoma patients are well managed with surgical resection and generally have a favorable prognosis.
Predicting ICU and Total Hospital Length of Stay Among Brain Tumor Patients using Patient- and Procedure-Related Factors

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Background: Many studies within the neurosurgical literature have identified factors associated with prolonged hospital length of stay (LOS). These factors can be categorized as either patient-specific, such as age or tumor diagnosis, or procedure-specific, such as date/time of surgery and surgeon operating experience. The present study aimed to quantify whether patient-specific or procedure-specific factors are the main drivers of LOS in brain tumor patients.

Methods: Patients who underwent brain tumor surgery between 2017-2019 at a single academic institution were included in our study. Prolonged ICU LOS and total LOS were defined as >2 and >7 days, respectively, and multivariate analysis was conducted using logistic regression models. Receiver operating characteristic (ROC) curve analysis was used to assess model predictive performance, and DeLong’s test was used to assess for significance differences between two areas under the ROC curve (AUCs). p<0.05 was defined as statistically significant.

Results: Our cohort included 661 patients and was majority female (55.7) and Caucasian (72.9). For models predicting ICU LOS, the AUC of a model containing only patient-specific factors (AUC=0.73) was significantly greater than a model containing only procedure-specific factors (AUC=0.57; p<0.001). Further, adding procedure-specific factors to the patient-specific model (AUC=0.73) did not significantly increase the model’s AUC (AUC=0.73; p=0.57). For models predicting total LOS, the AUC of a model containing only patient-specific factors (AUC=0.83) was significantly greater than a model containing only procedure-related factors (AUC=0.57; p<0.0001). Adding procedure-specific factors to the patient-specific model (AUC=0.83) did not significantly increase the model’s AUC (AUC=0.83; p=0.23).

Conclusion: Among brain tumor patients, patient-specific factors such as frailty and tumor diagnosis are the main drivers of prolonged LOS, rather than procedure-specific factors such as surgeon experience. Our results may inform strategies for preoperative stratification of ideal surgical candidates and may also optimize the provision of high-value health care.
Predictive factors for Overall Survival in Surgical Cases of Gliomatosis Cerebri from the National Cancer Database

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**Background**: Gliomatosis Cerebri (GC) is a rare, aggressive, diffusely infiltrating cerebral tumor. Prognostic indicators and management strategies are currently poorly characterized.

**Methods**: The National Cancer Database was queried for patients with histologically confirmed GC between 2004 and 2016. Demographic, tumor, and treatment characteristics were collected, including the Charlson/Deyo score, a comorbidity index adapted from the Charleston Comorbidity Index. Allowable values for the Charlson/Deyo score are 0 (no recorded comorbidities), 1, 2, and 3+ (most severe). Factors associated with overall survival were identified via bivariate log-rank tests and multivariate stepwise Cox proportional hazards models.

**Results**: The query returned 108 GC patients. The median age was 60.0 years, males were predominantly affected (63%), and most patients were white (86%). While 12% of cases achieved near/gross total resection and 27% of cases achieved partial resection, most surgeries were for biopsy (61%). Treatments included radiation therapy in 64% and chemotherapy in 63% of patients. The median overall survival was 15.1 (95% confidence interval [CI] = 11.1–24.8) months. On bivariate analysis, chemotherapy improved overall survival (p = 0.01) while radiation therapy (p = 0.07) and extent of resection (p = 0.48) did not. On multivariate analysis, older patients (hazard ratio [HR] = 1.07, CI = 1.03–1.11, p < 0.01) and Charlson/Deyo scores of ≥1 versus 0 (HR = 3.47, CI = 1.40–8.60, p < 0.01) had significantly increased mortality risk following surgery.

**Conclusion**: The Charlson/Deyo score is a novel prognostic factor for GC that may guide clinical and surgical decision-making for this rare, rapidly fatal tumor. Further prospective studies are warranted to clarify the effects of chemotherapy versus radiation as treatment modalities for GC.
Optimizing Postoperative Surveillance of Adult Low-Grade Glioma

Richard Pellegrino BA, Debraj Mukherjee MD

**Background:** Adult low-grade gliomas (WHO grades 1 and 2) are tumors that arise from astrocytes, oligodendrocytes, and ependymal cells, and treatment is often surgical resection followed by MRI surveillance. Most institutions establish their own postoperative surveillance protocols, but little research has been conducted to determine the optimal imaging schedule.

**Methods:** This study reviewed the charts of JHH patients > 18 years old who received more than 2 years of follow-up after surgical resection of a histopathologically confirmed low-grade glioma between 2008-2016. Data collected from postoperative MRIs, along with the patient’s surgery date, presence of recurrence or progression, and reoperation information were recorded and used to propose a protocol that minimized the delay in recurrence detection, delay in reoperation, and cost.

**Results:** There were 308 patients to undergo surgery for low-grade glioma between 2008 and 2016. A total of 74 patients met the inclusion criteria, and 35 of those patients underwent a gross total resection (GTR). For patients that underwent GTR, our 8-image, 7-year protocol demonstrated more efficient detection than a currently used 10-image protocol over the same period. The proposed protocol calls for MRIs at 3, 8, 16, 29, 39, 52, 72, and 84 months postop, and would reduce the cost over 7 years by $1,668 per patient.

**Conclusion:** The data shows that a less intensive and less costly imaging protocol can be used with more efficient results than protocols currently in place.
The Relationship of Diabetes to MRI Brain Characteristics and Cognitive Performance in the GeneSTAR Study


Background: Persons with diabetes are known to show cognitive impairment, but it is unclear if this corresponds to changes in regional brain volumes. The purpose of our study was to examine the association between diabetes status and cross-sectional MRI brain volumes and cognitive function.

Methods: We investigated the cross-sectional relationship of diabetes status to MRI brain characteristics and cognitive function tests in the GeneSTAR cohort, siblings and offspring of patients with documented CAD events prior to age 60, performed between 2009-2012 (n=775). Diabetes (n=101) was defined based on self-report, use of glucose-lowering medication, and/or fasting glucose levels ≥126 mg/dl. Prediabetes (n=168) was defined based on fasting glucose levels 100-125 mg/dl. We used linear and logistic regression models for our continuous and dichotomous variables, respectively, sequentially adjusting for demographic factors, lifestyle factors, body mass index, and cardiovascular disease risk factors.

Results: Participants had a mean age of 51, were 58.6% female, 60.3% white, and 19.2% currently smoking. Many MRI characteristics and cognitive tests showed significant differences by diabetes status in bivariate analysis, including decreased total grey matter volume (p<0.001), increased frontal WMH lesion volume (p<0.001), decreased delayed word recall (p<0.001), and decreased digit substitution score (p<0.001) in persons with versus without diabetes. However in adjusted models, the significant associations that remained were for a higher globus pallidus volume (β=0.33, p<0.01), lower digit span performance (β=1.08, p<0.05), and lower likelihood of any WMH lesion (OR=0.27, p<0.01) or any insula WMH lesion (OR=0.57, p<0.05) in persons with versus without diabetes.

Conclusion: Our study unexpectedly found increased globus pallidus volumes and decreased likelihood of WMH lesions in persons with diabetes. The clinical significance of these findings remains unclear and contradicts established literature; however, the findings of decreased cognitive function with diabetes confirm previous findings. Future analyses will explore relationships by level of blood glucose, and sex-stratified analyses.
Mindful Eating for Diabetes Control -- A Systematic Literature Review

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**Background:** Psychological well-being may be associated with a reduced risk of developing diabetes. One approach to improving psychological well-being is mindfulness, a concept which extends to mindful eating. Mindful eating tenants include focusing on the taste and texture of food, cultivating an awareness of hunger and satiety, and practicing non-self-judgment. Mindful eating can help achieve weight loss and control disordered eating behaviors, suggesting that it may be effective for controlling diabetes.

**Methods:** We conducted a systematic literature review to explore how the effect of mindful eating interventions on measures of glycemic control compares to other dietary or lifestyle interventions. Using PubMed, Embase, Cochrane, CINAHL, PsycINFO, and Web of Science, we identified randomized and non-randomized controlled trials, cohort studies, and pre-post single group comparison studies. Two independent reviewers screened citations and extracted data. Here, we present a narrative review of study characteristics and outcomes.

**Results:** After reviewing 1957 citations, we identified 17 studies for inclusion with a total of 1760 participants. Six studies adapted their intervention from the mindful-based eating awareness training (MB-EAT) program and 14 incorporated meditation and/or yoga. The average intervention length was 15 weeks (range: 6 weeks – 12 months). Most studies included participants with type 2 diabetes (5/17), prediabetes (4/17), or gestational diabetes (1/17). The majority included diabetes-related outcomes such as fasting gluc

**Conclusion:** Mindful eating may help control some of the leading prognostic factors of diabetes. However, the literature on this topic is heterogenous, and there is insufficient evidence to draw a conclusion regarding the effectiveness of mindful eating for glucose control. Future studies should focus on isolating the effects of mindful eating from those of other mindfulness-based practices.

Prolonged Surgical Interval Following Chemotherapy in a Patient with Idiopathic Subglottic Stenosis (iSGS)
**Background:** Laryngotracheal stenosis (LTS) is an extrathoracic obstruction of the upper airways. Its primary goal of management is to maintain the patency of the airways using surgical dilations. However, the need of frequent interventions poses a significant burden on the patient’s quality of life. Although adjuvant therapies are employed, their effectiveness remains variable. Recent studies have demonstrated that Th2 and Th17 lymphocytes play a key role in LTS fibrosis initiation, raising the possibility of using therapies that target lymphocytic differentiation or activity to treat LTS.

**Methods:** A case report of a non-rheumatologic LTS patient with secondary exposure to chemotherapy was performed at a tertiary academic medical center. Clinical characteristics, medications, comorbidities, serology, and procedures were documented. Patient was analyzed descriptively.

**Results:** We report an interesting case of a 71-year-old Caucasian woman with a history of Idiopathic LTS diagnosed in 2008 with a total of 5 endoscopic dilations (2013-2017). In 2016, patient was diagnosed with ovarian cancer and began a regimen of Carboplatin and Pemetrexed that lasted for 6 months. Unfortunately, her cancer recurred in 2018 prompting her to restart a new regimen of Carboplatin and Doxorubicin that lasted for 5 months. Curiously, her stenosis stabilized afterwards, reducing the need for further dilations. Patient is currently dilation free with a clinically significant increase in her average dilation-free days of 611 days (Pre-2nd-regimen: 369 days, post-2nd regimen: 980 days).

**Conclusion:** Secondary exposure to carboplatin might have contributed to the increase in dilation free days in our patient. Although no conclusive evidence can be established in a case report, we hypothesize that non-systemic use of chemotherapeutic agents might prove effective in managing some forms of LTS. These observations are consistent with a prior case series that noted a similar increase in surgical interval in non-rheumatologic LTS patients exposed to methotrexate, another agent that indirectly target lymphocytes.
Madeleine Waldram BA, Maria Amalia, Francisco Canseco, Antonio Bernadez, Jaime Miranda MD, Antonio Trujillo PhD

**Background:** Incentives can facilitate introducing health-related behavior changes that are critical to managing diabetes. However, the effectiveness of such interventions might be influenced by patients’ personal qualities and preferences, like personality traits, that impact their decision-making; understanding these factors could help clinicians more effectively tailor interventions to individual patients. We investigated whether personality traits were associated with downward weight trajectory among diabetic patients receiving individual or mixed reward schemes (i.e., financial incentives without vs. with partner support) to promote weight loss.

**Methods:** We used data from a randomized controlled trial (RCT) of diabetic patients in Peru (N=54) (Miranda JJ et al, 2019). We used group-based trajectory modeling to identify clusters of participants who followed similar weight trajectories over the study period. We then used ordinary least squares regression to estimate the association between personality characteristics (openness, conscientiousness, extraversion, agreeableness, neuroticism) and probability of downward trajectory group membership.

**Results:** We identified three clusters of participants with respect to weight trajectory: steep downward (11.9%), slight downward (47.2%), and slight upward (40.9%). In univariate models, higher openness personality was positively correlated with membership in either downward trajectory group (p<0.05); moderate conscientiousness and high or low neuroticism were positively but less strongly correlated with downward trajectory group membership (p<0.1). These relationships persisted in multivariable models adjusting for all three personality traits, reward scheme, demographic characteristics, and interviewer effect (p<0.05 for conscientiousness and openness; p<0.1 for neuroticism).

**Conclusion:** We found that personality traits (openness, conscientiousness, and neuroticism) were correlated with steady weight loss among diabetic patients enrolled in an RCT of reward schemes to promote weight loss. These findings support the hypothesis that personality traits might impact diabetic patients’ response to reward schemes. Further research is needed to elucidate how personality characteristics could be leveraged to personalize and tailor behavioral interventions to improve outcomes among patients with diabetes.

**Diet Behavior in East Baltimore Patients with Diabetes during COVID-19 Restrictions**

Scarlett Guo BA, Alyssa Kretz BA, Candice M. Nalley MD, Katherine Rediger MSN/CRNP
**Background:** Diet is a well-recognized modifier of diabetes outcomes. Many diabetic patients in Baltimore city live in high-need, low-resource, "food desert" environments where undue barriers to acquiring nutritious food exist. Little is known regarding how the COVID-19 landscape has affected the diet and health behaviors of these patients. This project aimed to assess how diet behaviors and diabetes management of diabetic patients in East Baltimore has changed during the COVID-19 pandemic considering potential mediators including income, food assistance use, and household size.

**Methods:** Adult diabetic patients who received care at the Johns Hopkins Community Physicians East Baltimore Medical Center, but were not involved in other diet-related research or food access programs, were invited to complete a short survey about participants’ self-recalled diet, food-assistance use, and demographic information during 2019 compared to 2020 conducted via telephone, online, or mail. Paired t-tests and linear regressions were performed using R Commander.

**Results:** 49 patients were recruited with a 55% survey completion rate (n=27). Participants reported a significant decrease in household size (-6.0% p<0.05) and increase in reliance on food stamps and other subsidized food resources this year compared to the previous year (+26% p<0.05). Most participants preferred the idea of receiving vouchers for produce (n=19) over produce distributed at an accessible location (n=6). Changes in average household income, food insecurity, vegetable intake, decadent food intake, rates of cooking at home, and diabetes control were non-significant.

**Conclusion:** Compared to 2019, in 2020 our diabetic patients have not reported significant changes in nutritious food-intake or diabetes control. However, they do report significantly increased food assistance use and living in smaller households. These results are not explained by changes in average household income or food insecurity. Future research will qualitatively elucidate relationships between the COVID-19 socio-financial environment and health behaviors of vulnerable diabetic patients.
Background: Motoric cognitive risk (MCR), a syndrome characterized by slow gait speed and subjective cognitive complaints, has been associated with dementia risk. However, the neural correlates of MCR, and whether they differ from that of mild cognitive impairment (MCI), remain poorly understood.

Methods: Participants in the Atherosclerosis Risk in Communities (ARIC) prospective cohort study (n=5023) were classified using standardized criteria as MCR+/- and MCI+/- based on information from a cognitive exam, questionnaires, and a 4-meter walk. We used Cox proportional hazard models to evaluate the 5-year dementia risk associated with MCR+ and MCI+ status. At baseline, a subset of participants (n=1591) received a structural brain MRI to quantify brain volume, white matter hyperintensity (WMH) volume, and white matter microstructural properties. A second subset (n=314) received florbetapir PET neuroimaging to measure cerebral amyloid. We used multivariable linear and logistic regression, adjusted for demographic variables, to test differences in neuroimaging characteristics by MCR/MCI status.

Results: Of 5,023 nondemented participants (mean age=75.1 [5.0 SD]) included, 204 were MCR+ and 1030 were MCI+; 77 participants were both MCR+ and MCI+. Both MCR+ and MCI+ participants demonstrated increased dementia risk, but the baseline cognitive decrements associated with MCR+ were approximately half that of MCI+. The pattern of structural brain abnormalities associated with MCR+ differed from that of MCI+. While MCI+ was associated with comparatively smaller volumes in brain regions vulnerable to Alzheimer’s pathology, WMH volume associated with MCR+(B=0.29, 95% CI: 0.12-0.54) was over double that associated with MCI+(B=0.12; 95% CI: 0.03-0.25). MCI+(OR=2.98, 95% CI: 1.70-5.35), but not MCR+(OR=1.63, 95% CI: 0.47-6.53), showed increased odds of elevated amyloid, defined as a florbetapir standardized uptake value ratio of more than 1.2.

Conclusion: MCR may be a clinical marker of dementia risk. The structural and pathological brain abnormalities underlying MCR are distinct from those underlying MCI.

Analysis of Levodopa Treatment Delay in Patients with Parkinson's Disease

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Background: Parkinson’s Disease (PD) is a progressive neurodegenerative disease caused by loss of dopaminergic neurons in the substantia nigra. As the disease progresses, motor symptoms can have a significant negative impact on quality of life. Among currently available therapies for PD, the dopamine precursor levodopa is considered the gold standard for treatment of motor symptoms. However, previous conflicting reports raised concerns that levodopa therapy may hasten disease progression – this led to the popularization of “dopamine-sparing therapy.” More recently, large randomized controlled trials have demonstrated that levodopa has no disease-progressing effect. Regardless, dopamine-sparing therapies remain popular among PD patients.

Methods: We used data from the Parkinson’s Progression Markers Initiative (PPMI) – an observational, multicenter database of 682 PD patients with a total of 3,442 unique visits. Working in PPMI, we designed a linear regression model to examine correlations between length of treatment delay and demographic and clinical data. Demographic variables examined included years of education, age at disease onset, and age at diagnosis. Clinical variables included questionnaire scores and clinical assessments – Scales for Outcomes in PD (SCOPA), rigidity/tremor assessments, Unified PD Rating Scale (UPDRS), State-Trait Anxiety Inventory (STAI), Montreal Cognitive Assessment (MOCA), Schwab & England Scale – taken as pre-treatment means across follow-up visits.

Results: Pre-treatment STAI scores had the greatest correlation with treatment delay, with a linear regression coefficient of -3.01 (p=0.029; 95% CI -5.713 - 0.301) – indicating that for each point increase on the state-trait anxiety inventory (scores range 0-160), patients initiated symptomatic therapy three days sooner, on average. Increasing tremor severity scores correlated with increased treatment delay – coefficient of 11.49 (p=0.039; 95% CI 0.596 - 22.387).

Conclusion: More anxious PD patients, as judged by STAI score, begin symptomatic therapy sooner than patients who rate as less anxious. Patients who present with more significant tremor tend to delay symptomatic therapy longer.

Painful Neuroma Formation in Allograft Repair of Digital Nerve Injuries
Background: Digital nerve injuries are one of the most common peripheral nerve injuries, resulting in loss of sensation in the afflicted digit(s). When possible, a tension-free, direct end-to-end ("primary") repair of the injured nerve is optimal. When primary repair cannot be achieved without introducing tension, one can either do a primary repair with finger flexed to limit tension, or bridge the gap between the nerve ends with use of allograft. A common complication of these nerve repairs is the formation of a symptomatic neuroma, and incidences of neuroma formation have not been compared directly between these two procedures.

Methods: Patients who underwent digital nerve injury repair between 2010-2020 at JHH or JH Bayview were identified according to CPT codes. A retrospective chart review was performed to assess surgical details and outcomes. Follow-up phone calls were administered for patients with incomplete data sets. Incidences of symptomatic neuroma were compared between the patients in the two groups using a Chi square test.

Results: 62 patients with 65 nerve injuries were included: 69% male and median age 31. Among these patients, 23 nerves were repaired with allograft and 42 were repaired primarily. 17 nerve repairs have a complete data set for analysis at this time: 6 allograft repairs and 11 primary repairs. The incidence of symptomatic neuroma was calculated to be 0.27 in the primary repair group and 0.50 in the allograft repair group. Due to the small sample size at time of analysis, this difference was not significant (p=0.13).

Conclusion: The incidence rate for neuroma formation in the primary repair group is higher than in the allograft repair group. Limitations in data collection due to difficulty reaching patients for follow-up interviews have led to a lack of statistically significant results at this time. Additional patient interviews and recruitment are ongoing.

Occipital nerve decompression surgery decreases headache incidence and severity in patients with post-traumatic headaches with occipital trigger points.
**Background:** Chronic headaches are a source of significant morbidity in patients who have suffered head trauma. Some studies suggest that persistent headache is the most common lingering sequela post-concussion. Peripheral nerve compression or damage has been found to be a significant contributor to post-traumatic headaches. Surgical decompression of these nerves has emerged as an important new treatment modality to even those patients refractory to traditional pharmacotherapies. For patients with headaches of occipital origin who have defined tenderness over the greater and lesser occipital nerves, surgery entails local release of fascia, scar, or muscle impinging on these nerves. Good candidates for this procedure are patients with chronic headaches of occipital origin who inadequately respond to other therapies but experience relief from local anesthetic blockade of the greater or less occipital nerve.

**Methods:** We retrospectively studied 39 patients with post-traumatic headaches of occipital origin who underwent occipital nerve surgery at JHH. We examined patient outcomes focusing on relief of headache symptomatology, relief of secondary symptoms, and incidence of complications. Headache symptoms, severity, and frequency were compared using a three-point scale pre-operation, 1-week post-operation, and 1-month post-operation. Procedure type was noted including which branches of the occipital nerves were operated on and whether each nerve was decompressed or partially resected. Complications including poor wound healing or development of painful neuroma were also examined.

**Results:** Patients who were indicated for occipital nerve release surgery from response to occipital nerve blocks showed considerable improvement in headache symptoms, frequency, and duration at both their 1-week and 1-month post-procedure follow-ups.

**Conclusion:** Our data suggest that patients who had transient symptomatic improvement from occipital nerve blocks have sustained improvement from occipital nerve release surgery. It adds to the body of literature supporting this modality as an important tool in post-traumatic headache management. Longer term outcome analysis and comparison to other modalities are ongoing.
**Background**: While dysphagia is a recognized manifestation of autoimmune inflammatory myopathy, a relationship between myositis and dysphonia or laryngeal pathology is not well-documented. We therefore sought to describe the spectrum of laryngeal disorders present in myositis patients, evaluate whether any specific diseases are overrepresented among these patients compared to a large treatment-seeking population, and examine the clinical course and outcomes of these symptoms.

**Methods**: This was a retrospective chart review, including all patients seen at the Johns Hopkins Voice Center between January 2016 and December 2017. Demographic data, comorbidities, and laryngeal diagnoses were extracted from the electronic medical record. The charts of patients with myositis were reviewed further to ascertain details of their laryngeal symptoms and myositis disease course. Associations between myositis and dysphonia/dysphagia were evaluated using binary regression and multinomial logistic regression models to adjust for age, sex, race, and smoking status.

**Results**: Of 4,252 patients, sixteen had myositis. Compared to 4,236 controls, these patients had significantly higher odds of presenting with muscular voice disorders (adjusted odds ratio (OR*) = 4.503, p*=0.005) and dysphagia (OR* = 6.823, p*<0.001). A majority (64.3%, CI:35.6 – 93.0%) of myositis patients had laryngeal pathology among the presenting symptoms of their myositis. Across all diagnostic categories, there was a non-significant trend towards better outcomes in patients receiving specific interventions for their laryngeal symptoms.

**Conclusion**: Muscular voice disorders and dysphagia are significantly overrepresented in myositis patients presenting to a laryngology clinic, and in these patients, both are frequently among the presenting symptoms of myositis. Not only do these voice symptoms present an untapped opportunity to improve quality of life, but broader recognition of muscular voice disorders as part of the myositis symptom complex may empower otolaryngologists to set their patients on a path to earlier diagnosis than would otherwise be possible.

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Retrospective analysis of treatment regimens for refractory or recurrent central nervous system lymphoma: Johns Hopkins Hospital experience

Carlos A. Perez-Heydrich, BS, Matthias Holdhoff, MD, PHD
**Background:** Central nervous system lymphoma (CNSL) are rare and despite recent advances most patients eventually relapse and die from their disease. There are limited prospective studies for patients with relapsed/recurrent CNSL (r/r CNSL) and there is currently no uniform standard of care in this disease setting. Here we describe the Johns Hopkins Hospital (JHH) experience in treatment of r/r CNSL.

**Methods:** We searched the Johns Hopkins Cancer Registry for adult, immunocompetent patients with CNSL treated at JHH between 2000 and 2019. Retrospective data collection was based on chart review using the Hospital’s electronic patient record system.

**Results:** Fifty-three of 286 screened patients (18.5%) met study inclusion criteria. Median age at diagnosis was 64 (range 33-85; 50.9% female). At first recurrence, 16 patients (30.2%) were retreated with high dose methotrexate ± rituximab (HD-MTX ±Rb; group 1); 6 patients (11.3%) received high-dose chemotherapy followed by autologous stem cell transplant (HCT/ASCT; group 2); 9 patients (17.0%) received temozolomide ± rituximab (TMZ ±Rb; group 3); and 18 patients (34.0%) received radiation (group 4). Overall response rates (complete and partial responses) and the median time to progression for groups 1, 2, 3, and 4 were 100% and 18.7 months (range 1.6-109.9), 100% and 23.1 months (range, 6.2-108.5), 88.9% and 17.7 months (range 3.0-41.5), and 50.0% and 3.7 months (range 0.2-37.3) respectively.

**Conclusion:** The most common initial therapy for JHH patients that previously responded to HD-MTX ±Rb at first recurrence, was a HD-MTX ±Rb rechallenge. Overall response rates were encouraging for all three systemic therapies studied. Limitations of this analysis include its retrospective nature, small patient numbers, and heterogeneity of the patient population studied. Central neuroradiology review and addition of cases from other high-volume centers for CNSL are planned as next steps for this analysis.

**Impact of Biliary Stenting on Prognosis in Cholangiocarcinoma: A Retrospective Review**
Background: Biliary obstruction is a frequent complication of cholangiocarcinoma (CCA) and is usually treated by endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiogram and percutaneous biliary drainage (PTC/PBD). Currently, there are limited data available regarding optimal biliary stenting practices for CCA patients. This study evaluated stenting outcomes in CCA patients with biliary obstruction in order to determine how to best achieve biliary decompression in this patient group.

Methods: This was a retrospective review of CCA patients with malignant biliary obstruction amenable to stenting who were treated at Johns Hopkins Medicine (JHM) between January 2009 and December 2019. Data including demographics, CCA diagnosis and treatment history, and stenting procedures were collected from patients' records and correlated with biliary decompression success, defined as total bilirubin reduced to <1.2 mg/dL and/or resolution of obstruction symptoms, stenting procedure complication rates, and overall survival (OS).

Results: Of the 263 CCA patients analyzed, 54.0% had early stage/resectable disease, 30.4% had locally advanced disease, and 15.6% had distant metastatic disease at diagnosis. 83.9% of patients underwent ERCP stenting, with 33.3% of ERCP patients receiving plastic stents, 12.2% receiving metal stents, and 78.9% receiving an unknown stent type. The remaining 16.1% of patients underwent PTC/PBD. 50.0% of all ERCP patients achieved successful biliary decompression, including 46.5% of patients receiving plastic stents and 56.0% of patients receiving metal stents (ns), compared with only 14.6% of PTC/PBD patients (OR 5.83, 95% CI: 2.48-13.16, p<0.0001). There were no significant differences in complication rates or OS between patients undergoing ERCP with placement of any stent type or PTC/PBD within each disease stage category.

Conclusion: ERCP with plastic stent placement is the most common stenting procedure for treatment of malignant bile duct obstruction due to CCA. Overall, ERCP is associated with higher biliary decompression success rates than PTC/PBD without decreased complication rates or significant survival benefit.
Background: Breast cancer is the most common non-cutaneous malignancy diagnosed in women. Some factors increase risk for tumors with certain molecular subtypes. Molecular subtype strongly influences prognosis of breast cancer and differs across racial and ethnic groups. For instance, triple negative breast cancer conveys the highest mortality risk and disproportionately affects Black women.

Methods: We conducted a literature review of studies in PUBMED published from 2015 to 2020. The 3,818 references generated from this search were screened by two reviewers using two-tiered screening (title then abstract) in Distiller SR software. Eligibility criteria included: full-length research articles in English that related risk factor(s) to breast cancer risk or tumor characteristics. We excluded studies with fewer than 1,000 total participants, male participants, and commentaries, meta-analyses, treatment, survival, and animal studies. A single reviewer collected data for the 379 eligible studies using a pre-made form assessing study population, design, and primary outcome; a second reviewer verified a subset of data abstraction.

Results: Factors associated with increased risk include: combined but not estrogen-only postmenopausal hormone replacement therapy (especially luminal), oral contraceptive use (premenopausal, HER2-), obesity, alcohol, and smoking (all postmenopausal, luminal), germline mutations (e.g. BRCA1 (triple negative) and BRCA2 (luminal)). Some factors are associated with decreased risk, including exercise (premenopausal, HER2-). Childbirth at a younger age and having more children are associated with decreased risk of luminal tumors in postmenopausal women, but increased risk of triple negative tumors in premenopausal women. However, breastfeeding is highly protective against premenopausal triple negative breast cancer and therefore attenuates the risk of aggressive tumors among younger women.

Conclusion: The increased risk of triple negative breast cancer seen in Black women that is often attributed to biological difference may be influenced by social factors such as younger age at first birth and lower rates of breastfeeding.

Salvage chemotherapy after treatment with immune checkpoint inhibitors in women with recurrent cervical cancer
Background: Immunotherapy may change the tumor microenvironment, increasing sensitivity and response to subsequent therapy. We aimed to describe response to salvage chemotherapy after progression on immune checkpoint inhibitors (ICI) in women with cervical cancer.

Methods: This is a single-center retrospective analysis of cervical cancer patients who received cytotoxic chemotherapy following ICI at Johns Hopkins Hospital from January 2015 to August 2020. An EMR query was performed to identify cervical cancer patients treated with ICI, and chart review was performed to identify patients who received subsequent chemotherapy. Demographic and clinical data was abstracted, and descriptive statistics were performed. Outcome analysis was conducted on patients who received >1 cycle of salvage therapy.

Results: Seven eligible patients were identified. Median age at diagnosis was 35 years, and 5 patients were White, 1 Black, and 1 Other. Five had squamous cell carcinoma, one adenocarcinoma, and one cervical melanoma. Two had stage I disease, and five had stage III or IV disease. Patients received a median of two standard regimens prior to immunotherapy. Median time from diagnosis to ICI was 18.6 months. All women progressed on ICI after a median of three cycles. Overall response rate (ORR) to immunotherapy was 0%, and median progression free survival (PFS) was 56 days. Two patients opted for hospice after 1 cycle of salvage chemotherapy. Of the remaining five, PFS was 122 days (4.1 months) after a median of six cycles. ORR was 40%, and clinical benefit rate was 60%.

Conclusion: To our knowledge, this is the first study of salvage chemotherapy after ICI in cervical cancer. Median salvage PFS in this cohort is comparable to, if not slightly longer, than historic PFS for third-line chemotherapy in recurrent cervical cancer (4.1 vs. 3.2 months). Additional research is needed to further delineate the effect of ICI on subsequent chemotherapy response.
Background: The factors that predict immunotherapy response (IR) in head and neck cancer (HNC) patients are not well-understood. High-grade tumors (HGTs) proliferate rapidly, leading to a potentially increased tumor mutational burden (TMB), which has been correlated with susceptibility to immunotherapy. This study examines the association between tumor grade (TG) and IR in HNC patients.

Methods: A retrospective review of 89 patients treated with immunotherapy for recurrent or metastatic HNC at Johns Hopkins Hospital between 7/1/2016 and 1/22/2020 was conducted. Data were collected on patient age, smoking status, tumor site, TG, TMB, IR, and overall survival (OS). Low-grade tumors (LGTs) included “well-differentiated” and “moderately differentiated” tumors; HGTs included “poorly differentiated” and “undifferentiated.” IR was defined as complete remission, partial remission, or at least four months of stable disease. Differences between groups were assessed using Chi-squared and Mann-Whitney U tests for categorical and continuous variables, respectively. Survival differences were evaluated using the log-rank test.

Results: The patient cohort (HGTs: n=58, LGTs: n=31) had a median age of 64 years and were predominantly males (n=75), current or former smokers (n=57), and most commonly had oropharyngeal cancer (n=35). Patients with HGTs had a significantly higher IR rate (32/58, 55.2%) than those with LGTs (10/31, 32.3%) (p=0.039). Among patients with TMB data available, median TMB for HGTs (n=14) and LGTs (n=6) was 8 and 3 mutations/megabase, respectively (Mann-Whitney U: p=0.075). The magnitude of OS benefit between responders and non-responders was higher for patients with HGTs (median OS: 651 days for responders, 202 days for non-responders, p<0.0001) than those with LGTs (median OS: 614 days for responders, 290 days for non-responders, p=0.058).

Conclusion: Patients with HGTs had an increased IR rate, and the OS benefit was greater in immunotherapy responders with HGTs than LGTs. These findings highlight the value of TG in assessing HNC patients as candidates for immunotherapy.

Examining the effect of a Group-well-child intervention on screening for maternal depression in Latina Mothers

Ikechuwku Enenmoh MD, Sarah Polk
Freeform Abstract: Post-natal depression has adverse effects on both family and child mental health as well as family and child functioning. Despite being at increased risk, immigrant Latinas have incredibly low rates of engagement in mental health specialty use. The “Centering Approach” uses a group-based model for women receiving prenatal care and has been shown to improve social support and quality of life for mothers. Beginning in March 2019, Johns Hopkins Bayview Medical Center’s Children’s Medical Practice implemented Centering for the delivery of postnatal well-child care in a population of Latina mothers. As part of a larger study to assess implementation of this intervention, this project assessed rates of screening for maternal depression and other maternal health issues before and after the implementation of group visits. We reviewed and extracted data regarding evidence of maternal mental health screening, intimate partner violence, referral to social services and other metrics from the medical records of infants and mothers at the Children’s Medical Practice both before and after the implementation of group well visits. Independent samples T-test was used to determine whether screening practices for maternal depression improved from the pre-intervention group to the post-intervention group. In the post intervention group, medical records for 42 mothers were reviewed and we found a maternal depression screening rate of 85.7% at 1 year. This same cohort had an IPV screening rate of 97.6% and a 100% referral to social services rate. Analysis of pre-intervention rates is in progress. Interpreting these results and determining how the implementation of group visits affects screening for maternal depression may inform further roll-out of group visits at other sites within the Johns Hopkins Health System and elsewhere. Furthermore, better understanding of the prevalence of maternal depression will also influence models and plans to address this important issue.

Identifying Risk Factors for Developing Anxiety During Pregnancy

Shivani Rangaswamy BA/BS, Lauren Osborne MD
Background: Anxiety during pregnancy is associated with increased odds for negative outcomes such as preterm birth and postpartum depression. It is important to understand risk factors for developing anxiety during pregnancy so women can be provided with early intervention. This project is an exploratory study that aims to analyze the correlation between anxiety in pregnancy and various social and medical factors.

Methods: This is a subanalysis of a prospective study at The Johns Hopkins Women’s Mood Disorders Center. Pregnant women (n=120) with and without anxiety disorders were followed at four time points across pregnancy and postpartum. Exclusion criteria include active depression and/or a history of mania or psychotic disorders. The variables of interest in this analysis are psychiatric symptoms during prior pregnancies or postpartum periods, family history of pregnancy-related mental illness, pregnancy complications in prior pregnancies, labor and delivery complications or pregnancy complications in the index pregnancy, and medical risk factors. The latter four variables are pooled categories consisting of multiple variables. All variables were analyzed using a 2 proportion Z test.

Results: Family history of mental illness during pregnancy or postpartum (p<.001) and anxiety symptoms during prior pregnancies (p<.007) or prior post-partum periods (p<.004) were associated with an increased likelihood of developing anxiety during pregnancy. Labor and delivery complications, pregnancy complications, past pregnancy complications, and medical risk factors did not have significant associations when analyzing either the pooled or individual variables. No correction was made for multiple comparisons as this is an exploratory study and we did not want to miss relationships that could prove important to study in a larger sample. Limitations of the study include a small sample size and homogenous patient population.

Conclusion: We found several risk factors for anxiety during pregnancy that can be identified for early intervention, including a positive family history and past psychiatric history during pregnancy.

Substance Use Disorder Treatment Discontinuation in Pregnant and Postpartum Women: The Impact of Child Protective Services Involvement

Darien Colson-Fearon BS, Alexis Hammond MD
Background: Substance use disorder (SUD) in pregnant women is associated with poor health outcomes for mothers and their infants. However, the incidence of SUD among pregnant women has continued to rise. A woman’s decision to enroll in treatment is influenced by numerous factors, including the potential of Child Protective Services (CPS) involvement as many states have adopted mandatory reporting procedures. The goal of this study was to determine any associations between CPS involvement and poor treatment retention for pregnant women with SUD.

Methods: This was a retrospective chart review study of 127 patients from the Center for Addiction and Pregnancy. Ninety-two women with active CPS cases were enrolled in the CPS-involved group and 35 individuals were enrolled in the CPS-uninvolved group. After treatment outcomes were collected from charts and assessed based on demographics, psychiatric history, substance use history, and treatment outcomes were assessed. Variables were compared between the two groups using chi-square test or unpaired t-test. Statistical significance was noted at a level of p < 0.05.

Results: CPS-involved women had more children (2 [0.19] vs. 1 [0.19], t= 3.1956, p<0.05) with a lower percentage in their physical custody (0.308 [0.05] vs. 0.579 [0.116], t=2.3361, p<0.05). The CPS-involved group also had a higher percentage who received medication for opioid use disorder (88.0% vs. 73.5%, x= 3.9163, p<0.05). CPS-involved women spent a greater number of weeks in treatment (20.8 [1.41] vs. 14.5 [2.16], t= 2.3385, p<0.05). However, there was no statistical difference regarding treatment completion. Finally, there was a larger percentage of CPS-involved women whose infants experienced Neonatal Abstinence Syndrome symptoms (68.5% vs. 20%, x= 11.342, p<0.05).

Conclusion: Preliminary evidence points to important differences between groups, however, CPS involvement did not have a significant impact on outcomes, including treatment completion. Prospective research is needed in this area.

Impact of maternal isoniazid preventive therapy (IPT) timing on acquisition of infant TB infection (TBI) in the IMPAACT P1078/TB APPRISE trial

Priya Singh MS/BS, Lisa Aaron, Grace Montepiedra, Amita Gupta MD
**Background:** The objectives were to assess the impact of maternal antiretroviral therapy (ART) and isoniazid preventative therapy (IPT) timing on acquisition of infant TB infection (TBI).

**Methods:** A Phase IV randomized, double-blind, placebo-controlled trial (IMPAACT P1078) compared initiation of IPT (28 weeks) during pregnancy versus 12 weeks postpartum in HIV+ women residing in high HIV and TB burden regions (sub-Saharan Africa, Haiti, India, Thailand). Mother-infants were followed until 1 year post-delivery. Infant TBI was assessed at 1 year of life using tuberculin skin test (TST) and QuantiFERON Gold-in-tube interferon gamma release assay (IGRA). TST and IGRA concordance were compared using Kappa statistics. Risk factors for infant TBI were assessed using univariable and multivariable logistic regression.

**Results:** Of 749 infants assessed, 731 (97.6%) had IGRA and 727 (97.1%) had TST performed. Seven (0.9%) were HIV-infected, 489 (65.3%) had BCG, 20 (2.7%) had reported TB exposure, and 9 (1.2%) received IPT. At 1 year of age, 41/731 (6%) were IGRA+ and 55/730 (8%) were TST+. TST and IGRA incidence varied by site (IGRA+ range: 0%–53.7%; TST+ range: 0%–49.1%). Agreement between IGRA and TST was poor; only 8 infants positive by both measures and 78 with discordance (Kappa [95% CI] = 0.107 [0.002, 0.212]). Risk factors for infant infection by IGRA were BCG vaccination and infant INH use; by TST were TB exposure, infant INH use, BCG vaccination and infant feeding status. There was no difference by timing of maternal IPT initiation, HIV-infection status, or weight-for-age Z score.

**Conclusion:** We found maternal ART+IPT to be associated with much lower incidence of TBI than the ~24% observed in historical literature in infants born to HIV+ women in high TB incidence settings. Infant TBI differed across sites and by type of TBI test employed with poor concordance. Timing of maternal IPT did not significantly affect infant TBI acquisition.

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**Burning in Baltimore: Environmental Advocacy and the Politics of Air Pollution in South Baltimore**

Samuel Jordan BS, Alexandre White PhD
**Background:** In recent decades, Baltimore has faced significant health burdens associated with air pollution. One of the largest sources of air pollution in the city is the Wheelabrator incinerator in South Baltimore. A grassroots campaign led by residents of the Curtis Bay neighborhood prevented construction of an additional incinerator in the area in 2016. This project further examines Baltimore waste incineration from the 1940s to the present with a focus on the social conditions in which activism has taken place, as well as how advocates have navigated and shaped the public discourse and regulatory process around air pollution.

**Methods:** I conducted oral histories with career environmental advocates who worked on the Curtis Bay waste incineration campaign. I also examined primary sources including local news articles, reports from environmental and public health organizations, and legal documents such as incinerator permits.

**Results:** These sources reveal an informational imbalance between the industry and the public, exacerbated by the complex technical nature of air pollution. This can impede citizens from gaining sufficient information to meaningfully participate in the regulatory process and to consent or dissent to industrial projects which impact their communities; however, the history of industrialization in South Baltimore, along with the existence of a robust intersectional activist community, has created the conditions for the city to become unusually well informed and mobilized around air pollution.

**Conclusion:** Corporate and political interests often compete with the concerns of industrialized communities, especially low-income communities and communities of color. The ways in which knowledge is generated and deployed shape the public debate and often favor these powerful interests. Efforts by Baltimore environmental advocates to disrupt this dynamic have created space for radical and creative ways to promote health. Given the significant negative impact of air pollution on human health, this history provides insight into how communities might promote their interests.

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**Power, Agency, and Cholera in Haiti**

Tesha Davilmar, BS, Elizabeth O'Brien, PhD
**Freeform Abstract:** In 2010, amid a political regime change, the aftermath of a magnitude 7.0 earthquake, and widespread protests against corruption and foreign occupation, Haiti was faced with the first cholera outbreak in its modern history and the worst cholera outbreak of the 21st century. Substantial public health literature has described the public health response to the cholera outbreak and the United Nations involvement in inadvertently introducing the bacterium. This paper takes an archival and oral history approach to explore how the unequal distribution of power between local community agents and foreign governmental organizations has shaped discourse around public health crises in Haitian history between 2004-2017. This article proposes that incorporating a historical perspective on the development of international public health strategies is critical for understanding the structural forces that made Haiti vulnerable to the outbreak and subsequent destabilization of its social and political structure. This article also posits that the militarization of aid bolsters systemic racism and exacerbates health disparities. Haitian newspapers, MINUSTAH security general reports and resolutions, and journal articles were used to create a timeline of events chronicling the events that occurred between 2004-2017, from the start of the UN’s mission to the end of the mission. Oral histories with stakeholders and letters written by individuals impacted by the outbreak were analyzed to better understand the cholera outbreak from the perspective of grassroots activists, journalists, and Haitian individuals advocating for reparations or ethical development practices. Secondary literature was used to further examine primary sources and provide scholarly context.

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**The San Francisco General Hospital Ethnic Focus Units from 1980 to the present: A Case Study in Institutional Engagement**

Diane Jung BA, Marta Hanson PhD
**Background:** In 1980, Dr. Francis Lu founded the Ethnic Focus Units at San Francisco General Hospital in an effort to provide culturally competent care to San Francisco’s diverse population. The program first started with the Asian Focus Psychiatric Unit in 1980 in an effort to provide culturally competent care to San Francisco’s large Asian population. The program later expanded to include a Latino Unit, Black Unit, HIV/AIDS Unit, and Women’s Unit. The focus units were locked inpatient psychiatric units with healthcare providers and staff that matched the ethnicity and spoke the language of the unit’s focus population. Despite the attention the program received at the time, not much is known about its history.

**Methods:** This research relies primarily on 7 oral history interviews conducted with physicians, social workers, and administrators involved with the Ethnic Focus Units. I analyzed these as well as 2 additional oral histories conducted by UCSF from physicians involved with the Ethnic Focus Units, as well as research papers and manuals that were produced by physicians on the units.

**Results:** The project utilized oral histories combined with the research papers and manuals to piece together a narrative about the creation and eventual evolution of the SFGH Ethnic Focus Units from 1980 to the present day.

**Conclusion:** The Ethnic Focus Units arose from a strong background of community clinic efforts to provide ethnically focused psychiatric care in San Francisco in the 1960s and 1970s. During its tenure from 1980 to the early 2000s, the SFGH Ethnic Focus Units provided culturally competent psychiatric care in an inpatient setting. Changes in institutional leadership and hospital priorities at SFGH in the early 2000s led to a major reduction of the psychiatric units, resulting in the demise of the Ethnic Focus Units. Despite the Ethnic Focus Units expiration, the program left a lasting legacy at SFGH.

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**The Role of Patient Communication Tools in Medication Management After a Regimen Change**

Elaine Ruscetta, MPH, Dr. Samatha Pitts, MD, MPH, Dr. Yushi Yang, PhD
**Background:** Patient communication tools such as After-Visit Summaries (AVS) and Patient Portals (PP) have the potential to mitigate potential medication errors. Improving the accuracy and patient-centeredness of the AVS has been shown to reduce errors and improve patient comprehension. However, current evidence indicates that existing tools often fail to adequately support patients. This qualitative study sought to elucidate details about current utilization of these tools following a medication change and generate recommendations to improve their utility in this context.

**Methods:** We conducted five interviews each with prescribers and pharmacy staff at an outpatient Internal Medicine clinic and affiliated pharmacy. Transcript excerpts that referenced the AVS, PP, or general patient education strategies were compiled to gather preliminary themes (presented here). Future analysis will utilize a hybrid of Framework Analysis and Grounded Theory methodologies to inductively update the code book throughout the coding process.

**Results:** Preliminary findings:
- Prescribers tended to utilize the AVS for patient education during visits and the PP for communication with patients between visits.
- Prescribers would like to customize the content of communication tools but also expressed concerns about creating additional workload.
- Several prescribers expressed unawareness of content of the AVS/PP, how that content changes when they discontinue a medication, and how patients/caregivers use it.
- Pharmacists report that patients rarely utilize the AVS/PP when filling prescriptions.
- When changing medications during a telemedicine visit, prescribers have not found a comparable alternative to the AVS for patient instruction.

**Conclusion:** Preliminary Recommendations:
- Prescribers should receive training on how the AVS/PP content is generated and how patients utilize it. The system should provide additional customization options.
- The AVS content generation system should include mechanisms to highlight key information about medication changes and ensure that the medication list is accurate.
- A suitable alternative to the printed AVS should be developed to support telehealth visits.

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**Exploring the Perceived Barriers to Palliative Care from Community Health Workers**

Julian Rowe BS, Fabian Johnston MD
**Freeform Abstract:** Palliative care is an underutilized medical caregiving approach that helps prevent and treat the multi-dimensional suffering that coincides with a serious or terminal illness. Community health workers (CHWs) are lay people with specific health training to help peers with health issues. The CHW population may represent a partial solution to increasing patients’ access to and quality of palliative care. This study seeks to understand community health workers’ decisions about whether to become involved in palliative care and, for those who became involved, what barriers they felt were in place that hindered their abilities to help seriously ill patients.

This is a qualitative study involving in-depth interviews with CHWs. A 14 question interview guide was designed to explore CHWs’ motivations to provide palliative care, their patient population and type of care, thoughts on their perceived utility within the palliative care sphere, and barriers to care they provided. Community health workers within the Johns Hopkins Health System and across the DC, Maryland, and Virginia area who work with adults experiencing serious illness were targeted for recruitment. Community health workers who decided not to work with seriously ill populations were targeted for recruitment as well.

Semi structured interviews were conducted for 40 minutes to 1 hour over the Zoom platform. Automatic transcripts from Zoom will be codified, organized, and analyzed for themes with NVIVO qualitative data analysis software. Themes across multiple interviews will then be evaluated for patterns. Community health workers, palliative care providers, and palliative care patient populations serve to benefit from study findings. Future patterns discovered will further our knowledge of barriers to CHW palliative care, a significant hindrance to helping a critically suffering patient population.

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**Global Preferred Practice Patterns for the Management of Ophthalmic Trauma**

Sarah C. Miller B.A., Michael J. Fliotsos B.S., Ariel Chen, M.D., Sidra Zafar M.B.B.S., Fasika A. Woreta M.D., M.P.H.
Background: Despite ocular trauma being an important cause of vision loss worldwide, there is currently a lack of consensus on the optimal management for traumatic injuries. Our objective is to summarize global preferred practice patterns for the management of ophthalmic trauma.

Methods: An online survey was distributed to trauma centers throughout the world to assess institutional management practice patterns for eye emergencies including open globe injuries, hyphema, and orbital fractures.

Results: Responses were collected from 48 institutions (response rate 48/61, 78.7%) that were distributed across Asia (60.4%), North America (22.9%), South America (8.3%), Africa (4.2%), and Europe (4.2%). The respondents practiced ophthalmology for a median 9.5 (IQR 5.3, 17.75) years after residency. The majority of institutions (n=33, 68.8%) have ophthalmology coverage 24 hours per day each day; of those that do not, 14 (93.3%) have on-call ophthalmology coverage available within one hour of notification. Most institutions (n=39, 83.0%) routinely administer pre-operative systemic antibiotics for open globe injuries, while 29.2% (n=14) administer pre-operative topical antibiotics. The majority of institutions also administer intraoperative antibiotics during the time of open globe injury repair (n=30, 62.5%). Regarding hyphema management, 91.7% (n=44) of responding institutions administer topical steroids, with prednisolone as the preferred medication for most (n=37, 77.1%). For patients presenting with orbital fractures, 28 centers (58.3%) give systemic antibiotics to prevent infection, while 13 (27.1%) administer systemic steroids to quell inflammation.

Conclusion: Preferred management practices for ocular trauma-related eye emergencies vary widely. Evidence based consensus guidelines for the management of ophthalmic trauma are needed.

Ocular Changes Over Five Years Among Different Self-Reported Races/Ethnicities in Pathologic Myopia

Ashley Zhou BS, Onnisa Nanegrungsunk MD, Neil Bressler MD
**Background:** Pathologic myopia (PM), atrophic abnormalities in the retina due to abnormal elongation of the posterior segment of the eye, can lead to loss of central and peripheral vision. This study aimed to elucidate characteristics of PM at an academic retina referral practice among patients who self-identified as Black, a topic not well characterized to our knowledge.

**Methods:** Adult patients with PM of seven ophthalmologists at Johns Hopkins Hospital were identified using 23 ICD-9 and ICD-10 PM codes. Patients that self-identified as Black were allocated into one cohort while non-Black patients of one physician comprised a comparison cohort. Data collection included visual acuity and optical coherence tomography (OCT) macular volume and central subfield thickness, when available, from these patients with at least five years of follow-up between January 2005 and December 2014.

**Results:** Of 428 patients with pathologic myopia identified, 60 (14%) self-identified as Black. For comparison, in 2014, approximately 2026 (22%) of all 10,012 patients seen at the Retina Division self-identified as Black. OCT images were available for 30 non-Black (63% female, average age 61) and 17 Black patients (71% female, av

**Conclusion:** The proportion of patients who self-identified as Black with PM appeared to be smaller than the proportion of all other patients who self-identified as Black at the Retina Division. No differences in OCT central subfield thickness were identified in Black versus non-Black patients. While prevalence differences may be due to confounding factors, the findings suggest there may be protective factors that might reduce the progression of myopia to pathologic myopia in Black patients. A prospective cross-sectional study is planned to characterize pathologic myopia in this patient population in greater detail.

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**Association Between Changes in Visual Field and Contrast Sensitivity in Glaucoma Patients Over Time**

Grace Xiao BA, Aleksandra Mihailovic ScM, Pradeep Ramulu MD
**Background:** While association between visual field [VF] and contrast sensitivity [CS] tests for functional loss in glaucoma has been shown in previous studies, their longitudinal association has not been studied. The aim of this study was to assess the association between changes in VF tests and changes in CS tests in glaucomatous eyes over time.

**Methods:** Glaucoma patients who underwent a minimum of three Humphrey 24-2 SITA-Standard VFs and three MARS letter CS tests were used in this analysis. Linear regression was used to calculate a slope for change in VF mean deviation (MD), VF pattern standard deviation (PSD), VF foveal threshold (FT), and CS over time for each eye in individual study participants. Generalized estimating equation models accounting for clustering by individual were used to assess the association between MD, PSD or FT slopes and CS slopes. Models controlled for age, sex, and race.

**Results:** 338 eyes from 180 patients were included and each patient had at least 3 CS and 3 VF tests. There was a significant association between MD slope and CS slope (beta= 0.9586, P-value= 0.026). However, there was no significant association between the PSD slope and CS slope (beta= 0.4329, P-value= 0.068), or FT slope and CS slope (beta= 0.208, P-value= 0.871).

**Conclusion:** In this study, changes in MD were associated with changes in CS while changes in PSD and FT were not associated with changes in CS. A more thorough understanding of the relationship between VF and CS changes and the relative variability of each measure may provide clinicians with a more complete picture of changes in visual function in glaucomatous eyes.

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**The Role of Away-from-Home Excursions on Fall Rates in Individuals with Glaucoma**

Catalina Garzon BS, Aleksandra Mihailovic ScM, Jian-Yu E MD ScD MPH, Pradeep Y. Ramulu MD MHS PhD.
**Background:** Falls are the leading cause of fatal and nonfatal injuries in the elderly and often lead to substantial mobility restrictions; however, it is unclear how mobility could impact fall rates. This study determines how daily excursions away from home impact the rate of falls steps.

**Methods:** Prospective observational cohort of individuals with glaucoma or suspected glaucoma whom reported falls monthly for 3 years. To determine average daily steps taken at home and away from home, participants wore a GPS and accelerometer for 1-week. Excursion parameters were quantified by the average number of daily excursions (ANDE), average daily time away from home (ADTAH), average time per excursion (ATPE), and percentages of days without excursions (PWE). Multivariable negative binomial regression models evaluated the relationship between the rates of fall/step with the 4 excursion parameters adjusting for glaucoma severity and covariates.

**Results:** From a total of 205 individuals, roughly half were males (51.2%) with a mean age of 70.4. ANDE was 3.3(SD=2.7), ADTAH was 4.7(SD=2.9), ATPE was 2.1(SD=1.7) hours and 31% of participants had at least one day without any excursions. When considering the overall falls rate, ADTAH was associated with a 7% reduction in the rate of falls/step per each hour spent away from home (IRR=0.93, 95%CI[0.87,0.99], p=0.02). When evaluating the rate of falls exclusively at home, ADTAH was associated with a 10% reduction in the rate of fall/step per every hour spend away from home (IRR=0.90, 95%CI[0.83, 0.99], p=0.021). None of the excursion parameters were associated with fall rates exclusively away from home, and significant associations did not disproportionately affect those with greater glaucoma severity.

**Conclusion:** Excursions away from home appear to be a protective factor to the overall and at home rate of falls per step taken. A significant impact considering that most people in our cohort spent 4 hours away from home daily. Further research is needed to better understand the relationship between the falls and excursions.
**Background:** Firearm suicides account for half of all suicides in the United States. In 2013, the state of Maryland passed the Firearms Safety Act limiting the private sales of handguns. Importantly, this act did not apply to the sale of long guns used for hunting (e.g. rifles, shotguns). We aim to assess the frequency of long gun suicides in the years preceding and following the policy change during winter season, which encompasses hunting season in Maryland.

**Methods:** We used data from the Office of the Chief Medical Examiner to identify firearm type in all 4144 firearm suicides in Maryland from 2003 to 2019. Year of death was binned as 2003-2013 and 2014-2019. Winter season was defined as December through February. Logistic regression was used to examine the incidence of winter long gun suicides before and after the 2013 policy change, controlling for decedent sex, race and age (binned as 0-34, 35-59, 60+ years).

**Results:** While the incidence of all firearm (both handgun and long gun) suicides decreased between 2003-2013 to 2014-2019 (p<0.008); the incidence of wintertime long gun suicides increased during this period (p<0.004). Upon stratifying by age, sex, and race, we found that the Caucasian race (p<0.006), male sex (p<0.005) and middle age (p<0.001) were significantly associated with more wintertime long gun suicides after 2013.

**Conclusion:** Our findings suggest that the 2013 laws which limited handgun access but not long gun access may be unintentionally correlated with an increase in deaths by long guns, particularly in the demographic most likely to hunt (Caucasian, middle-aged, men). This suggests the need for additional policy and public health interventions surrounding long gun use and access.

**Racial Differences in Suicide Mortality During the COVID-19 Pandemic in Maryland, USA**

Michael JC Bray MS, Nicholas O Daneshvari BA, Indu Radhakrishnan BA, Janel Cubbage MS LGPC2, Michael Eagle, Pamela Southall MD, Paul Sasha Nestadt MD
**Background:** Background: Changing patterns of suicidality during the COVID-19 pandemic are probable but poorly understood. This study aimed to characterize suicide mortality during the pandemic in Maryland, USA, including racial differences.

**Methods:** Methods: State-wide data for all non-natural deaths in Maryland were obtained by the Office of the Chief Medical Examiner of Maryland (OCME) stratified by race/ethnicity. 236 deaths by suicide between January 1st–July 7th, 2020 were compared to 289 during the same period in 2017, 305 in 2018, and 249 in 2019. Three temporal windows were chosen for investigation: January 1st–March 4th (pre-pandemic), March 5th–May 7th (progressive closure of businesses/public spaces from Maryland state of emergency declaration), May 8th–July 7th (progressive reopening).

**Results:** Results: Suicide mortality increased among Black residents, doubling between March 5th–May 7th compared to historical norms (0.344/day in 2020 vs. 0.177/day in 2017-2019, p<0.01). During progressive reopening, this returned to levels comparable to historical norms. Suicide mortality among White residents decreased in both periods (0.672/day in 2020 vs. 1.224/day in 2017-2019, p<0.001 [March 5th–May 7th]; 0.787/day in 2020 vs. 1.126/day in 2017-2019, p=0.03 [May 8th–July 7th]).

**Conclusion:** Conclusion: During the COVID-19 pandemic, suicide mortality increased among Black residents and decreased among White residents.

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**Knowledge Surrounding Proper Administration of Antipsychotic Orally Disintegrating Tablets**

Barry R. Bryant, BS, Heidy Vanessa Rivera-Muniz, BS, Tae Joon Park, BSN, Sujin Weinstein, PharmD, Paul S. Nestadt, MD
**Background:** Orally disintegrating tablets (ODT) are not intended to be absorbed orally but instead must be swallowed. Improper administration can result in treatment failure or medication diversion. We investigated whether those who administer antipsychotic medications understand important administration technique differences between ODTs, sublingual (SL) medications, and other methods of oral administration.

**Methods:** An anonymous 12-item survey was sent to 158 psychiatric nurses across five inpatient units in a large teaching hospital. Preliminary questions collected demographic data before a series of six questions to assess knowledge surrounding proper administration of ODT antipsychotics.

**Results:** Forty-five nurses completed the survey for a response rate of 28%, and 91% of respondents had greater than one year of experience administering antipsychotics. Only one of the six questions was answered correctly by the majority of respondents. Years of experience was not significantly correlated with accurate answer selection for any of the questions. For the question that asked explicitly about ODT administration, only 27% selected the correct answer while 62% incorrectly reported that ODTs could be administered sublingually.

**Conclusion:** The results of our survey demonstrate that better education is needed concerning the differences between ODT and SL medications to prevent misadministration and its consequences. We propose a plan for incorporating evidence-based patient specific alerts in the electronic medical record, in addition to blended face-to-face and electronic learning for those who administer ODT antipsychotics.

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**Targeting the Medial Prefrontal Cortex to Ameliorate Radiation-Induced Neurobehavioral Deficits**

Benjamin A. Johnson MSc, Lauren Granata BA, Robert D. Hienz PhD, Siobhan Robinson PhD, and Catherine M. Davis PhD
Background: Future long-duration space exploration missions will involve travel outside of the protection of Earth’s magnetosphere, exposing astronauts to protons and high energy and charge (HZE) particles through galactic cosmic rays (GCRs) and solar particle events. Studies simulating space radiation exposure have shown that protons and HZE particles can damage multiple tissues, including the central nervous system, resulting in molecular, structural, and functional changes to brain regions important for neurobehavioral function, such as the medial prefrontal cortex (mPFC).

Methods: In the current study, we used a chemogenetic technique (Designer Receptors Exclusively Activated by Designer Drugs; DREADD) to determine if altering activation in the mPFC following oxygen ion exposure could ameliorate deficits in social recognition memory. Male Long-Evans rats were implanted bilaterally with modified inhibitory (pAAV-hSyn-hM4D(Gi)-mCherry) G-protein coupled receptors, irradiated with oxygen ions (16O, 25 cGy; 1000 MeV/n) at Brookhaven National Laboratory, and then tested with the social odor recognition memory (SORM) test.

Results: For irradiated rats, silencing the mPFC immediately before the habituation stage of the SORM test restored their ability to distinguish unfamiliar odors from familiar odors, which was absent following radiation exposure (t(11) = 2.479, p = 0.031).

Conclusion: These data suggest that the mPFC is involved in radiation-induced deficits, such as deficits in social recognition, and that chemogenetically decreasing activity in this region can reduce radiation-induced neurobehavioral deficits. This contributes to our understanding of radiation-induced damage and creates avenues for novel therapies to counteract brain damage from GCR in astronauts on long duration missions.

Sexual stigma is independently associated with Depression and Depressive symptoms among Men who have Sex with Men and Transgender Women in Kigali, Rwanda: a cross-sectional study
Background: Sexual minority groups experience an excess of social stressors, including discrimination and stigma, which lead to a higher prevalence of depression and other mental health illnesses. However, despite a high burden of these stressors among men who have sex with men (MSM) and transgender women (TGW), data on the burden of depression and the effects of stigma on mental health remain limited across sub-Saharan Africa. The aim of this study was to evaluate the role of stigma as an independent determinant of depressive symptoms and depression among MSM/TGW in Kigali, Rwanda.

Methods: MSM/TGW aged 18 years or older were recruited between March-August 2018. Participants underwent a structured interview in which mental health was assessed using the Patient Health Questionnaire (PHQ-9). Multinomial logistic regression models were used to determine the association between stigma and depressive symptoms and depression. A secondary analysis compared depression and depressive symptoms among MSM/TGW.

Results: In total, 736 participants were included with a mean age of 27 years (range: 18-68). Among them, 14% identified as TGW. The prevalence of depression and mild/moderate depressive symptoms were 8.9% (RDS-adjusted: 7.6%; 95% CI = 4.6-10.6) and 26.4% (RDS-adjusted: 24.1%; 95% CI = 19.4-28.7) respectively. Anticipated (41%), perceived (36%) and enacted (45%) stigma were prevalent, and were significantly higher among TGW (p < 0.001). In multivariable RDS-adjusted analysis, adjusting for demographic characteristics, HIV status and alcohol use, anticipated (RRR: 1.88; 95% CI = 1.11-3.19) and perceived (RRR: 2.06; 95% CI = 1.12-3.79) stigma were associated with a higher prevalence of depressive symptoms, and anticipated (RRR: 4.78; 95% CI = 1.74-13.13) and enacted (RRR: 3.09; 95% CI = 1.61-5.93) stigma were associated with a higher prevalence of depression. In the secondary analysis, statistically significant differences in depression prevalence between MSM and TGW were lost after adjusting for the three forms of stigma (RRR: 1.47; 95% CI = 0.71-3.07).

Conclusion: These data reveal a high burden of depressive symptoms and depression among MSM/TGW in Kigali. The significant positive association between stigma and depression demonstrates the need for stigma mitigation interventions and the introduction of mental health evaluation and treatment into routine packages of services for MSM/TGW.
Sexual Behaviors and STI Risk among Young Women who have Sex with Women and Men in Baltimore, Maryland

Holly Everett BA, Kathryn Carson ScM, Charlotte Gaydos MS MPH DrPH, Maria Trent MD MPH, Jenell Coleman MD MPH

Background: Young women who have sex with women and men (WSWM) are an understudied subgroup within the sexual and gender minorities. Limited data exist regarding the prevalence of sexually transmitted infections (STI) or behavioral risks in this specific population. By distinguishing the sexual milieu and landscape of high-risk behaviors among WSWM, individual providers and public health systems can appropriately tailor their responses to address the particular needs of this frequently overlooked population.

Methods: 109 sexually active young women, age 15-24, were recruited from adolescent and Ob/Gyn clinics in Baltimore, Maryland. Participants completed a questionnaire using an Audio Computer-Assisted Self-Interview and were tested for bacterial vaginosis (BV), chlamydia, gonorrhea, HIV, and trichomonas infection. Fisher’s exact and Mann-Whitney U tests were performed.

Results: Of the 109, 12 (11%) reported having vaginal sex with both women and men in the past 3 months. WSWM were mean age 19.8±2.9 years, majority Black (58%), and 5.0±5.4 years younger than their oldest partner. WSWM were more likely to report having two or more current partners (42% vs. 6%, p<0.001), a new vaginal sex partner within the month (50% vs. 29%, p=0.03), partners who are non-monogamous (58% vs. 18%, p=0.004), and having a “one-night stand” (50% vs. 15%, p=0.01) compared to women who have sex with men exclusively (WSM). Though not statistically significant, WSWM reported increased participation in anal sex (25% vs. 18%, p=0.46), marijuana use, and sex while high or drunk compared to WSM. BV (56% vs. 36%, p=0.30) and STIs (17% vs. 13%, p=0.65) were not significantly higher for WSWM compared to WSM.

Conclusion: While WSWM had a similar prevalence of BV and STIs, they were more likely to engage in high-risk sexual behaviors compared to their WSM peers. It is important for providers to consider these risk factors for WSWM in STI screening and counseling.
Analysis of Optimal Method of Measuring Tenofovir and Emtricitabine in Cervicovaginal Fluid

Nicholas Henlon BS, Craig Hendrix MD

Background: Antiretroviral (ARV) drugs are an important tool in reducing transmission of HIV. Because these drugs’ site of action may include both the systemic circulation and site of HIV acquisition, it is important to understand drug penetrance at the mucosal site of HIV transmission. The study objective is to evaluate the optimum collection method to characterize Tenofovir (TFV) and Emtricitabine (FTC) concentration in women’s cervicovaginal fluid (CVF).

Methods: We recruited 216 HIV infected adult women who were previously prescribed daily oral TFV and FTC for HIV treatment. Plasma and CVF were sampled within 24 hours of their last TFV/FTC dose. CVF sampling methods evaluated included cervicovaginal lavage (CVL), Dacron Swab (DS), direct aspirate (DA), MeroCel sponge (MS) and SoftCup (SC). During CVF sampling, two methods were done sequentially.

Results: The SC method had higher concentration than the paired method in SC/DS, MS/SC, SC/MS, and SC/CVL pairs (all p<0.05). Furthermore, there was poor agreement in TFV or FTC concentration between any of the CVF method pairs using various statistical methods. The CVF volume collected did not differ between the first and second method in a sequence, except when MS and SC are performed after SC where there is a 49% reduction in both MS and SC volumes (p<0.05).

Conclusion: SC had better efficiency in capturing TFV and FTC in CVF compared to other methods. If a series of sampling methods would be required, leading with SC may reduce the sample volume available for the second method, thus reducing drug assay sensitivity. The lack of agreement among methods remains unexplained and warrants caution when comparing CVF data between studies using different collection methods.
Pregnancy in HIV Infected Women in a Tuberculosis (TB) Preventative Therapy Trial

Priya Singh MS/BS, Lawrence Moulton, Grace Link Barnes, Neil Martinson MD, Richard Chaisson MD, Amita Gupta MD

**Background**: TB preventative therapy is recommended in HIV infection, including during pregnancy, but rarely used. We assessed pregnancy outcomes in a controlled trial of TB preventative therapy in South Africa.

**Methods**: Nested study of pregnancy outcomes among HIV-infected women enrolled in a single center, open label randomized trial of two short-course rifamycin-based regimens, lifelong isoniazid (INH) or INH for 6 months. Women who became pregnant throughout the course of the study were given the opportunity to continue treatment.

**Results**: 957 HIV-infected, tuberculin-positive women entered the trial. During the trial, 216 women (22%) had 235 pregnancies. Women becoming pregnant were younger (27.87 vs 31.26 years, p < 0.001) and had higher baseline CD4 counts (589.10 vs 536.70, p = 0.011). The odds of becoming pregnant were higher in women in the rifamycin treatment arms than the INH treatment arms (RPT/INH: RR = 1.50, p = 0.003; RIF/INH: RR = 1.64, p = 0.019). Pregnancy occurred in 36 women (15.3%) while they were still taking medication (8 rifamycins, 28 INH). Pregnancy outcomes were: 19 mother/baby healthy (52.8%), 2 spontaneous abortion (5.6%), 4 elective abortion (11.1%), 1 premature delivery (2.8%), 2 infant death (5.6%) [1 rifamycin/1 INH], 8 outcomes unknown (22.2%). None of the women subsequently developed TB. Bivariate relative risk ratios for adverse pregnancy outcomes were performed on the following variables: treatment arm, smoking, alcohol consumption, contraceptive use, type of contraceptive, current medication use, BCG scar, most recent CD4 count, and BMI. The only statistically significant variable was alcohol consumption, associated with a 3.68 higher risk of adverse pregnancy outcome (95% CI: 1.36, 8.81; p = 0.026).

**Conclusion**: Continuation of INH preventive therapy was safe among HIV+ women taking TB preventative therapy. More widespread use of INH preventative therapy in HIV+ women, including those who are pregnant, could reduce the burden of TB in this population.
Assessing the Effectiveness of the Cefaly device in Pediatric Headache

Nivedha Ram BS, Christopher Oakley MD

**Background:** Migraines experienced in the pediatric population are just as disabling as those experienced by adults, though the duration may be shorter. Once the diagnosis is established of migraine, management of migraine in the pediatric population includes using both pharmacologic and non-pharmacologic therapies. Cefaly is a non-invasive neurostimulator device approved for use in adults, but needs further study of its efficacy in pediatric populations.

**Methods:** We used a prospective study of 96 patients who were seen at Johns Hopkins Hospital up to the age of 21 and prescribed a Cefaly neurotransmitter device. Data was collected in two ways: 1) via an EMR review to assess prior headache information including but not limited to: headache frequency, severity, associated symptoms, diagnosis, and disability by using the PedMIDAS and 2) via patient completion of a questionnaire. The questionnaire was collected either through a Qualtrics-based survey link, with oral consent done over the phone. The primary outcome variable was the reduction in pain frequency and duration. The secondary outcome variable was to potentially decrease the use of acute abortive and preventative medications.

**Results:** 31 patients responded to the survey. 93.75% of patients reported that the device is helping with their headaches overall. 75% of patients reported that the severity of their headaches decreased. There was a reported 40.6% decrease in average severity of headaches.

**Conclusion:** Based on the preliminary results, we are hopeful that Cefaly can be used in pediatric populations because patients have indicated that their headaches are mitigated by using the device.
Factors Influencing Delirium Screening in Pediatric Intensive Care Patients

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Background: Delirium is an important determinant of healthcare outcomes in critically ill children, yet delirium screening is not universal in Pediatric Intensive Care Units (PICUs). We aimed to determine the patient level factors associated with the performance of delirium screening in PICUs with formalized delirium screening protocols.

Methods: Prospective data from the preintervention stage of the PICU Up! early mobility pilot study, a multicenter stepped-wedge randomized trial, was collected between May 2019 and March 2020. All pediatric patients with lengths of stay ≥3 days admitted to 6 participating PICUs were included.

Results: Of 1160 patients, 68% of patients were screened for delirium at least once during their admission. Delirium screenings were performed on only 44% of eligible patient days. The daily prevalence of delirium in patients receiving screening was 46%, with 63% of patients developing delirium at any point during their stay. Mechanical ventilation through an endotracheal tube (adjusted OR 2.12, 95% CI 1.58-2.84), increased duration of PICU stay (aOR 6.02 for >14 days vs 1-2 days, 95% CI 4.71 – 7.68) and physical restraints (aOR 1.46 95% CI 1.09-1.96) were associated with increased odds of daily delirium screening. Children receiving opioids (aOR 0.58, 95% CI 0.46-0.72), benzodiazepines (aOR 0.70, 95% CI 0.54-0.91) or ketamine (aOR, 0.28 95% CI 0.14-0.56) infusions were less likely to have delirium screening. Age, gender, race and family presence were not associated with the likelihood of daily delirium screening.

Conclusion: Even in the presence of unit screening protocols, PICUs do not consistently perform delirium screenings. Children who do not receive respiratory support, have decreased levels of consciousness, and those who receive sedative medications have lower odds of being screened for delirium daily. Our results underscore the importance of delirium education and the necessity of daily delirium screening to ensure proper diagnosis of delirium in critically ill children.
Factors Affecting Bone Health in Pediatric Patients with Acute Flaccid Myelitis

Yilin Yang BSE, Cristina Sadowsky MD

Background: Acute Flaccid Myelitis (AFM) is a rare syndrome characterized by non-traumatic spinal cord injury in children, possibly associated with enterovirus D68. One hallmark of AFM is abrupt-onset, irreversible paralysis, requiring long-term rehabilitation. AFM rehabilitation is complicated by co-morbidities related to paralysis, including bone loss and fractures. Maintaining bone integrity, therefore, is of utmost concern in AFM rehabilitation. Our objective was to identify and quantify factors affecting bone health to better delineate the need for bone preservation.

Methods: Retrospective chart review of patients presenting for rehabilitation (01/2007-12/2019, n=39). Bone health, measured by bone mineral content (BMC) and density (BMD) at lumbar spine, bilateral wrists, hips and knees, was determined using dual energy absorptiometry (DXA). Factors examined were: paralysis severity, measured by Manual Muscle Testing (MMT) score; Body Mass Index (BMI) at DXA; age at DXA; and time from paralysis onset to DXA. Data were extracted from participants’ electronic health records and GraphPad Prism8 was used for statistics.

Results: Demographically, patients’ mean age at paralysis onset was 6.09yrs, mean age at DXA 8.43yrs, and mean time to DXA 2.34yrs. BMD and BMC were positively correlated with corresponding MMT scores at all sites, and with BMI at lumbar spine only (0<Pearson r<1, all p<.05). Additionally, BMD and BMC were positively correlated with Age at DXA (0<Pearson r<1, all p<.05) but not Time to DXA (all p>.2). Finally, we showed a trend of BMC decreasing before, and increasing after 2 years from paralysis onset.

Conclusion: We demonstrated that both paralysis severity and BMI correlated with bone health in AFM children, possibly tying bone loss to site-specific muscle weakness and low body weight. BMC and BMD increased with age, suggesting bone growth continues despite initial loss after paralysis. Overall, our findings support the need to focus on bone preservation in AFM rehabilitation, especially immediately following paralysis onset.
Is the Early Discharge Policy Associated with Shorter Hospital Stays and Improved Outcomes in Pediatric Oncology Patients with Low Risk Neutropenic Fever?

Christine Atik, BS, Chana Richter, MD, Kelsey Gladen, MD, Stacy Cooper, MD

**Background:** While week-long admissions have generally been the standard of care for pediatric oncology patients with neutropenic fever (F&N), hospitals have begun reducing inpatient time for low risk patients. In July 2018, Johns Hopkins Pediatric Oncology instated the Early Discharge Policy, which allows for low risk pediatric F&N patients to be discharged after 48 hours if they meet certain criteria. We aimed to compare the characteristics and clinical outcomes of patients before and after institution of this policy.

**Methods:** In this retrospective review at Johns Hopkins Children’s Center, we included all patients between 2 and 28 years of age (mean age, 16.2 ± 7.3 years) with a total of 353 patients, including 39% females. To determine how the new policy has affected patient care, 12 months of patient chart review prior to the change of policy (July 2017 - July 2018) will be analyzed and compared to prospective chart review data collected after the change in policy (July 2018 - January 2019). Average length of stay and rates of unplanned readmission, PICU admission, bacteremia, mortality, and C. difficile and nosocomial infections will be measured.

**Results:** In the prospective cohort, patients who were eligible for early discharge and discharged early and appropriately (n=44) had a mean length of stay of 2.20 days (with a 95% CI of 2.05-2.36). Of the 44 patients discharged early, there were 8 unplanned readmissions (18.2%), all of which had benign courses with no PICU readmission, C. difficile infection, bacteremia, other nosocomial infections, or mortality within 30 days of admission for F&N.

**Conclusion:** Conclusion to be determined based on ongoing data collection and analysis as a result of IRB delay. Reducing time spent inpatient in low risk F&N pediatric oncology patients would greatly improve family quality of life, decrease nosocomial infections, and cut costs for both families and healthcare systems.
An intrathecal limited postoperative chemotherapy regimen for the treatment of young children with nodular/desmoplastic medulloblastoma and variants.

Harrison Naung BA, Kenneth Jay Cohen MD MBA

**Background:** Therapy for medulloblastoma in patients < 4 years old omits radiotherapy due to risk of neurocognitive deficits. The German Pediatric Brain Tumor Study Group described a chemotherapy regimen (HIT-SKK’ 92 and HIT-SKK 2000) without radiation which yielded a five-year progression-free survival (PFS) rate of 85% in children with nodular/desmoplastic medulloblastoma (NDMB) and medulloblastoma with extensive nodularity (MBEN). One drawback of the HIT-SKK regimen is frequent intra-Ommaya administration of intrathecal methotrexate (IT MTX), which can be inconvenient and increase risk of neurotoxicity. We have modified the HIT-SKK regimen to mitigate such concerns and report the outcomes of five patients treated with our approach.

**Methods:** Eligible children were less than 4 years old and newly diagnosed with NDMB or MBEN by histology. Three cycles of modified chemotherapy commenced 3-4 weeks following surgical resection. In adjusting HIT-SKK protocol, IT MTX was eliminated altogether on weeks when high-dose intravenous methotrexate was administered. On weeks when no systemic methotrexate was administered, a single dose of lumbar-administered IT MTX was substituted in place of multiple intra-Ommaya doses. These changes reduced IT MTX from 14 to 2 doses/cycle. Following chemotherapy, patients were monitored with interval imaging and observation for acute and late effects.

**Results:** Four children remained in remission 3, 5, 9, and 10 years post-treatment respectively, without observed learning difficulties. One child had recurrent tumor and metastasis six months post-treatment. She failed the attempted salvage regimen and continued to deteriorate, dying of disease at 3 years old.

**Conclusion:** Review of existing literature supported our modifications well. While this report is limited by the small number of children treated, we believe there is encouraging evidence that our approach warrants further evaluation in a larger population of young children with NDMB and MBEN.
Prognostic Indicators of Successful Treatment of de Quervain Tendinopathy

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**Background:** De Quervain tendinopathy (DQ) is a common condition that causes pain at the first extensor compartment of the wrist. Corticosteroid injections are a commonly used and effective treatment for patients who have attempted conservative measures. Our purpose was to determine factors associated with need for and efficacy of injections and review the demographic profile of DQ patients.

**Methods:** We reviewed 1104 patients with DQ from 2013-2017. Follow-up averaged 6.49 months. We assessed patient demographics and determined factors or treatments associated with injection use and efficacy, recurrence rate, and need for surgery. Results were analyzed with logistic and linear regression (significance, p<0.05).

**Results:** The female: male ratio was 4.4:1, and 44.9% of patients were obese. 20.7% of women were currently or recently pregnant. Common conservative treatments included splinting (70.7%) and NSAIDs (57.3%). 391 (35.4%) patients received injections, and 91 (8.2%) received surgery. 66.9% had symptom resolution with conservative measures only. 33.1% of patients needed further injection or surgical management due to failure of conservative measures. Recurrence rates (and efficacy length) were 31% (7.18 months), 21.6% (9.88 months), and 27.3% (14.8 months) after first, second, and third injections, respectively. Trigger Finger was positively correlated with need for injections (p=0.017). Splinting was negatively correlated with need for injection (p=0.036). Carpometacarpal arthritis, numbness/tingling, and physical therapy were positively correlated with need for surgery (p=0.03, p=0.03, and p=0.004, respectively).

**Conclusion:** Women are affected by DQ at a higher rate than men, and a significant amount were pregnant or recently post-partum. Only splinting is associated with reduced risk of injection therapy. Carpometacarpal arthritis appears to be a worse prognostic indicator for need for surgery and duration of DQ episode. Most patients did not need injection therapy, however, if needed, injection therapy was safe and effective. Surgery is a rarely used but a definitive treatment modality for DQ.
Progression of metastatic bone lesions after intramedullary nail stabilization: a retrospective study

Punthitra Arpornsuksant, BS, Carol D. Morris, MD, Adam S. Levin, MD

**Background:** A common complication of osseous metastases include pathologic and impending fractures of long bones, for which intramedullary nail fixation may be warranted. However, there is limited evidence detailing factors associated with the incidence local progression of tumor as well as prevalence of new lesions following intramedullary stabilization. We explored two questions: (1) What is the incidence and factors associated with progression of metastatic disease following stabilization? (2) Is there a difference in survival between patients who experienced progression to those who did not?

**Methods:** Between January 2013 and December 2019, 98 patients were treated with 113 intramedullary nails for impending and completed pathologic fractures of the long bones secondary to bone metastases. The primary outcome measured was the incidence of local osseous progression after stabilization, as well as the development of newly recognized tumor in the same bone. A univariate analysis was performed to determine any association between lesion progression and various risk factors. Survival was assessed by Kaplan-Meier survivorship.

**Results:** There were 7 cases (6%) of disease progression around the intramedullary implant, with no cases of new lesions developing at the end of the intramedullary nail. Of those who demonstrated progression, 4 occurred in the femur, 2 in the humerus, and 1 in the tibia. A primary tumor of renal cell carcinoma seemed to be associated (p = 0.008) with progression. Presence of visceral or other skeletal metastases, radiation, systemic therapy, antiresorptive therapy, and type of fracture did not appear to be associated with local progression. There was no significant difference in mean survival between those with progression (9.3 months) and those with stable local disease (17.9 months; p = 0.07).

**Conclusion:** With this comprehensive, multidisciplinary approach, our current analysis suggests that the rate of local progression of tumor destruction around, or adjacent to, the intramedullary implant in long bones remains low.
Amputation or Reconstruction? Development and Validation of a Patient Decision Aid for Treatment of Severe Lower-Extremity Trauma

Oluseye I. Raymond, BA, Megan Hsu, MD, and Casey Jo Humbyrd, MD, MBE

**Background:** After severe lower-extremity trauma, choosing between amputation and reconstruction can be challenging. We developed and validated a tool to help patients make treatment decisions aligned with their values.

**Methods:** We developed the Severe Lower-Extremity Trauma (SLETRA) Decision Aid. Sixty-two patients of an orthopedic foot and ankle practice at a US academic hospital were recruited from June–August 2020. Patients completed knowledge pre- and post-tests, consisting of 8 questions. We evaluated knowledge scores (maximum, 8 points); decisional conflict scores (maximum, 400 points, with higher scores indicating greater respondent difficulty in decision-making); ratings of factors influencing the decision; and decision aid helpfulness (maximum, 7 points) to assess the tool’s validity and impact on patients’ decision-making experience. Pre- and post-test knowledge scores were compared using paired Student t-tests. Alpha = .05.

**Results:** Mean (± standard deviation) knowledge scores were 5.2 ± 1.6 (pre-test) and 6.7 ± 1.6 (post-test), for a mean improvement of 1.5 ± 1.9 points after respondents reviewed the decision aid (P < .001). The mean decisional conflict score was 223 ± 16, reflecting moderate difficulty. Factors that greatly affected respondents’ treatment choice were risk of complications (n = 29), recovery time (n = 27), and future use of a prosthesis (n = 27). No respondent found the decision aid difficult to understand. The mean helpfulness score was 5.6 ± 0.16, reflecting considerable benefit.

**Conclusion:** The SLETRA Decision Aid is a helpful, understandable tool that significantly improves patient knowledge regarding treatment options for severe lower-extremity trauma.
Efficacy for Urinary Diversion via Percutaneous Nephrostomy Tubes to Treat Hemorrhagic Cystitis

Ahmed Farhan, MS, Gray Lyons, MD PhD

Background: Hemorrhagic cystitis (HC) is diffuse hemorrhage of the bladder mucosa that can lead to anemia requiring transfusions and bladder outlet obstruction. In severe cases that are refractory to conservative treatment, urinary diversion utilizing percutaneous nephrostomy tubes (PCN) has been reported.1–3 However, there is a paucity of data regarding the efficacy and safety of PCNs for severe HC. We present the largest case series to date of adult HC treated with PCNs for urinary diversion.

Methods: An IRB-approved, retrospective, single center cohort study was conducted in patients with HC who had PCNs placed for urinary diversion between 2004 and 2020. Diagnosis of HC was determined on clinical and/or cystoscopic examination. 24 patients (median age 59 years; 17/7 M/F ratio) were identified. Etiology of HC included radiation (12), BK virus (6), and other (6), with a median CTCAE severity grade of 3 (range 2-4). Mann-Whitney test with p value <0.05 was used to determine significance.

Results: PCN placement procedure had a primary technical success rate of 23/24 (96%). Median post-procedure CTCAE severity score was 1 (range 0-4), a mean decrease of 1.95 compared to pre-procedure. Resolution of hematuria occurred in 17/24 cases (71%); median time for hematuria to resolve after procedure was 12 days (range 3-71). Postoperative hemoglobin increased (mean 7.4 g/dL at the time of procedure to 8.3 g/dL 3 days post-operative, p<0.05) and transfusion requirement decreased (mean 7.3 units PRBC within 30 days prior to the procedure to 3.4 units PRBC within 30 days following the procedure, p<0.05). 4/17 patients demonstrated subsequent recurrence of hematuria; median time to recurrence of hematuria was 60 days (range 12-200). 5/24 patients died within 30 days of the procedure, however no death was attributed directly to HC or PCN placement.

Conclusion: Urinary diversion from PCN placement is a safe and efficacious treatment for severe, treatment-refractory HC.
Factors Affecting Patency of Vascular Interventions for Transplant Renal Artery Stenosis

Oscar Covarrubias BS, Gray Lyons MD

**Background:** Transplant renal artery stenosis (TRAS) is a post-transplant complication characterized by a narrowing of the renal artery with an associated decrease in allograft function and survival. Despite endovascular interventional procedures having been performed for the last two decades to treat TRAS, there is a paucity of data on factors that lead to optimal long-term renal artery patency. The overall objective of this study is to determine what factors may lead to some patients having to undergo multiple interventions to maintain renal artery patency.

**Methods:** We conducted a retrospective chart review of patients who received a kidney transplant at the Johns Hopkins Hospital between January 2010 to June 2020. We characterized patient demographics and performed descriptive statistics to determine if there were differences between patients who had only one intervention compared to those who had multiple interventions.

**Results:** Of 2364 patients reviewed, 23 patients (age: 53.8 +/- 13.6) met the inclusion criteria for analysis. Diagnostic arteriograms ruled out TRAS in 9 patients, leaving 14 patients who underwent interventional treatment for TRAS. These fourteen patients were categorized into two groups based on the number of interventions required to maintain renal artery patency: single intervention (n=8) and multiple interventions (n=6). There was no difference in the number of days from transplant to first intervention between patients with a single intervention compared to multiple intervention (547.4 days vs 261.6 days respectively, P=0.460). There was no difference between these two groups in whether the initial intervention was angioplasty alone or angioplasty plus stent (P=0.124). We found no differences in demographics, past medical history, pre/post doppler ultrasound or lab values.

**Conclusion:** In our retrospective cohort we found no differences between TRAS patients undergoing a single or multiple interventions to maintain renal artery patency. Future studies should investigate other variables which may predict need for multiple interventions to maintain patency.
Short-Term Outcomes for Robotic Bilateral Cardiac Sympathetic Denervation

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Background: Cardiac sympathetic denervation (CSD) is performed to reduce sympathetic innervation to the heart in patients with refractory tachyarrhythmias. CSD has been performed using video-assisted thoracoscopy, however the feasibility and safety of a robot-assisted approach has not been established. We investigated the short-term outcomes for patients undergoing robot-assisted CSD.

Methods: In this retrospective chart review, we characterized demographic, operative, and short-term outcomes of adults undergoing robotic CSD at a single center over one year. The da Vinci Xi system was used to remove the sympathetic chain from the inferior portion of the stellate ganglion to the fourth intercostal space.

Results: Fourteen patients (13 men) underwent robotic CSD with a median age of 55 (IQR 51-67) years. Median follow-up was 39 (IQR 13-72) days.

Indications for surgery included non-ischemic cardiomyopathy (64%), ischemic cardiomyopathy (21%), and postural orthostatic tachycardia syndrome (7%). Preoperatively all patients were taking at least one antiarrhythmic medication (median of 2; IQR 1.3-2.8). 71% of patients were previously treated with cardiac ablation (median 2.5 procedures; IQR 2.0-3.0). 79% of patients received implantable cardioverter defibrillator (ICD) shocks in the year prior to surgery (median 5.5 shocks; IQR 2.8-6.3).

All patients underwent robotic bilateral CSD without conversion to open procedure. Median operative time was 148 (IQR 138-164) minutes; median hospital stay was 3.0 (IQR 3.0-4.8) days. There were no intraoperative complications. One patient experienced ventricular tachycardia and atrial fibrillation postoperatively.

At follow up, one patient was successfully weaned from all antiarrhythmic medications. Overall, 79% of patients had a dosage reduced or medication stopped; 36% had a dosage increased or class added. One patient experienced compensatory sweating and two experienced ICD shocks.

Conclusion: In our cohort, robot-assisted CSD is a safe therapy for managing recurrent malignant arrhythmias. This technique can potentially reduce the need for ablations, ICD shocks, and antiarrhythmic medication in patients with refractory arrhythmias.
Investigating the Impact of the 2018 UNOS Heart Allocation Policy Change on Patients Receiving Temporary Mechanical Circulatory Support as a Bridge-to-Transplant

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Background: The 2018 UNOS heart allocation policy altered the prioritization of patients receiving temporary mechanical circulatory support (tMCS). We compared tMCS patients pre versus post-policy change by baseline, waitlist and device characteristics, transplant rates and outcomes.

Methods: We reviewed the OPTN database for adult heart transplant patients listed October 2016-March 2018 or October 2018-March 2020, excluding multi-organ and retransplant cases. Those receiving tMCS were compared by listing, waitlist, transplant, and 90 day outcome characteristics between eras. Time between listing and first tMCS was adjusted for baseline characteristics via multiple linear regression. Time between listing and transplant was modeled via competing risks analysis and adjusted for baseline characteristics.

Results: Post-policy, more patients (31.1% [1,697/5,453] vs. 11.5% [608/5,254], p<0.001) received tMCS and fewer tMCS recipients (10% vs 40%, p<0.001) received durable support. Patients now receive first tMCS 13 days sooner than pre policy (95% CI 1-24, p=0.04). Patients with tMCS now become inactive for worsening condition less often than pre-policy (16% vs 21%, p=0.01). Significantly more tMCS patients are transplanted within their listing window (87% vs 64%, p<0.001), with a 1.7 odds-ratio of transplantation compared to pre-policy (95% CI 1.5-2, p<0.001). These patients also have lower cardiac outputs and are more often in the ICU and on mechanical ventilation at transplant compared to pre-policy (p<0.001). Patients with tMCS and at least 90 days of follow-up post-transplant now experience lower survival rate (92%, n=793/865) versus those pre-policy (96%, n=298/311, p=0.01).

Conclusion: Patients now receive tMCS sooner and more often than pre-policy change. Post-policy tMCS transplant recipients have shorter list times and fewer inactivations, though they are sicker at transplant and have lower 90-day survival. The policy change may have resulted in changed tMCS patient selection or management, leading to decreased time to transplant at the expense of survival.
Tracking SGLT2 Inhibitor and GLP-1 Receptor Agonist Prescribing by Cardiologists Since the Publication of Favorable Cardiovascular Outcomes Trials: A National Study

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**Background:** Recent cardiovascular outcomes trials have revealed that sodium-glucose cotransporter-2 inhibitors (SGLT2i) and glucagon-like peptide-1 receptor agonists (GLP-1RA) reduce the risks of cardiovascular disease in patients with type 2 diabetes. Guidelines strongly recommend these therapies for diabetes patients at elevated cardiovascular risk, but few patients receive them. This study aimed to evaluate national prescribing patterns for these medications by cardiologists compared to other specialties over time.

**Methods:** We used IQVIA’s National Prescription Audit, a projection of total national prescription volumes based on a sample that captures over 70% of national dispensing activity, to determine monthly prescriptions, dispensed units, and specific medications prescribed within SGLT2i and GLP-1RA drug classes by prescriber specialty from 2014-2020. Combining this with physician census data from the AMA Physician Masterfile, we also calculated the average number of SGLT2i/GLP-1RA prescriptions per physician within each specialty in the past year.

**Results:** Over the six-year period, monthly prescriptions by cardiologists increased 14-fold for SGLT2i (1,206 to 17,016) and 4-fold for GLP-1RA (1,368 to 5,421). However, cardiologist-initiated prescriptions represent a small fraction of national totals (SGLT2i: 0.5% in 2014 vs. 1.5% in 2020; GLP-1RA: 0.5% in 2014 vs. 0.4% in 2020). Rather, primary care physicians account for most prescriptions (58% of SGLT2i, 51% of GLP-1RA) while endocrinologists lead prescribing on a per-physician basis (245 and 355 prescriptions/physician/year for SGLT2i and GLP-1RA). Unlike non-cardiology prescribers, cardiologists predominantly use the SGLT2i empagliflozin (48% of all SGLT2i/GLP-1RA prescriptions). Cardiologists’ rapid uptake of empagliflozin in 2016 coincided with publication of the EMPA-REG OUTCOME trial and the FDA’s addition of a cardiovascular indication to the drug’s label.

**Conclusion:** Prescriptions by cardiologists for cardioprotective SGLT2i and GLP-1RA medications increased many-fold over the past six years. Notable inflections coincided with landmark clinical trials and FDA decisions. However, adoption by cardiologists remains low and accounts for a small fraction of national prescribing.
Association of birth weight, sodium intake, and cardiovascular disease risk factors among children with overweight/obesity

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Background: Children born early for gestational age (EGA) and/or with low birth weight (LBW) have greater lifetime risk of hypertension. This is likely related to decreased nephron endowment, however accelerated post-natal growth, co-morbid conditions, and diet may also play a role. We aimed to determine the association of EGA/LBW with cardiovascular disease (CVD) risk factors among children with overweight/obesity and elevated blood pressure (BP), and to determine if sodium intake modified these associations.

Methods: We performed a cross-sectional analysis of 91 children 4-21 years of age referred for evaluation of overweight/obesity and elevated BP. We compared children born EGA (<37 weeks; n=25)/LBW(<2.5kg; n=22) to their counterparts using t-tests, Wilcoxon rank-sum, and Fisher’s exact tests as appropriate. Logistic regression analyses adjusting for age, sex, race, BP medication use, BMI z-score, and socioeconomic status determined the association of EGA/LBW with BP index (BPI; mean BP/age-sex-height specific 95th percentile BP), hypertension, left ventricular mass index (LVMI), and left ventricular hypertrophy (LVH; LVMI≥51g/m2.7). We also explored for potential effect modification of elevated sodium load (>1.8 mg/kcal/day).

Results: The average age was 13.3 years, 60% were male, 78% were African American, mean BMI was 36.2 kg/m2, mean BMI z-score was 2.61, 62% were hypertensive and 38% had LVH. There were no significant differences between the groups for sodium load or any CVD risk factor. Neither LBW nor EGA were significant independent predictors of hypertension, LVMI or LVH, though EGA was independently associated with a 0.08 increase in diastolic BPI (p=0.037). Sodium load did not modify any associations.

Conclusion: Among this at-risk cohort, prematurity was not independently associated with CVD measures, excepting EGA with diastolic BPI, suggesting the increased CVD risk conferred by prematurity may be less significant once a certain cardiometabolic profile is reached. Preventing pediatric overweight/obesity remains of utmost importance for promoting cardiovascular health.
Alignment of guidance between academic medical centers in the American Association of Medical Centers (AAMC) “Coronavirus (COVID-19) Clinical Guidance Repository”

Francesca Brancati BS, Gabriela Gomez BS, Victoria Grabinski BA, Rosha McCoy MD, Eric Bass MD

**Background:** Due to the urgent need for protocols to address many aspects of care at the onset of the COVID-19 pandemic, we worked with the American Association of Medical Centers (AAMC) to create the "Coronavirus (COVID-19) Clinical Guidance Repository", where selected academic medical centers (AMCs) have posted their guidance documents for use across the world. The aim of this study is to describe the extent to which COVID-19 response guidance was aligned between two or more AMCs in the following topics: implementation of isolation precautions, discontinuation of isolation precautions, infectious disease treatment, critical care, in-person ambulatory care, patient risk stratification, prevention and treatment of venous thromboembolism, extracorporeal membrane oxygenation, and discharge policy.

**Methods:** For each set of documents from different institutions that addressed a similar topic, we identified discrete recommendations within each document and sorted them into related categories using a spreadsheet to facilitate direct comparison of guidance. Each spreadsheet was reviewed for fidelity to the source documents by one or two clinicians. Then, two reviewers used the spreadsheets to independently code each set of guidance documents in a topic for content presence, content similarity, clarity, flexibility, strength, and extra-clinical considerations.

**Results:** Guidance in each topic ranged from 42 to 476 unique recommendations. In isolation precautions, infectious disease treatment, and critical care, we found relatively little overlap in content between centers (25.9%, 28.6%, and 48.7% of content overlapped, respectively). When content overlapped, 100%, 75%, and 80% of recommendations were similar, respectively. Differences in content were often due to evolving clinical knowledge, such as treatment under investigation. Recommendations were mostly very clear with high or moderate strength and low or moderate flexibility. Guidance occasionally distinguished recommendations for subgroups, like children, and occasionally noted resource and equity considerations.

**Conclusion:** AMCs were partially aligned in content covered and mostly aligned in overlapping content recommendations.
Addressing problem-related distress among cancer survivors during COVID-19: findings from the Johns Hopkins Primary Care for Cancer Survivors Clinic

Aamna Kabani BA, Sydney Dy MD, Youngjee Choi MD

**Background:** As cancer survivors live longer, there has been increased demand on primary care to address survivors’ numerous healthcare and psychosocial needs, which have been further exacerbated by the COVID-19 pandemic. We established the Johns Hopkins Primary Care for Cancer Survivors (PCCS) Clinic in 2015 to improve survivorship care delivery. To inform survivorship priorities during COVID-19, we aim to examine differences in distress and need for support among recent and long-term survivors in the PCCS clinic.

**Methods:** From August-December 2020, survivors completed a validated distress survey with 48 problems (1-5 scale) grouped into 4 distress domains: physical, practical, functional, and emotional. Patients indicated their need for support for each problem (nothing, written information, or direct assistance). We defined clinically significant distress as a rating of ≥3 on at least one problem in the survey, and domain-specific distress as a rating of ≥3 on a problem in a particular domain. Recent survivors were <5 years from diagnosis; long-term survivors were ≥5 years from diagnosis. We used Chi-square tests to assess associations among survivorship duration, distress, and need for support services.

**Results:** We approached 69 patients and 55 completed the survey (80% response rate). Recent survivors were statistically significantly more likely to report clinically significant distress (96%) compared to long-term survivors (63%) (p<0.05). There were no statistically significant differences among recent and long-term survivors in the frequency of physical, practical, functional, or emotional distress. Recent survivors were statistically significantly more likely to request any form of support (64%), either written information or direct assistance, compared to long-term survivors (33%) (p<0.05).

**Conclusions:** A majority of cancer survivors seen in the PCCS clinic during COVID-19 reported distress, with decreasing but still clinically meaningful distress in longer-term survivors. Models of survivorship embedded in primary care may enable PCPs to more effectively support survivors through the challenges posed by the pandemic.
Implementation of the Live Donor Champion Program

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**Background:** The Living Donor Champion Program (LDCP) aims to educate kidney transplant candidates, and community members who act as “Champions,” about living donor kidney transplantation (LDKT). Stakeholders in the program (health care professionals involved in the implementation of the LDCP including physicians, transplant pharmacists, research coordinators) work to provide community members with the tools to advocate for patients and to communicate about LDKT. The purpose of this study was to determine the facilitators and barriers to implementing the living donor champion program as reported by stakeholders at centers implementing the program.

**Methods:** This was a qualitative, in-depth interview study conducted at two transplant centers: Washington University in St. Louis and University of Pennsylvania. Twenty informants were interviewed on average for 45 minutes. Interviews were audiotaped, transcribed, and then coded using the Consolidated Framework for Implementation Research. Coded segments were organized into thematic categories. The Nvivo software was used to facilitate the analysis.

**Results:** Several broad themes arose from the data. Some barriers included: limited time, concerns about work center capacity, lack of staff support, and overworking of staff. Some facilitators include: the LDCP providing a relative advantage to the center compared to those without the LDCP, the LDCP’s alignment with current practices and norms of the respective centers, meeting needs of the transplant candidates, improved education, increasing support and empowerment for transplant candidates, and higher transplant volumes.

**Conclusion:** Preliminary analysis indicates that staff support and workload are significant barriers to LDCP implementation. Therefore, an appropriate implementation guide for the program should address these issues, and mid-implementation interview analysis should focus on how centers have addressed these barriers. Knowledge of barriers and facilitators to implementation of the LDCP will facilitate the development of an implementation guide for future use in other centers.
Adapting a global telemedicine model to address hearing health inequity in Baltimore

Samuel Weinreb BS, Izabella Samuel BS, Kai Zhang BS, Mackenzie Hall BS, Mariana Bendavit MS

**Background:** Intelehealth is a nonprofit startup that provides medical care where there is no doctor by equipping frontline health workers in India with an open-source digital assistant and telemedicine platform. Here, we explore how this technology and model of care might be adapted to address health inequities in the context of the U.S. healthcare system.

**Methods:** We began with primary ethnographic research, expert interviews, and literature review to identify needs in the general areas of health disparities, community health workers, and telemedicine accessibility. We then scored each need on clinical impact, feasibility, business potential, and strategic fit. Root cause analysis was performed for the top need.

**Results:** Of 106 identified needs, the most highly scored was undertreatment of age-related hearing loss. While hearing aid nonuse disproportionately affects Mexican and African Americans and people with low income, it is high across the board. 85% of those who could benefit - at least 61,000 individuals in Baltimore City alone - do not regularly use hearing aids. As such, there is a large and diverse market with the potential to support a self-sustaining business model. Furthermore, this problem is uniquely compatible with the Intelehealth care model. The root causes that we identified for poor hearing aid uptake, including stigma around aging, denial of hearing loss, poor awareness of resources, and lack of education around proper use and maintenance, are primarily sociocultural in nature and thus within community health workers’ scope of practice.

**Conclusion:** We have identified age-related hearing loss, specifically the problem of hearing aid underuse, as an optimal test market for Intelehealth in the U.S. By developing a targeted solution to this problem, specifically within the context of medically underserved Baltimore communities, we will create a generalizable model for delivering care through community health workers equipped with a decision support and telemedicine platform.
The Impact of Telemedicine on Access to Urological Outpatient Care in the COVID-Era

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Background: COVID-19 has ushered in telemedicine at a historic speed and scale. While telemedicine has the potential to improve access to care, these modalities may also worsen disparities among patients who are older, have limited-English proficiency, or have unstable access to internet. Hence, the objective of our study was to understand the impact of the expansion of telemedicine on the urological outpatient population.

Methods: An IRB-approved, retrospective analysis was performed to collect deidentified data from all non-procedure, adult outpatient encounters conducted as either in-person, office visits in April 2019 (n=1,949), or video visits in April 2020 (n=608), the latter being during the peak of telemedicine use in our academic practice. We assessed demographic factors, language preference, zip codes, and use of language interpretation services of all encounters. Using Census data, zip codes were linked to internet speeds. We performed hypothesis testing and a logistic regression analysis on Stata (College Station, TX).

Results: Total outpatient encounters were reduced by 65% when comparing April 2020 to April 2019. Video visits increased from 0% of all outpatient encounters during April 2019 to 66% of the practice in April 2020 (P<0.001). Outpatients seen over video visits were younger than outpatients seen during the previous year over office visits (58.9 vs 60.8, P=0.008). The proportion of patients with a non-English language preference was also significantly reduced (1.48% vs 3.54%, P=0.0099), as well as use of language interpretation services (1.48% vs 3.34%, P=0.017). Logistic regression analysis found patients who were older than 60, non-English proficient, or originating from zip codes with low broadband upload speeds were all significantly less likely to participate in video visits.

Conclusion: Our findings suggest that outpatients who are older, have a non-English language preference, or originate from areas of unstable internet access have been significantly excluded from outpatient telemedicine visits.

Rachel Strodel BS, Jeremy Greene MD PhD

**Background:** The price of insulin has risen exponentially since the late 1990s, even though this drug was discovered nearly a century ago. The three companies that currently manufacture insulin have implemented these price increases in unison, inviting inquiry about whether they have conspired to do so. Yet there has been little examination of the history of insulin pricing and the origins of this modern problem.

**Methods:** We reviewed Congressional records and newspaper articles from 1920-2000 for commentary on insulin pricing. These searches highlighted investigations by Congress in 1952 on fair trade laws. We outlined the stakeholders in these investigations and how insulin manufacturers responded to allegations of anti-competitive practices.

**Results:** The terms of the 1952 insulin price fixing debate were centered on a set of policies known as fair trade laws. These laws were intended to protect small businesses by allowing retailers and manufacturers to set a minimum price at which a product could be sold. However, insulin manufacturers co-opted these agreements to curb competition while maintaining high profit margins for retailers. The U.S Department of Justice and Federal Trade Commission both decried fair trade laws for making it easier for companies to “cloak” anti-competitive practices. Still, fair trade laws remained in effect in the aftermath of the 1952 hearings. Emboldened manufacturers then began suing drug retailers for selling insulin below minimum fair trade prices.

**Conclusion:** Insulin price-fixing is not a new phenomenon. Instead, manufacturers in the 1950s maneuvered a policy landscape to maintain artificially high insulin prices. This analysis informs the modern insulin pricing debate, which has centered on a blame-game between manufacturers, pharmacy benefit managers, and distributors. Instead of trying to uncover one group of culpable actors, a historical perspective suggests a more fruitful approach would challenge the underlying policies that have allowed the evasion of meaningful regulation to persist for decades.
The Microscope is Also a Mirror: Reflections on Gender Minority Health Research by a Non-binary Medical Student

Xian Mao BS, Kathryn Van Eck PhD

Background: In her essay “Poetry is Not a Luxury,” Black feminist writer Audre Lorde described poetry as “the way we give name to the nameless so it can be thought.” Through poetry, boundaries can be questioned and explored freely, allowing both poet and reader to exist in liminalities and investigate complex topics through an emotional lens. For this project, I used poetry to reflect on my experiences as a non-binary individual conducting research on gender minority healthcare and being a medical student during the COVID-19 era.

Methods: I wrote reflective, free-verse poetry centered around three main themes: outness, healthcare access, and psychological distress. Many of the poems also reference my medical education, research progress, and being a medical student during COVID-19. I reflected on what these themes mean both to me personally and to the community as a whole, and interrogated my position in speaking for and as a member of the transgender and gender non-conforming community.

Results: I have written nine poems centered on gender identity and gender minority health, with additional themes of institutional power, living during a pandemic and intersectional approaches to addressing oppression. They, along with a preface explaining my thought process and theoretical framework, are collected in a folio titled “The Microscope is Also a Mirror.”

Conclusion: Poetry gave me space to speak as an individual and contextualize my role in research, as well as reflect on my medical school experience during the COVID-19 era. Limitations of my work are that I write from a privileged socioeconomic position and can only reflect my own experiences, not the experiences of a community. I hope my voice may lead to better understanding among my classmates regarding transgender health issues and allow future transgender and gender non-conforming medical students to know that someone else has passed through this space and thrived.
Discontinuing cancer screening for older adults: a comparison of clinician decision-making across breast, prostate, and colon cancer screenings

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**Background:** Clinical practice guidelines recommend against routine screening for breast, prostate, and colon cancers in patients with less than 10 years of life expectancy. Yet, a substantial proportion of older US adults with limited life expectancy continue to be screened. While previous studies have broadly examined clinician perspectives regarding cancer screening or focused on one specific type of cancer screening, little is known about clinicians’ decision-making across different types of cancer screenings. We conducted a study to better understand the similarities and differences in clinician decision-making for breast, prostate, and colon cancers to shed light on ways to optimize screening practices in older adults.

**Methods:** We conducted semi-structured interviews with 30 primary care clinicians throughout Maryland. We asked about cancer screening decision-making in older adults generally and used chart-stimulated recall to prompt each clinician about specific breast, prostate, and/or colon cancer screening decisions in 2-3 of their patients. The audiotaped interviews were transcribed verbatim, and standard techniques of qualitative content analysis were used to identify major themes.

**Results:** Participants were mostly physicians (24/30) and split between women (16/30) and men. Four major themes highlighted variability across cancer screening types with regard to how clinicians: (1) weighed patient age when considering screening cessation; (2) prioritized harms and benefits of the different cancer screenings; (3) discussed the harms and benefits of cancer screening with patients; and (4) valued interactions with and recommendations from specialists around screening decisions.

**Conclusion:** Despite guidelines using similar thresholds to guide screening cessation for multiple types of cancer screenings, our findings suggest that clinicians often consider screening for distinct types of cancer differently and that their priorities for evaluating and communicating screening-related benefits and harms vary by cancer type. These results highlight the complexity and nuances in clinicians’ cancer screening considerations and can inform future efforts to standardize and improve screening practices.
Clinically significant anxiety and depression in inherited arrhythmia patients with implanted defibrillators

Sajya Singh BS, Andreas Barth MD, PhD

Background: In patients with inherited arrhythmia syndromes, implantable cardiac defibrillators (ICDs) are indicated for those at high risk for sudden cardiac death (SCD) and for secondary prevention in survivors of sudden cardiac arrest. While an effective intervention for improving survival in this population, ICDs have been shown to impact patients’ psychological health, particularly after experiencing ICD shocks. This study sought to improve understanding of mental health concerns in patients with an ICD placed for an inherited arrhythmia.

Methods: Eligible patients were identified through the Johns Hopkins Center for Inherited Heart Diseases registry. An online link (Qualtrics) and/or a paper copy of the survey were sent between June 23-July 23, 2020. The survey included questions from the Hospital Anxiety and Depression Scale (HADS) and the Florida Patient Acceptance Survey (FPAS). Chi-square tests were used to identify associations with anxiety or depression by HADS.

Results: Among eligible patients (n=65), 32 individuals (49%) completed the survey. An ICD was indicated for secondary prevention in 11 patients (34%). Twelve patients (38%) had an abnormal HADS anxiety sub-score and five patients (16%) had an abnormal HADS depression sub-score. Placement of an ICD for secondary prevention was statistically associated with an abnormal HADS anxiety sub-score (p=0.03) but not with an abnormal depression sub-score (p=0.19). Experiencing an ICD shock, device complications, age, sex, and family history of SCD were not statistically associated with anxiety or depression by HADS. Respondents demonstrated high levels of device acceptance by FPAS total score (mean = 79.9, SD = 16.2, maximum score 100).

Conclusion: A high prevalence of generalized anxiety was identified among inherited arrhythmia patients with ICDs, particularly in those with a history of sudden cardiac arrest. High device acceptance and lack of association with ICD shocks or complications indicate that further research is necessary to identify the source of elevated anxiety in this population.
10 Years Later: Reconsidering The Rosewood Center and Institutional Care in Maryland

Leigh Alon BA, Elizabeth O'Brien, PhD

Freeform Abstract: In 2009, Governor Martin O’Malley of Maryland ordered the Rosewood Center, a state institution for people with intellectual disabilities, to close its doors forever. This executive order followed a series of reports by the state’s Office of Healthcare Quality in 2006-2008 documenting a long list of instances of abuse and neglect at Rosewood. Using institutional reports, newspaper reports, and oral histories, this study aims to discuss the institutional culture of Rosewood over the course of its lifetime from 1888 to 2009, and how it might inform the understanding of the deinstitutionalization of Rosewood and its impact on services for people with intellectual disabilities in Maryland. Institutional reports show that Rosewood’s leadership viewed its mission as educational and therapeutic, rather than custodial, with plans to reintegrate its residents back into the community, running counter to the perceived role of such facilities. However, lack of community-based resources—such as home nursing, respite care, and residential placements—compelled Rosewood to continue to admit residents at a much higher rate than they were discharged. Allocated resources could not keep pace with Rosewood’s growth through its entire lifetime, making for subpar conditions and a demoralized, undertrained workforce. Sadly, Rosewood’s closure did not result in the growth and development of community resources to adequately serve those with disabilities in Maryland. As a result, a mere decade after the deinstitutionalization movement made its mark, parents and professionals, per oral histories, are calling for residential, long term care services for this population. However, while Rosewood and similar institutions did provide a much-needed safety net, they came with their own set of endemic problems, many of which were exacerbated by their explosive growth. I argue that the consistent lack of community-based resources has been a driving force for a cycle of institutionalization and deinstitutionalization for individuals with intellectual disabilities.
Surgeon Preference for Keratoplasty Techniques and Barriers to Performing Deep Anterior Lamellar Keratoplasty

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**Background:** Penetrating keratoplasty (PK) has been performed for management of keratoconus for over 7 decades. However, deep anterior lamellar keratoplasty (DALK) has become an alternative procedure and gained popularity in the past decade. Although DALK is typically a longer and more challenging procedure than PK, it has gained interest due lower complications. However, there are fewer number of cases performed globally. This project aims to identify barriers and facilitators to adopting deep anterior lamellar keratoplasty (DALK).

**Methods:** An anonymous survey consisting of 22 multiple choice and free text questions, was designed to gather information on sociodemographic factors of surgeons and DALK surgical practices. The survey was emailed to members of the kera-net, a global online corneal surgeon/surgery platform. Chi-squared test was used for analyses.

**Results:** A total of 100 surgeons completed the survey, the majority of whom practice in the United States (73%). Most surgeons (89%) reported performing DALK. Surgeons who did not learn DALK during fellowship (34%) tended to be in practice for higher numbers of years (p<0.001). Surgeons in private practice are more likely to perform DALK versus those in other settings (92.7% versus 80.8%, p=0.087). Surgeons performing more corneal surgeries (at least 100 per year) are more likely to perform DALK than those who perform fewer than 100 per year (52% versus 14%, p=0.01). There was also a positive correlation between PK and DALK surgical volumes (Spearman’s rank correlation coefficient = 0.57, p<0.001). The main reasons for surgeon preference for DALK over PK were a desire to preserve the endothelium, intraoperative safety, and decreased complications. Longer surgical time and low patient volume were cited as barriers to adoption of DALK.

**Conclusion:** Alterations in DALK technique that reduce surgical time and providing more learning opportunities for DALK might improve adoption.
Endovascular Interventions Safely and Effectively Maintain Long-Term Patency in Patients with Arterial Complications of Liver Transplantation

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**Background:** Following solid organ transplantation, stenosis of the arterial blood supply can threaten viability. The overall objective of our study was to characterize the long-term safety and efficacy of endovascular interventions, which have been used for over 20 years, at treating transplant hepatic artery stenosis and thrombosis.

**Methods:** An IRB-approved, retrospective single-center cohort study was conducted on patients who underwent liver transplantation surgery between 1986 and 2020. Complications were considered clinically significant if the Common Terminology Criteria for Adverse Events grade was ≥2. Two-sided, Wilcoxon signed-rank tests were performed to compare pre- and post-procedural duplex imaging measurements of resistive index and peak systolic velocity; P < 0.05 was considered statistically significant. Kaplan-Meier analyses were used to evaluate the primary patency and primary-assisted patency rates of the interventions.

**Results:** Of the 1,984 records reviewed, 29 patients had a diagnosis of transplant hepatic artery stenosis (HAS) or thrombosis (HAT) necessitating a total of 50 endovascular interventions between 2005 and 2020. Ninety-four percent of interventions were performed for HAS, and 6% were performed for HAT. Median follow-up time from the initial intervention was 644 days, but it exceeded 2500 days in 11 cases. Primary technical success was achieved in 92% of cases. Clinically significant peri-procedural complications occurred in 6% of cases. Pre- and post-procedural duplex imaging demonstrated improvements in resistive index (mean difference: 0.10, P < 0.05) and peak systolic velocity (mean difference: -128 cm/s, P < 0.01). The primary patency rate of initial interventions was 90%, 63%, and 55% at 1, 6, and 12 months, respectively. The primary-assisted patency rate was maintained at 97% through 10 years of follow-up.

**Conclusion:** Endovascular interventions used to treat transplant HAS and HAT demonstrate safety and efficacy on long-term follow-up. Although one-year primary patency is modest, additional interventions can be performed to maintain primary-assisted patency for a durable long-term result.
Preoperative Opioid Use Negative Impacts Surgical Outcomes Among Patients Undergoing Colon Resection

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Background: Preoperative opioid use has increased in prevalence in recent years, due in part to the worsening opioid epidemic. We hypothesized that a dose-response relationship exists between preoperative opioid use and surgical outcomes among colorectal surgery patients.

Methods: We performed a retrospective cohort study of adult colectomy patients in the Truven MarketScan database (2010-2017). Patients were stratified based on preoperative opioid use, calculated as the average dose in morphine milligram equivalents (MME) over 90 days prior to surgery: 0 MME, 1-49 MME, and ≥50 MME. These categories were defined based on CDC guidelines for opioid prescribing. The association between preoperative opioid use and anastomotic leak, as well as other postoperative complications, was assessed using multivariable regression.

Results: Among 49,582 patients, 71.4% had no preoperative opioid use, 27.3% had an opioid dose between 1-49 MME, and 1.3% had an opioid dose ≥50 MME. Patients with preoperative opioid use exhibited a higher incidence of anastomotic leak (P<0.001). After adjusting for confounders, there was a dose-response relationship between preoperative opioid use and surgical outcomes. The risk of anastomotic leak worsened as the opioid dose increased from 1-49 MME (Ref: 0 MME; OR 1.19, 95% CI 1.09-1.31, P<0.001) to ≥50 MME (OR 1.49, 95% CI 1.09-2.02, P=0.011). Similar dose-response relationships were seen for sepsis (1-49 MME: OR 1.31, 95% CI 1.17-1.48, P<0.001 vs. ≥50 MME: OR 1.47, 95% CI 1.03-2.09, P=0.032), pneumonia (1-49 MME: OR 1.05, 95% CI 0.89-1.23, P=0.563 vs. ≥50 MME: OR 1.90, 95% CI 1.26-2.85, P=0.002), and 30-day readmission (1-49 MME: OR 1.35, 95% CI 1.25-1.45, P<0.001 vs. ≥50 MME: OR 1.99, 95% CI 1.57-2.51, P<0.001).

Conclusion: Increasing doses of preoperative opioids are associated with worse outcomes and higher readmission rates among colectomy patients. Providers need to be aware of these negative associations and exercise caution when prescribing opioids preoperatively.
Appendectomy and cholecystectomy outcomes for pediatric cancer patients with leukopenia: a NSQIP-Pediatric study

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Background: Children undergoing cancer treatment often develop leukopenia, which may impair wound healing and increase surgical complication rates. In leukopenic children who develop an acute surgical process, the optimal management strategy remains unclear. This study examined the effect of preoperative leukopenia on postoperative outcomes in children treated for cancer who underwent an appendectomy or cholecystectomy.

Methods: This was a retrospective cohort study of pediatric cancer patients in the National Surgical Quality Improvement Program-Pediatric database from 2012-2018. Patient demographics and perioperative characteristics were compared by leukopenia status (WBC <4 vs. ≥4 x 10^3/mL) using chi-squared and Kruskal-Wallis tests for categorical variables and Mann-Whitney U tests for continuous variables. Primary outcomes of 30-day composite complications, including infections, reoperations, and readmissions, as well as postoperative length of stay (LOS) were analyzed by leukopenia status for each procedure using multivariate logistic and log-transformed linear regression.

Results: A total of 328 children met inclusion criteria, with 227 (69.2%) appendectomy and 101 (30.1%) cholecystectomy cases. Leukopenia was seen in 93 (41%) appendectomies and 57 (56.4%) cholecystectomies. Nineteen (8.37%) appendectomy patients developed a postoperative complication as compared to six (5.9%) cholecystectomy patients. The mean postoperative LOS was 4.5 days (SD 5.9) for appendectomies and 3 days (SD 4.8) for cholecystectomies. After multivariate analyses, leukopenia was not associated with postoperative complications for children undergoing appendectomies (OR 0.55, p=0.36) or cholecystectomies (OR 0.39, p=0.37). There was also no significant different in postoperative LOS for patients with versus without leukopenia who underwent an appendectomy (1.27 days, p=0.15) or cholecystectomy (1.08 days, p=0.71).

Conclusion: In children with active cancer, leukopenia was not associated with increased short-term postoperative complications or longer postoperative LOS after either an appendectomy or cholecystectomy. This suggests surgery could be a first-line treatment, and delaying procedures out of concern for leukopenia in this population may not improve clinical outcomes.
Corneal Edema and Keratoplasty: Risk Factors in Eyes with Previous Glaucoma Tube Shunt Procedures

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**Background:** To assess risk factors contributing to corneal decompensation or need for keratoplasty following glaucoma tube shunt surgery.

**Methods:** Between June 1, 2009-April 1, 2020, 1974 eyes underwent tube shunt surgery at Wilmer Eye Institute. 79 eyes (4%) subsequently developed corneal decompensation, of which 46 underwent keratoplasty. To determine risk factors for corneal decompensation, a retrospective case-control study was performed. These 79 cases were matched with 237 controls, thus a total of 316 eyes of 298 subjects were included for chart review. Eyes with preexisting corneal decompensation were excluded. Chi-square tests and t-tests were used to assess the relative prevalence of risk factors amongst cases and controls. A multivariable regression analysis to assess risk factors for corneal decompensation was performed.

**Results:** Median age of cases and controls was 68 and 61 years, respectively. 91% of cases received anterior chamber tubes (vs 93%). The mean time from primary tube shunt surgery to corneal edema was 2 years and 5 months, and mean time to keratoplasty was 3 years and 5 months. Relative to controls, eyes with subsequent corneal decompensation were found to be significantly older at time of tube shunt surgery (p<0.001) and had a higher rate of Fuchs dystrophy, ICE syndrome, and post-operative complications. They also had a higher mean number of previous intraocular surgeries (p <0.001) and total tube shunt surgeries (p=0.001). Results of the multivariate analysis are pending.

**Conclusion:** Corneal decompensation is a known complication of tube shunt surgery occurring in 4% of eyes in our study. Risk factors include advanced age, preexisting corneal pathology, and prior intra-ocular surgeries. Eyes with risk factors for corneal decompensation should be counselled preoperatively about the risk for corneal decompensation.
Cardiac Amyloidosis: No Longer a Barrier to Heart Transplant

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Background: The incidence of amyloidosis is increasing, and restrictive cardiomyopathy (RCM) as a complication of cardiac amyloidosis is an increasingly common indication for heart transplant. However, evidence regarding survival outcomes in this patient subset is mixed. The overall objective of this study is to evaluate medium- and long-term survival outcomes in transplant recipients with a primary indication of RCM-amyloidosis.

Methods: This study utilized the Organ Procurement and Transplantation database to retrospectively characterize survival trends among all adult patients with a primary diagnosis of RCM-amyloidosis receiving a first-time heart transplant between 1999-2020. We examined outcomes by primary diagnosis and by ISHLT-defined transplant era (1999-2001, 2002-2008, 2009-2015, 2015-2019). Multivariable Cox regression was used to evaluate survival and logistic regression was used to measure secondary outcomes.

Results: Of 41,707 patients, 440 (1.1%) were transplanted for a primary indication of RCM-amyloidosis. Across all transplant eras, amyloidosis was associated with a 29% increased risk of mortality at ten years (p=.0009), but not with increased risk of mortality at one (p=.42) or five (p=.06) years (Figure 1). When divided by transplant era, RCM-amyloidosis patients had a higher risk of mortality at five years in the 1999-2001 (p=.005) and 2002-2008 (p=.014) periods, but not during the 2009-2015 (p=.27) and 2016-2019 (p=.34) periods (Table 1).

Conclusion: While five-year outcomes among RCM-amyloidosis patients prior to 2008 were inferior to non-amyloidosis patients, there is no difference in five-year outcomes between groups in the most recent transplant era. Carefully selected RCM-amyloidosis patients now experience comparable medium-term outcomes compared to all other patients. Long-term outcomes for patients transplanted in the most recent era are expected to be comparable once follow-up data is available.
Pain and Ambulatory Function After Treatment of Pathologic Acetabular Fractures in Metastatic Bone Disease: A Retrospective Analysis

Christopher R. Leland BS, Carol D. Morris MD MS, Adam S. Levin MD

**Background:** Osseous metastases to the acetabulum may cause mechanical insufficiency resulting in debilitating pain and loss of ambulatory function, impairing quality of life. This study aims to evaluate the reduction of pain and restoration of ambulatory function in patients with pathologic acetabular fractures in the setting of osseous metastases, comparing nonoperative and operative treatment courses.

**Methods:** A retrospective cohort of 2530 patients (age >18) at a tertiary care center with osseous metastases between 1/1/2005 and 7/31/2020 were screened for pathologic acetabular fractures. Identified patients underwent a comprehensive review of the electronic health records. Pain was assessed using patient-reported, visual analog scores. Ambulatory status was determined as those who can ambulate independently. Functional status was assessed using the Eastern Cooperative Oncology Group (ECOG) scale. Bivariate analysis was used to evaluate statistical associations.

**Results:** We identified 68 patients (median age = 60.5) with 70 adjudicated pathologic acetabular fractures. Of these fractures, 42 were treated nonoperatively and 28 were treated operatively. Patients experienced significant reductions in pain at discharge (2.7-point average decrease nonoperatively, n=33, p=0.0001; 3.8-point average decrease operatively, n=26, p<0.0001). There were no significant differences in pain between cohorts at two-week (n=40, p=0.29), six-week (n=45, p=0.99), or twelve-week (n=30, p=0.83) follow-ups. Unassisted ambulatory status increased by 7.3% in nonoperative patients and 22.2% in operative patients (n=68, p=0.14) at final follow-up. Improvement in ECOG status was observed in 10.7% of nonoperative patients and 52.4% of operative patients (n=49, p=0.003) at discharge.

**Conclusion:** These results suggest that both nonoperative and operative management of pathologic acetabular fractures may improve pain and ambulatory function. While we were unable to determine a statistically significant improvement in ambulation following surgical reconstruction as compared to those treated nonoperatively, a significant improvement in overall functional status was observed. Subsequent studies could delineate granular differences between various treatment courses within nonoperatively and operatively treated patients.
Prostate Cancer Progression in Men with BRCA1 and BRCA2 Mutations after PARP Inhibitor Treatment

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Background: In May 2020, the FDA approved Olaparib for adult patients with metastatic castration-resistant prostate cancer (mCRPC) who have progressed on other androgen inhibitors. The drug is a poly-ADP-ribose phosphorylase inhibitor (PARPi) used in men with mutations in homologous recombination DNA-repair genes. The purpose of this retrospective review was to determine if men with either a BRCA1 or BRCA2 mutation respond differently to the treatment.

Methods: We followed 36 men (5 BRCA1 and 31 BRCA2) at an urban academic medical center from 2016-2020 who had both received Olaparib and had documentation of a BRCA1 or BRCA2 mutation. Abstracted data included the type of mutation, age at which treatment began, progression free survival (PFS), PSA50 value, and overall survival (OS). The Kaplan Meir method was used to analyze PFS and OS with STATA, and a Chi-squared analysis for a PSA50 test.

Results: Median age of BRCA1 patients was 65 (64.5 for BRCA2), median baseline PSA of 85.3ng/mL (22 ng/mL for BRCA2). Overall, 27/36 patients had clinical or radiographic progression, 4/5 of BRCA1s progressed, and 23/36 of BRCA2s progressed. Men with BRCA1 mutations had a shorter median PFS (2 vs 11 mo; hazard ratio [HR] 0.36, 95% confidence interval [CI] 0.11–1; p = 0.073). 13 patients (3 BRCA1 and 10 BRCA2) died during follow-up. Median OS was longer in the BRCA2 cohort than in the BRCA1 cohort (29 vs 6 mo; HR 0.3, 95% CI 0.08–1.13; p = 0.07). 23/36 achieved PSA50 response, 1/5 BRCA1s and 22/31 BRCA2s (p=.028).

Conclusion: BRCA1 patients had higher median baseline PSA, higher rates of clinical or radiographic progression, shorter PFS and OS, and were less likely to achieve PSA50 response compared to BRCA2 patients. These findings suggest Olaparib is an effective treatment for individuals with BRCA2 mutations, and BRCA1 patients may benefit from alternative therapies.
Imaging Mass Cytometry reveals key spatial features among immune cells in hepatocellular carcinomas treated with neoadjuvant cabozantinib and nivolumab

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Background: Hepatocellular carcinoma (HCC) is the most common primary liver cancer and carries a poor prognosis. We recently conducted a single-arm trial of neoadjuvant cabozantinib and nivolumab for borderline resectable or locally advanced HCC. The regimen converted 12/15 patients to resectability, with 5/12 resected patients experiencing a major or complete pathologic response. Here we characterize changes in the tumor microenvironment induced by therapy.

Methods: We constructed a tissue microarray containing 37 core liver biopsies, stained with a 27-marker panel, and segmented the resulting images, producing a single-cell dataset comprising 59,453 cells. We used FlowSOM to perform unbiased clustering, which we annotated into 17 cell types. Next, we performed spatial analysis using Voronoi diagrams and top-neighbors mapping. We used a minimum spanning tree to model the simplest spatial relationships among all cell types and ranked their importance using random forest models.

Results: Grossly, responder cores contained a higher percentage of several immune cell types, including CD4 T (p<0.05) and CD8 T cells (p<0.005). In responders, Voronoi diagrams revealed denser packing of most immune cell types, particularly B cells (p<0.005), and top-neighbors analysis indicated higher numbers of lymphoid-lymphoid, myeloid-myeloid, and lymphoid-myeloid neighbors, suggesting that response is characterized by immune infiltration. A minimum spanning tree showed that in nonresponders, CD8 T cells were flanked by CD163+ macrophages, whereas in responders, HCC cells were closely linked to lymphoid cells. Importance plots from random forest models for B, CD4 T, and CD8 T cells indicated that proximity of B and T cells to macrophages exerting immunosuppression via Arg1 is a critical feature of resistance, whereas proximity to proliferative macrophages expressing higher levels of PD-L1 is a key feature of response.

Conclusion: Cabozantinib and nivolumab can effectively promote antitumor immunity by altering both the abundance and spatial organization of macrophages, B cells, and T cells in the HCC tumor microenvironment.
Accuracy of Diagnostic Coding for Diabetes Mellitus in Hospitalized Patients

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**Background:** Studies have shown that there is undercoding of diabetes mellitus among hospitalized patients, which can adverse clinical and financial implications for health systems. We aimed to validate diagnostic coding of diabetes in hospitalized patients to identify the prevalence of undercoding and factors that may contribute to undercoding in the inpatient setting.

**Methods:** This was a retrospective cohort study of 184,846 hospitalizations of 112,172 unique adult patients (age 18 or older) hospitalized within the Johns Hopkins Health System between January 1, 2015 and May 31, 2019 who had at least 4 blood glucose (BG) measurements during admission. The outcome of interest was non-coded admission for diabetes (i.e. diabetes was likely to be present based on gold-standard laboratory criteria and use of home antihyperglycemics). Three different diagnostic criteria for diabetes were evaluated with increasing specificity. Multivariable logistic regression was used to identify factors associated with non-coded diabetes coding compared to coded diabetes.

**Results:** Based on varying criteria for diabetes, missed coding for diabetes ranged from 20.2% (least conservative criteria) to 12.3% (intermediate criteria) to 1.7% (most conservative criteria). Using intermediate specificity criteria, factors associated with higher odds of non-coding were being non-white, Charlson Comorbidity Index, hemoglobin, transplant, hypertension, and hyperlipidemia. Non-medicine discharge service, increased length of stay, medium or high steroid use, infection, kidney failure, and hepatic disease were associated with lower odds of non-coding for diabetes.

**Conclusion:** Various clinical factors and race were identified as factors associated with undercoding of diabetes in the hospital. Further studies are needed to understand mediators and implications of these factors. Clinical decision support tools could be developed to enhance accurate diabetes coding in the hospital.
Influence of Admission Group Size During Ketogenic Diet Initiation on Seizure Outcomes

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**Background:** Most pediatric centers admit children with epilepsy for several days when initiating the ketogenic diet (KD). At some institutions, several children are admitted in order to save staff time by educating families together in groups. However, it is unknown if admitting children in groups for the KD affects outcomes.

**Methods:** We performed a retrospective study of all children with intractable epilepsy admitted for KD initiation at Johns Hopkins Hospital from 2010-2020. Charts were reviewed for size of admission groups, 3-month seizure reduction, and total KD duration. A linear mixed effects model was used to analyze diet duration between admission groups.

**Results:** Over the 10 years, 245 children were started on the KD, mean age 5.2 years. Thirty-three (13%) children were admitted in one-child admission groups, 52 (21%) in 2-child groups, 78 (32%) in 3-child groups, 72 (29%) in 4-child groups, and 10 (4%) in 5-child groups. Although fewer large admission groups have been occurring over the 10-year period, there was still a significantly higher KD duration with larger groups. After adjusting for time, the 3-child admission group had higher KD duration than 1-child (1.9 times KD duration, p=0.035). Additionally, after grouping cohort sizes into small (1-2 patients) versus large (3-5 patients), KD duration in the larger admission size groups was 1.6 times higher, p=0.036. There was no statistically significant correlation between the size of the admission groups and 3-month seizure reduction.

**Conclusion:** Admitting children in larger groups, specifically 3 children at a time, was associated with longer KD durations. This may be due to parent support from groups, listening and learning from other parents’ questions, or other factors. As such, it may be preferable to admit children for the KD in groups when possible.
Treatment for Chronic Burn-Induced Neuropathy: A Systematic Review and Meta-Analysis

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Background: Effective management of chronic burn-induced neuropathy manifesting as pain and/or pruritus presents an ongoing challenge for clinicians. Standards of care are based on limited evidence and vary widely, especially for non-surgical neuropathies that are not associated with a specific nerve distribution. This study aims to quantify and qualify evidence for non-surgical treatments of chronic burn-induced neuropathy to define their efficacy.

Methods: PubMed, Science Direct, Embase, Cochrane Library, and Web of Science databases were searched for relevant studies. Studies for inclusion were comparative intervention studies for treatments of chronic burn-induced neuropathies. Mean differences (MD) between interventions were analyzed for neuropathy outcomes.

Results: Literature searches yielded seventeen randomized controlled trials (RCTs) with a mean post-burn follow-up of 20.8±39.3 months. Nine studies reported pain and sixteen reported pruritus using patient reported visual analogue scales for 601 and 975 patients, respectively. Pain interventions included transcranial direct current stimulation (tDCS), extracorporeal shockwave therapy (EWST), massage therapy, carbon dioxide (CO2) laser, silicone gel and pressure therapy. Pruritus interventions included tDCS, ESWT, massage, herbal cream, doxepin cream, enzymatic moisturizer, CO2 laser, silicone gel, and pressure therapy. CO2 laser showed no improvement over standard care for the treatment of pain or pruritus associated with hypertrophic scarring [pain: MD 0.26, 95%CI -0.04, 0.57; p=0.09; pruritus: MD -0.07, 95%CI -0.44, 0.30; p=0.72]. ESWT showed no improvement over standard care for the treatment of pruritus (MD -2.69, 95%CI -5.42, 0.04; p=0.05). Massage therapy was associated with significantly greater improvements in pruritus than standard care (MD -1.64, 95%CI -2.10, 1.09; p<0.00001). Doxepin cream was not associated with greater improvements in pruritus than placebo or antihistamines (MD -0.84, 95%CI -3.61, 1.94; p=0.56).

Conclusion: Creative efforts have revealed massage therapy as a potential non-surgical intervention for treating chronic burn-induced neuropathy. Additional RCTs with innovative non-surgical interventions will provide further insights for this challenging condition.
Cutaneous presentation, comorbidities, and systemic manifestations associated with progressive sarcoidosis

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**Background:** Sarcoidosis is a granulomatous disorder of unknown etiology that can present with a wide array of systemic manifestations, most commonly involving the lungs, lymph nodes, and skin. A small percentage of patients exhibit progressive symptoms resistant to standard corticosteroid therapy. More data are needed to highlight how cutaneous manifestations, systemic involvement, and comorbidities are associated with sarcoid prognosis.

**Methods:** A retrospective chart review was conducted on data from a population-based sample of patients diagnosed with sarcoidosis of the skin at the Johns Hopkins Hospital aged 18 and up from 2015-2020. We used chi-squared tests and logistic regression controlling for sex, age, race, gender, and smoking status to determine the associations between cutaneous manifestations, systemic involvement, or comorbidities and disease outcome.

**Results:** 240 patients were included in this cohort study. The mean (SD) age was 43.76 (11.72) years and 30% of participants were male. 76% of patients identified as black, 20% as white, and 4% as other. The most common cutaneous manifestations included plaques, nodules, and papules. Lupus pernio was found in 20% of patients. The adjusted odds ratio (aOR) of progressive sarcoidosis in patients with lupus pernio was 2.06 (95% CI, 1.04-4.10). Progressive sarcoidosis was not significantly associated with other types of cutaneous involvement. Progressive patients had a significantly higher chance of exhibiting pulmonary sarcoid involvement (aOR 2.19, CI 1.17-4.09), neurological sarcoid involvement (aOR 2.85, CI 1.12-7.23), medical allergies (aOR 2.31, CI 1.23-4.32), and thyroid disorders (aOR 2.78, CI 1.16-6.49).

**Conclusion:** Supporting previous studies, lupus pernio was the only cutaneous manifestation we found to be significantly associated with progressive sarcoidosis. We also demonstrated that this association persisted even when controlling for potential confounders such as race. Type of systemic involvement and various comorbidities were also associated with progressive disease.
Evaluating Patient Priorities in Benign Prostatic Hyperplasia Treatment Using Conjoint Analysis

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Background: Patients suffering from lower urinary tract symptoms due to benign prostatic hyperplasia (BPH) face an overwhelming array of treatment options. American Urologic Association guidelines state urologists should consider patient preferences when recommending a treatment. Previous studies show contrasting patient and urologist priorities when considering the distinctions between treatments. The overall objective of this study is to quantify BPH patient preferences to promote guidelines-compliant, patient-centered care.

Methods: In this cross-sectional, online survey study using researchmatch.org, participants were required to decide between theoretical BPH treatments in a balanced, choice-based conjoint analysis. The treatments had varying levels of four attributes: efficacy, recovery difficulty, risk of complications, and risk of de novo ejaculatory dysfunction. Demographic and urinary health data (International Prostate Symptom Score) were collected and analyzed using comparative statistics. Each attribute was analyzed using a conditional logit model, and attribute importance was calculated.

Results: Out of 1235 recruited participants, 812 (66%) complete surveys were collected. Median IPSS was 6 (IQR 3-12) and median age was 56 (IQR 38-67). Overall data analysis showed complication risk to be the most important attribute (35%), followed by efficacy (24%), recovery difficulty (22%), and risk of ejaculatory dysfunction (18%). Complication risk is most important, being 1.45, 1.60, and 1.96 times more important than efficacy, recovery difficulty, and ejaculatory dysfunction, respectively. In a subgroup analysis of age quartiles, participants age <38 and >67 held efficacy (31%) and complication risk (47%) to the highest importance, respectively.

Conclusion: Males at risk for BPH valued treatments that minimize complication risks. Risk of ejaculatory dysfunction, a popular topic of BPH research, was least impactful. Variation in results between age subgroups emphasizes the need for individualized care to maximize patient satisfaction.
Disparities in Awareness of Myocardial Infarction and Stroke Symptoms and Response among United States and Foreign-born Adults in the National Health Interview Survey

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**Background:** Atherosclerotic cardiovascular disease, defined as nonfatal myocardial infarction (MI), coronary heart disease death, or fatal or nonfatal stroke, is the leading cause of death in the United States (US). MI and stroke symptom awareness and response reduces delays in hospitalization and mortality.

**Methods:** We analyzed cross-sectional data from the 2014 and 2017 National Health Interview Surveys on US-born and foreign-born adults from 9 regions of birth (Europe, South America, Mexico/Central America/Caribbean, Russia, Africa, Middle East, Indian subcontinent, Asia, and Southeast Asia). Our outcomes were recommended MI and stroke knowledge, defined as knowing all 5 symptoms of MI or stroke respectively and choosing “call 911” as the best response. Generalized linear models with Poisson distribution and a logarithmic link were used to assess disparities in recommended knowledge between foreign-born and US-born persons. We compared responses from 2014 and 2017 to assess improvement in recommended knowledge.

**Results:** We included 63,059 participants, with mean age, 49.4 years; 54.1% were female, and 38.5% had high school education or less. Recommended MI and stroke knowledge were highest in US-born persons. In both 2014 and 2017, prevalence of recommended MI and stroke knowledge was lowest in individuals born in Asia (23.8%±2.4%; 32.2%±3.2%) and the Indian subcontinent (44.4%±2.4%; 45.0%±3.1%), respectively. Among foreign-born, the highest prevalence of recommended MI knowledge in 2014 was among people born in Russia (38.2%±5.5%) and in 2017, it was among people born in Europe (44.2%±2.5%). The prevalence of recommended stroke knowledge was highest in European born individuals (60.5%±2.4%; 67.9%±2.4) in 2014 and 2017. Improvement in recommended knowledge was not significant in all groups between 2014 and 2017.

**Conclusion:** These findings suggest a disparity in MI and stroke symptom awareness and response among immigrants in the US. Culturally tailored public health education and health literacy initiatives are needed to help reduce these disparities in awareness.
Endostatin as a predictor of severity and survival in pediatric congenital heart disease associated pulmonary hypertension

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Background: Pediatric pulmonary arterial hypertension (PAH) is an often fatal disease characterized by elevated pulmonary artery pressure. Endostatin (ES), an angiogenic inhibitor, is associated with disease severity and mortality in adult PAH. This study aims to assess whether ES is associated with disease severity and outcomes in pediatric PAH.

Methods: Serum ES levels were measured in 2 pediatric PAH cohorts, the cross-sectional PAH Biobank (N=174) and a longitudinal cohort from the Children’s Hospital of Colorado (N=64), as well as healthy pediatric controls (N=54) and non-PAH congenital heart disease (CHD) controls (N=15). Outcomes included clinical variables, hemodynamics, change in ES across visits, and survival (death, transplant, palliative shunt). The relationships between ES and clinical outcomes were assessed using logistic/linear regressions and Kaplan-Meier analyses. ES expression and secretion were evaluated in pulmonary artery endothelial and smooth muscle cells through RNAseq and cell culture.

Results: ES was significantly higher in PAH subjects than in controls and was highest in PAH associated with CHD (APAH-CHD). In APAH-CHD, ES was associated with a 118m shorter 6-minute walking distance (p=0.01) and 1.9mmHg increased mean right atrial pressure (p=0.04) as well as a 2.23WU higher pulmonary vascular resistance index (p=0.007) and 9.6mmHg higher mean pulmonary arterial pressure (p<0.0001) over time. ES decreased significantly in subjects who improved over time and was associated with worse survival in both cohorts. Addition of ES to an NT-proBNP based survival analysis improved risk stratification, reclassifying subjects with adverse outcomes. Cell culture and RNAseq showed ES secretion specifically by pulmonary artery endothelial cells.

Conclusion: ES may be a pulmonary vascular specific biomarker to non-invasively identify children with worse PAH and predict poor outcomes, particularly in CHD. Given correlation with hemodynamic and functional outcomes, ES is a promising non-invasive prognostic biomarker and may add information to current markers.
The Association between Multiparity and Adipokine Levels: The Multi-Ethnic Study of Atherosclerosis (MESA)

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Background: Multiparity is a risk factor for cardiovascular disease (CVD). However, the mechanism of this relationship is unknown. Adipokines play important roles in appetite regulation, glucose metabolism, and inflammatory response. Adipokine dysregulation may predispose multiparous women to certain cardiometabolic complications that can increase their risk of future CVD.

Methods: We studied 975 female MESA participants (age 45-84 years and initially free of CVD) who had complete data on parity assessed at baseline and adipokines (leptin, resistin, and adiponectin) measured at either Exam 2 or 3, 1-5 years after baseline. Parity was categorized as nulliparity (reference), 1-2, 3-4 and ≥5 live births. Multivariable linear regression was used to evaluate the association of parity with log-transformed levels of leptin, resistin, and adiponectin.

Results: The women (38% white, 23% black, 13% Chinese, and 26% Hispanic) had mean age of 63+9 yrs. Compared to nulliparity, a history of 3-4 live births was associated with higher leptin levels in the fully adjusted model [β coefficient for log-transformed leptin = 0.14 (95% CI 0.01, 0.28)], including demographics, body mass index (BMI) and CVD risk factors. Grand multiparity (≥5 births) was associated with higher leptin [β coefficient for log-transformed leptin = 0.23 (95% CI 0.02, 0.45)] and lower adiponectin levels [β coefficient for log-transformed adiponectin = -0.15 (-0.28, -0.01)] after adjustment for demographic and lifestyle factors. However, these associations were no longer significant after BMI adjustment. In contrast, grand multiparity remained associated with higher resistin levels after full covariate adjustment, including BMI and CVD risk factors [β coefficient for log-transformed resistin = 0.11 (95% CI 0.01, 0.22)].

Conclusion: In a multiethnic U.S. cohort of women, multiparity was associated with adipokines, specifically with higher leptin and resistin levels. Further studies are needed to determine whether adipokines mediate the relationship between multiparity and CVD.
Readmission after Transcatheter Aortic Valve Replacement in the Modern Era: A Quality Improvement Study

Natalie Marrero BA, Jacqueline Latina, MD, Rimsky Denis, MD, Matthew Czarny, MD, Rani Hasan, MD

Background: Transcatheter Aortic Valve Replacement (TAVR) is the current standard of care for severe symptomatic aortic stenosis (AS) in patients deemed to be high risk for surgical aortic valve replacement (SAVR). As the field moves towards the use of TAVR among lower risk patient groups, a need to address the high readmission burden associated with TAVR has emerged. 30-day post TAVR readmission rates have been found to be around 18%, and 1-year post TAVR readmission rates have been reported to be as high as 44%. The purpose of our study was to identify common predictors of post-TAVR re-hospitalization and to recommend corresponding interventions to reduce readmission rates.

Methods: We conducted a narrative review of the literature on TAVR readmissions using PubMed. By searching keywords including, “TAVR readmission”, “TAVI”, “re-hospitalization” and “TAVR outcomes,” we identified published articles from 2002 to 2020 that evaluated outcomes after TAVR, with a specific focus on early (defined as 30 days or less) readmission and late (defined as 30 days to one-year post-TAVR) readmission. We included randomized controlled trials as well as observational studies, reviews, commentaries, and editorials. In selected articles, we noted major causes for TAVR readmission as well as predictors of readmission, median time to readmission, comparisons of outcomes with surgical aortic valve replacement and medical therapy, and any additional adverse outcomes associated with predictors of readmission, such as mortality. Predictors of readmission were categorized as baseline patient characteristics, procedural based, or pre-and-post-TAVR management based.

Results: A total of 54 studies of 514,353 patients, including patients with symptomatic aortic stenosis treated with either TAVR or SAVR, patients with atrial fribillation, and patients with chronic lung disease, were included in our review. The majority of readmissions post-TAVR are due to non-cardiac reasons (58%) when compared to cardiac causes (42%). Among non-cardiac readmissions, respiratory complications are the leading reason for readmission followed by infection and bleeding. Among cardiac causes for readmission, the leading reason is heart failure followed by arrhythmias. Respiratory readmissions are largely predicted by patient baseline chronic lung disease. The most common infections are urinary tract infections followed by pneumonia and then access-site infections. Predictors of infection-related readmissions were largely procedural-based with the use invasive interventions, such as mechanical ventilation and urinary indwelling catheters, as well as general anesthesia being found to predict readmission. Bleeding readmissions, largely either GI or access-site related, were found to be largely predicted by post-TAVR medical regimens, with discharge on aspirin and clopidogrel combined being associated with higher bleeding incidence and readmission when compared to aspirin monotherapy. Predictors of heart failure readmission include a number of markers of declining heart functioning, such as NT-proBNP changes pre-and-post TAVR. Additionally, medical therapy post-TAVR has also been reported to provide insight into readmission likelihood. While discontinuation of diuretics has been associated with increased readmission rates, it has recently been found that discharging patients on RAAS inhibitors is associated with reduced heart failure readmission. Arrhythmia-related readmissions are largely due to tachycardias as opposed to bradycardia episodes. These readmissions are also associated with medical management decisions, with discharge on an anticoagulant for patients with baseline atrial fibrillation being associated with reduced readmission, and newer direct oral anticoagulants (DOAC) yielding better outcomes than warfarin. In terms of time to readmission, early readmissions were often
due to infection, heart failure, and bleeding while late readmissions were more commonly due to arrhythmia and respiratory complications.

**Conclusion**: Overall, most readmissions are non-cardiac in etiology. The leading causes of non-cardiac readmission are respiratory complications, infections, and bleeding, while the leading causes of cardiac readmission are heart failure and arrhythmias. While respiratory complications are largely predicted by patient baseline characteristics and infections by procedural factors, bleeding, heart failure, and arrhythmias have all been strongly linked to components of the post-TAVR medical management and, therefore, can potentially be prevented. Readmission rates can be reduced through interventions and further research optimizing the heart failure, bleeding, and arrhythmia pharmacotherapy post-TAVR as well as additional follow-up for high-risk patients.
Vital Sign Predictors of Hospitalization in COVID-19 Outpatients

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**Background:** The coronavirus disease-19 (COVID-19) pandemic has resulted in the deaths of over 1.3 million people worldwide. Though prior studies have examined inpatient clinical course, less data is available regarding outpatients. Our prospective cohort study seeks to determine vital sign predictors of hospitalization in ambulatory patients diagnosed with COVID-19.

**Methods:** Data was collected on 70 outpatients in Maryland who received positive COVID-19 RT-PCR results and enrolled in our study within fourteen days of symptom onset. In addition to baseline demographics and symptomatology, pulse oximeter oxygen saturation (SaO2), heart rate (HR), and temperature data was recorded for 14 days post-enrollment. Logistic regression analysis revealed individual prognostic factors for hospitalization and forward selection yielded a predictive model.

**Results:** Our cohort of 70 patients had a mean age of 55.6 ± 9.85 years; 50% (n=35) were Caucasian, 54% (n=38) were female, and 50% (n=35) had a BMI ≥ 30 kg/m2. Additionally, 12 (17.1%) patients presented in the top respondent quartile for symptom severity based on InFLUenza Patient-Reported Outcome (FLU-PRO) scores and 7 (10%) were hospitalized over the duration of the study (median length of stay = 6 days). Hospitalized patients recorded a mean resting HR of 81.3 ± 10.9 bpm, mean resting SaO2 of 91.3% ± 5.12%, and mean initial temperature of 98.8°F ± 1.48°F.

Bivariate logistic regression analysis demonstrated that decreased resting SaO2 significantly predicted hospitalization (p < 0.01). Furthermore, after adjusting for age, race, and sex, multivariable modelling showed that each percent decrease in resting SaO2 resulted in a 33% increase in adjusted odds for subsequent hospitalization (95% CI [0.488, 0.924], p < 0.02).

**Conclusion:** Our study demonstrates that lower oxygen saturation levels can predict hospitalization during the disease course of COVID-19. Thus, vital sign monitoring may be a promising supplemental strategy to manage patients in the ambulatory setting, warranting future investigation.
Association between antibiotic use and clinical outcomes of immune checkpoint inhibition

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Background: Recent studies have shown that antibiotic use, and resulting changes in the gut microbiome, can alter the efficacy of immune checkpoint inhibitors (ICIs) in cancer treatment. We propose to perform a retrospective analysis of the effect of antibiotic class, route of administration, and timeframe of administration on progression-free survival (PFS) and overall survival (OS) in non-small cell lung cancer (NSCLC) patients treated with ICIs at Johns Hopkins Medicine.

Methods: We identified a cohort of metastatic NSCLC patients treated with ICIs at Johns Hopkins Hospital or Bayview Medical Center between 1/1/2013 and 12/31/2018 (n=84). Patient demographics, cancer and antibiotic treatments, and tumor characteristics data was extracted from EPIC and verified by chart review. Antibiotic data included inpatient administration and outpatient prescriptions. Progression dates were defined by radiological evidence or provider notes, and death dates were determined by EPIC or the National Death Index. Univariate analysis was performed with Kaplan-Meier curves with a log-rank test.

Results: Demographic data indicated that most patients were white (n=64), smokers (n=65), and had ECOG performance statuses of 0-1 (n=69). Most patients received single agent anti-PD-1/PD-L1 therapy (n=74), and a third of the patients (n=28) received ICIs as first line therapy. In univariate analyses, more smoking pack-years (PFS: p=0.11) and better ECOG performance status (OS: p=0.062) trended towards longer PFS and OS respectively. An increased number of prior lines of systemic therapy demonstrated statistically significant shorter PFS (p=0.0077). Of particular interest, there was a trend towards shorter OS in patients that received any antibiotics in a period ranging from 2 years before to 1 year after the start of ICIs (p=0.22).

Conclusion: Our study indicates a possible negative impact of antibiotics on clinical outcomes of ICI-treated NSCLC patients. Further analysis of antibiotic class, route, and timeframe that controls for confounders in multivariate analysis is ongoing.
Effects of the COVID-19 pandemic on pediatric kidney transplantation in the United States

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Background: As the death toll from COVID-19 rises around the globe, the pandemic continues to place a considerable burden on the health care system. Organ transplant centers have been among the most impacted, with many implementing rapid changes in transplant practice and policies over the past few months. Due to the scarcity of data, little is known about how the pandemic has affected organ transplant practices in the pediatric population. This project aims to address this by examining the effect of the pandemic on the pediatric kidney transplantation landscape at the national level.

Methods: We used the Scientific Registry of Transplant Recipients (SRTR) to obtain data on the pediatric waitlist registration, waitlist removal or inactivation, and deceased donor and living donor (DDKT/LDKT) events from February 2, 2020 until June 27, 2020. The study population were those aged 0-17. For each week, we plotted cumulative counts of each variable and compared the results to those of the same time the previous year.

Results: Following the national rise of COVID-19 cases in mid-March to the end of April, there was a decrease in DDKT and LDKT events by 47% (p<0.001) and 82% (p<0.001), respectively, compared to the same time the previous year. During this time, waitlist inactivation increased by 152% (p<0.001) and waitlist mortality increased by 189% (p=0.005).

Conclusion: The COVID-19 pandemic has reduced access to kidney transplantation among pediatric patients in the US, leading to increased waitlist mortality. Further studies are needed to assess outcomes in patients who did receive a KT during this time, which will help inform changes in policies to optimize pediatric transplant access and outcomes. It should be noted that, because this is a registry study, there are limitations in the completeness of data and the breadth of information that is available for analysis.
COVID-19 Symptomology in the Outpatient Setting: A Prospective Cohort Study

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Background: The clinical features of COVID-19 have been well characterized in hospitalized patients. However, the majority of SARS-CoV-2 infected individuals experience mild to moderate disease and can be managed as outpatients. Research remains limited on the progression of symptoms and clinical outcomes among ambulatory patients with COVID-19.

Methods: Population & Setting: Outpatients (≥18 years) with positive RT-PCR results for SARS-CoV-2 were recruited from the Johns Hopkins Health System, by phone, between April 21 and June 23, 2020. Measurements: Symptoms were reported on days 0, 3, 7, 14, 21, and 28 days after enrollment using a 32-item influenza patient-reported outcome (FLU-PRO) questionnaire, modified to include COVID-19 specific symptoms (e.g. ageusia, anosmia). Baseline demographics and information on comorbidities were also collected.

Data Analysis: FLU-PRO total score means and symptom domain (nose, throat, eyes, chest/respiratory, GI, systemic, other) means were calculated. Symptom prevalence was categorized by week of illness.

Results: Of 118 SARS-CoV-2 positive outpatients, the median age was 56.0 years (IQR: 50.0-63.0), and 50 (42.4%) were male. Participants were enrolled a median of 5.0 (IQR 3.0-10.0) days from symptom onset. There were five (4.2%) asymptomatic patients and four pauci-symptomatic patients (3.4%). The most common initial symptoms were measured or suspected fever (28.0%), dry cough (23.7%), body aches (21.2%), weakness or fatigue (20.3%), and headache (17.0%). Over the course of the first 28 days of illness, the prevalence of symptoms decreased but a significant proportion of individuals continued to report weakness (15.4%) or dry cough (18.3%). The median time to returning to usual health was 20 days (IQR: 13-38) from symptom onset. The median time to returning to usual activities was 17 days (IQR: 11-28) from symptom onset.

Conclusion: Presenting symptoms often persisted following acute SARS-CoV-2 infection but uncommonly progressed to hospitalization. Longer-term immunologic studies and follow-up of outpatients with COVID-19 are warranted to determine the extent of persistent symptoms.
**MRI with Gadolinium as a Measure of Blood-Labyrinth Barrier Integrity in Patients with Inner Ear Symptoms: A Scoping Review**

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**Background:** Increased permeability of the blood-labyrinth barrier (BLB), which separates the inner ear’s vasculature from the perilymph and endolymph, has been hypothesized to cause disorders such as Meniere’s disease and idiopathic sudden sensorineural hearing loss (ISSHL). There has been increasing interest in using MRI with intravenous-gadolinium (IV-Gd) to measure BLB permeability for diagnosis and research. The purpose of this systematic scoping review was to evaluate current evidence for contrast-enhanced MRI as an indicator of BLB permeability.

**Methods:** A systematic search of three databases (PubMed, EMBASE, CINAHL PLUS) was conducted to collect studies that assessed the BLB with IV-Gd MRI. Data was collected on the MRI protocols used and the enhancement patterns of diseased and healthy inner ears in humans and animals. Study quality was evaluated using the NIH Study Quality Assessment Tool.

**Results:** The search yielded 72 studies. In healthy human and animal ears, MRI with IV-Gd demonstrated a time-dependent rise in signal intensity that was limited to the perilymph. Signal intensity peaked at 80-100 minutes in rodents and at 4 hours in healthy humans. Patients with ISSHL and otosclerosis had increased inner ear signal intensity compared to controls in MRI acquired both before and shortly after IV-Gd. Patients with Meniere’s disease and vestibular schwannoma had abnormally increased enhancement at 4 hours. Correlations between enhancement patterns and clinical characteristics were variable. All included studies lacked sample size justification and many lacked adequate control groups or did not specify if MRI assessors were blinded.

**Conclusion:** Included studies support that Gd crosses the BLB in both healthy and diseased ears. However, evidence was inconclusive on whether uptake is a marker for general permeability of the BLB in disease. Rigorous studies are needed with adequate controls, clear patient recruitment methods, and objective measures of enhancement patterns to determine the utility of contrast-enhanced MRI in assessing BLB integrity.
Vestibular Function Predicts Balance and Fall Risk in Patients with Alzheimer’s Disease

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Background: Among older adults, patients with Alzheimer’s Disease (AD) are at high risk for falls and serious sequelae. The vestibular system is closely linked to balance in healthy adults; however, the contribution of vestibular function to balance and falls in patients with AD is not well known.

Methods: In this single-institution prospective study, we assessed vestibular function using measures of semicircular canal function (vestibulo-ocular reflex (VOR) gain) and otolith function (cervical vestibular-evoked myogenic potential (cVEMP) response), balance using quantitative posturography with eyes open and closed, and falls incidence up to a 2-year follow-up period in 48 patients with mild-moderate AD. Student’s t-test was used to compare postural stability results between the cohort of patients (n=48; 27M, 21F; mean age 74.9 ± 7.4) and matched healthy controls (n=44; 24M, 20F; mean age 75.6 ± 1.3) from the Baltimore Longitudinal Study of Aging (BLSA). Multivariate linear regression was used to correlate vestibular function and posturography measures. A modified Cox proportional-hazards model was used to evaluate vestibular measures as risk factors for falls.

Results: First, we observed that relative to healthy controls, patients with AD exhibited increased medio-lateral (ML) sway in both eyes-open (0.89 cm vs. 0.69 cm; p=0.033) and eyes-closed (0.86 cm vs. 0.63 cm; p=0.042) conditions. Among patients with AD, better semicircular canal function (VOR gain) was associated with lower ML sway (β = -1.46; p=0.028). Additionally, better cVEMP response was associated with lower sway velocity (β = -0.18; p=0.001). Finally, among patients with AD, better semicircular canal function was significantly associated with lower likelihood of falls when adjusted for age and gender (HR = 0.06; p=0.020).

Conclusion: Taken together, these results provide evidence that the vestibular system is an important contributor to postural stability and fall risk in patients with AD. Further research may promote vestibular therapy to mitigate fall risk in this population.
Is preoperative testing for head and neck surgery excessive?

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Background: Prior to surgery, patients undergo a preoperative risk assessment to determine their medical readiness for surgery and reduce their perioperative morbidity and mortality. Some studies suggest that routine preoperative assessment tends to include more tests than evidence shows are beneficial. Excessive testing would impose unnecessary burdens on both individual patients and the U.S. healthcare system. The goal of this project was to assess the degree to which national recommendations for preoperative evaluations are followed.

Methods: We retrospectively reviewed medical records of patients who were able to obtain an outpatient preoperative assessment and underwent surgery in the Johns Hopkins Department of Otolaryngology Head and Neck Surgery (OHNS) during the first two weeks of January 2019 (N=99). We collected data on patients’ demographic characteristics, preoperative health status, type of procedure, past surgical history, and preoperative testing. We used the National Surgical Quality Improvement Program (NSQIP) Risk Calculator to compute the preoperative risk of a major adverse cardiac event (MACE score). The MACE score was used to determine what preoperative testing would have been indicated according to national guidelines. Standard descriptive statistics were used to determine the appropriateness of the preoperative evaluation. The OHNS recommendations to PCPs were compared to national recommendations.

Results: In 44.3% of the preoperative evaluations, tests were ordered in excess of what was medically necessary. We discovered that the OHNS recommendations conflicted with national guidelines; OHNS advises obtaining an ECG on any patient over the age of 50, although guidelines do not endorse routine age-based preoperative ECG testing.

Conclusion: Preliminary evidence demonstrates that preoperative testing exceeds national recommendations. Next steps include reconciling OHNS recommendations with national guidelines, identifying the reason(s) for guideline discordance, and then intervening accordingly in order to prevent patient harm and reduce healthcare costs.
Baclofen Pump Use: Postoperative Complications After Growth-Friendly Instrumentation for Early-Onset Scoliosis

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**Background:** Neuromuscular disorders can cause early-onset scoliosis (EOS) and spasticity, which can be treated with an intrathecal baclofen pump. We compared the odds of complications and secondary interventions after growth-friendly spine surgery for EOS in patients with versus without baclofen pumps and characterized how complications in the pump cohort were managed.

**Methods:** Using a prospectively maintained, multicenter database, we obtained data for patients with neuromuscular EOS and baclofen pumps who underwent growth-friendly spine surgery from July 15, 1996, through August 7, 2019 (n = 25). Baclofen pumps were implanted before spine surgery in 18 patients, during spine surgery in 2 patients, and after spine surgery in 5 patients. These patients were matched 1:2 with 50 patients (control group) without pumps according to treatment center, diagnosis, surgery type, and curve magnitude. Univariate analysis and multivariate logistic regression were performed to compare complications and secondary interventions between the 2 cohorts. Alpha = 0.05.

**Results:** Patients with baclofen pumps had 5.8 times the odds (95% confidence interval [CI]: 2.0–17) of complications within 1 year compared with controls. They had 4.9 times the odds (95% CI: 1.6–14) of deep surgical site infection (DSSI) and 6.5 times the odds (95% CI: 1.7–24) of spinal implant removal. For patients with pumps who experienced infections (12/25), the most common microorganisms were Staphylococcus aureus (5/12) and Pseudomonas aeruginosa (4/12). The pump/catheter was removed, in addition to antibiotic therapy or irrigation/debridement in 3 patients. Pump implantation timing was not associated with complication rates.

**Conclusion:** Patients with neuromuscular EOS were more likely to experience complications within 1 year after growth-friendly spine surgery if they also had baclofen pumps. S. aureus and P. aeruginosa were the most common causative organisms, and pump/catheter removal was necessary in a subset of infection cases. Complication rates did not differ according to pump implantation timing.
Surgical Output and Capacity in Nyarugusu Refugee Camp, Western Tanzania: A 14-Year Retrospective Study

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Background: Forcibly displaced migrants have triple the burden of non-communicable disease, much of which requires surgical treatment. A 2014 estimate of the burden of surgical disease among refugees found that at least 2.78 million surgical procedures are needed for 59.5 million displaced persons worldwide. Very few studies have addressed surgical output and surgical capacity in refugee camps or the utilization of refugee camp medical services by local populations.

Methods: A retrospective review of surgeries performed in Nyarugusu camp, located in the western province of Kigoma, Tanzania, was conducted using paper logbooks containing entries between November 2000 and April 2014 inclusive. Data included the day, date, and time of surgery; patient nationality, sex and age; and indication for procedure, procedure performed, and anesthesia used. Data were digitized from handwritten logbooks into standardized electronic form using Microsoft Excel and a second reviewer spot checked 10% of entries for accuracy. Any entries that could not be read by either reviewer were marked as illegible and excluded. Indication for surgery, procedure performed, and anesthesia type were standardized for analysis. Data were analyzed in STATA.

Results: Out of 5,282 operations recorded, females accounted for a majority of the patients (n= 4,610; 87.2%). Most patients were from the Democratic Republic of Congo (n= 3,819; 72.3%) followed by Tanzania (n=1,318; 25.0%) and Burundi (24; 0.45%). Cesarean sections were the most common operation (n=3,941; 74.6%) followed by herniorrhaphies (n=384; 7.3%) and laparotomies (n=293; 5.5%). Spinal anesthesia was the most common anesthesia used (n=3,272; 61.9%) followed by general (n=1,764; 33.4%) and local (n=49; 0.93%).

Conclusion: Significant procedural volume reveals surgical infrastructure in this humanitarian setting. The high percentage of local, non-refugee patients from Tanzania (25%), shows integration of services in the national health system. Presuming the overwhelming majority of cesarean sections are emergent, the high ratio of emergent to elective procedures suggests diminished surgical capacity.
Serology, infection, and clinical trachoma as survey tools for re-emergence of trachoma in a formerly hyperendemic district

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Background: Trachoma, a chronic conjunctivitis caused by Chlamydia trachomatis, is the leading infectious cause of blindness worldwide. To eliminate trachoma as a public health problem, countries must achieve district-level prevalence of follicular trachoma (TF) <5% in children ages 1-9 years. Re-emergence of TF could trigger additional rounds of mass drug/antibiotic administration (MDA), so accurate survey tools are essential.

Methods: We surveyed 2401 children from 50 villages in Kongwa, Tanzania, 2 years post-MDA and 1.5 years after an impact assessment found TF <5% in those same villages. Our survey included multiple tools: field determination of clinical TF, PCR testing for C. trachomatis infection, and a multiplex bead assay for antibodies against chlamydial antigen pgp3. Eyelid photographs were taken in a subset of children to corroborate the field grades.

Results: The overall TF prevalence was 7.08% (95% CI: 5.61%-8.89%), which decreased with age (p=<0.0001). When adjusted for the population-level distribution of ages in Kongwa, TF prevalence rose to 7.28%. TF prevalence by village was heterogeneous, with 19 villages having TF <5% and 16 villages having TF >10%. There was a strong correlation between field and photo grading of TF (kappa=0.69; 95% CI: 0.60-0.78) and between TF and infection, with 21.47% of TF-positive children also testing positive for infection (p=<0.0001). The overall seroprevalence was 18.19% (95% CI: 14.84%-22.11%), which increased with age (p=<0.0001). Notably, children ages 1-2 years, who were born after the cessation of MDA and in theory should not have been exposed to trachoma in the absence of transmission, had an average seroprevalence of 6.73%.

Conclusion: TF prevalence was greater than the threshold of 5%, supported by photographic evidence, infection data, and seropositivity in age groups expected to have limited exposure to trachoma. Taken together, all data corroborated the re-emergence of trachoma in Kongwa, suggesting the need for additional rounds of MDA and community-level interventions.
Annual Trends and Geographic Variation in Utilization of Imaging in Pediatric Patients with Low Back Pain in the United States

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**Background:** Low back pain (LBP) is increasingly burdening the pediatric population. Advanced imaging such as computerized tomography (CT) scans and magnetic resonance imaging (MRIs) associated with LBP impose significant costs with little benefit. We investigated annual trends and demographic/geographic variation in spinal imaging for first time pediatric presenters of LBP in primary care clinics.

**Methods:** We queried a private administrative claims database for patients presenting with LBP who underwent plain radiographs, CT scans, and MRIs from 2011 to 2017. We used a Cochrane Armitage test of trend to determine significant annual variation in diagnostic imaging utilization during the study period. To determine demographic and geographic variation, chi-squared tests were performed.

**Results:** 7,423 patients were included, with mean age 15.2 ± 3 years. There was no significant change in radiograph use (34.8% in 2011 vs. 35.5% in 2017, p=0.795) or CT scans (1.6% in 2011 vs. 1.1% in 2017, p=0.073), but a significant increase in MRIs (3.3% in 2011 vs. 4.5% in 2017, p=0.017). Overall, there was no significant change in total imaging use (p=0.895). Males had higher rates of imaging compared to females (40.2% vs. 35.6%, p<0.001). Imaging rates significantly varied between regions and states across the United States (p<0.001). The Midwest had the highest imaging rates (41%), while the Northeast had the lowest (31%).

**Conclusion:** There was significant demographic and geographic variation but no significant annual change in total diagnostic spinal imaging for pediatric patients with LBP between 2011 and 2017, with rates of advanced imaging remaining relatively low.
Clinical and Functional Outcomes of Nonoperatively Treated Pediatric Supracondylar Humerus Fractures at the Nkhotakota District Hospital, Malawi

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Background: Displaced supracondylar humerus (SCH) fractures benefit from closed reduction and percutaneous pinning. In Malawi, many SCH fractures are treated non-operatively due to limited surgical capacity. We sought to assess clinical and functional outcomes of nonoperatively treated SCH fractures in a resource-limited setting.

Methods: We retrospectively identified and reviewed all patients with SCH fractures treated at Nkhotakota District Hospital in Malawi between January 2014 and December 2016. Patients subsequently underwent clinical and functional follow-up assessment and radiographic review.

Results: We identified 182 children (54% male, mean age 7.0 years) with SCH fractures. Most injuries (83%) were due to falls and were extension-type (98%). Gartland class distribution: type I (35%), type II (29%), and type III (35%). Treatment included straight-arm traction with manipulation under anesthesia without fluoroscopy (65%), traction alone (32%), and sling alone (2%). We followed up 137 (75%) patients at a mean 3.9 years (range, 2.4-5.4 years) after injury. All had radiographic union; 7 (5%) had varus or valgus malunion. Flynn’s functional outcome was excellent in 95% of type I, 70% of type II and 29% of type III fractures. Children returned to school without limitation in 98% of type I, 95% of type II, and 65% of type III fractures. Controlling for sex, delayed presentation, medical comorbidities, mechanism of injury, and early complications, patients with type II fractures, (AOR 5.82, 95% CI [1.71, 19.85]), and type III fractures, (AOR 9.81, [3.00-32.04]), were more likely to have a clinical complication or functional limitation, compared to patients with type I fractures.

Conclusion: Despite a low rate of radiographic complications, non-operative treatment of displaced (type III) SCH fractures resulted in high rates of clinical complications and functional impairment. These results illustrate the urgent need to increase surgical capacity in low-income countries like Malawi to improve pediatric fracture care.
Assessment of the ACHIEVE-D Mini-Pilot Program for Weight Management and Lifestyle Behavioral Change in Individuals with Serious Mental Illness

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Background: Individuals with serious mental illness (SMI) are significantly more likely to be obese or overweight. The Achieving Health Lifestyles in Psychiatric Rehabilitation trial (ACHIEVE) was the first program to demonstrate clinically significant weight loss in persons with SMI. With the current obesity epidemic, there is a critical need to expand and adapt the current ACHIEVE program, originally designed for a controlled psychiatric rehabilitation environment, for dissemination in community mental health clinics (ACHIEVE-D).

Methods: In this study, we examined the acceptability and feasibility of implementing the ACHIEVE-D program in a community mental health setting. The program was delivered to 17 individuals over 8 weeks, with 3 classes per week. Video-recorded classes were scored using the ACHIEVE-D fidelity tool to determine adherence to the curriculum. Attendance and surveys probing participant behavior changes, weight, and dietary changes pre- and post-intervention were assessed to determine net change.

Results: Fidelity to ACHIEVE-D lesson plans was high; the instructor met expectations for over 75% of classes in 21 of 30 criteria. Attendance ranged from 7-11 participants per week, with stable attendance across the 8-week period. While there was an average weight gain of 3.9lbs, there was a net decrease in sedentary behaviors of 5 hours per week, a 1.81-point decrease in sugar sweetened beverage consumption scores, a 4.44-point decrease in reward-based eating drive scores, and a 3.96-point decrease in trait food cravings scores.

Conclusion: The mini-pilot of ACHIEVE-D demonstrated high fidelity to the original curriculum and promising acceptability in the community mental health setting. The stable rate of attendance and short-term improved health behaviors suggest that the adapted program was able to engage study participants with SMI in an intensive program for weight loss.

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