

2024



CARILION CLINIC
RESEARCH AND DEVELOPMENT

Research Day

April 9, 2024

For Internal Distribution Only

Colleagues,

Welcome to 2024 Carilion Clinic Research Day. This year, over 100 abstracts were submitted from our residents/ fellows, faculty/ staff, and students in undergraduate and graduate programs. I was especially pleased that 41 abstracts were submitted by student researchers. The volume of submissions has created a need to explore a change in format/ venue. Presently, the plan is for posters to be displayed the entire day with a focus on resident/ fellow research viewing in the morning beginning at 10:00 am followed by student and faculty/ staff viewing in the afternoon, 12:30-3:00. Prior to poster viewing, I would like to encourage you to take part in listening to our oral presentations from 7:00 am -10:00 am (see enclosed agenda).

The increase in abstract submissions this year reflects the trends seen in The Department of Research and Development. In fiscal year 2023, over 200 research applications were submitted for review and approval. These applications include 35 new sponsored clinical trials executed with 20 Carilion Clinic Principal Investigators. If fully enrolled, these trials have a projected revenue of \$3,612,791. In total, over 900 participants are involved at some stage of a clinical trial including 346 randomized to a trial in our portfolio of 130 active trials. In addition to sponsored clinical trials, Carilion Clinic was awarded \$4,979,294 in extramural funding to support programmatic and research endeavors. While it is imperative that we increase extramural funding in all aspects of research, I am grateful for the support of the Research Acceleration Program. This support for internal research projects has been continuous for 18 rounds of funding including over \$200,000 awarded for the latest cycle.

The evolving and growing research enterprise could not be achieved without the support of executive leadership. Over the past few years, we have made strategic hiring in research, health analytics, compliance, and the Institutional Research Board to facilitate research support for our investigators. The expectation/ requirement is that this will lead to a positive return on investment monetarily but more importantly enhance the reputation of Carilion Clinic research at a national level. In addition to strategic hiring, a Department of Innovation was created in 2020 to support and develop the ideas and inventions from our employees leading to better treatments not only for our patients but for patients worldwide. Yet another recent development was the creation of an Inpatient Clinical Research Unit that will assess new discoveries at the bedside.

In summary, our research enterprise is built upon the contributions of our employees and their collaborations with our partners. I hope that you find time to view and engage with your colleagues at Research Day.

Regards,

Francis X. Farrell, PhD
Senior Director, Research and Development

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Oral Presentation Schedule

7:00 am

Effect of aminoglycoside irrigation on cardiac implantable electronic device infection rates

Ashley R. Guishard
Carilion Roanoke Memorial Hospital

7:10 am

The Comparison of Crystalloids and 5% Albumin for Post-Cardiac Surgery Fluid Resuscitation

Sophia Ham
Carilion Roanoke Memorial Hospital

7:20 am

Medication Use Evaluation of Angiotensin II

Sophia Ham
Carilion Roanoke Memorial Hospital

7:30 am

Economic Evaluation of Inhaled Respiratory Medication Use at a Community Hospital (ECO-INSPIRE)

Savanna LaFlamme
Carilion New River Valley Medical Center

7:40 am

Discounting behavior in primary care clinicians and its association with low-value care decision making

John Epling
Carilion Clinic

7:52 am

Factors Impacting Mortality and Withdrawal of Life Sustaining Care in Severe TBI: A Retrospective Single-Center Study

Varun Mishra
VTCSOM

8:00 am

Novel use of High-Frequency Trans-rectal Micro-Ultrasound in the Evaluation of Rectal Mass with Urogenital Invasion: A Case Report

Randall Bissette
Carilion Clinic

8:08 am

The Role of Human Serum Angiopoietins in Assessing Pial Collateral Function Following a Large Vessel Occlusion Stroke: A Pilot Study

Collin Tanchanco Ocampo
Virginia Tech Carilion School of Medicine

8:16 am

Improving patient adherence in rural populations by reducing pain after intravitreal injections for age-related macular degeneration!

Paul Varghese
Virginia Tech Carilion School of Medicine and Vistar Eye Center

8:24 am

Telehealth in a Rural Setting: Keys for Connection

Rachel Rogers
Radford University

8:32 am

Evaluating short-term functional performance following direct lateral interbody fusion

Zachary Johnson
Virginia Tech Carilion School of Medicine, Carilion Clinic Institute for Orthopaedics and Neurosciences

8:40 am

Anterior Vaginal Wall and Periurethral Growths Imaged with the ExactVu™ Micro-Ultrasound System

Mia Edelson
Virginia Tech Carilion School of Medicine, Carilion Clinic

8:48 am

Do minimally invasive surgical therapy procedures play a protective role in development of persistent postoperative opioid use following benign prostatic hyperplasia surgery?: A retrospective cohort study

Ethan Nethery
Virginia Tech Carilion School of Medicine

8:54 am

Splenic arteriogastric fistula following previous complicated sleeve gastrectomy: a surgical case report and literature review

Ethan Nethery
Virginia Tech Carilion School of Medicine

9:02 am

Silent Harm: Hematologic Manifestations of Systemic Lupus Erythematosus

Courtney Barth
Virginia Tech Carilion School of Medicine

9:10 am

Evaluating the Interaction Between Sludge and Multiple Chronic Conditions on Treatment Burden in Colorectal Cancer Screening

Brianna Chang
Virginia Tech Carilion School of Medicine

9:18 am

Angiotensin single-nucleotide polymorphism expression as a diagnostic and prognostic biomarker in traumatic brain injury

Liliana Ladner
Virginia Tech Carilion School of Medicine, School of Neuroscience at Virginia Tech, Department of Neurosurgery at Carilion Clinic

9:26 am

Preliminary Investigation: Evaluating the Impact of High-Intensity Treadmill Gait Training on Locomotion Recovery among Traumatic Brain Injury Patients

Tyler Shick
Virginia Tech Carilion School of Medicine

9:34 am

Emergent therapy for Sympathetic Crashing Acute Pulmonary Edema with High-dose Nitroglycerin

Robert Bevins
Carilion Clinic

9:42 am

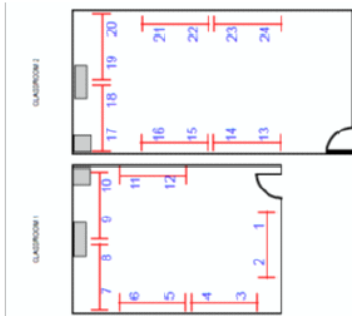
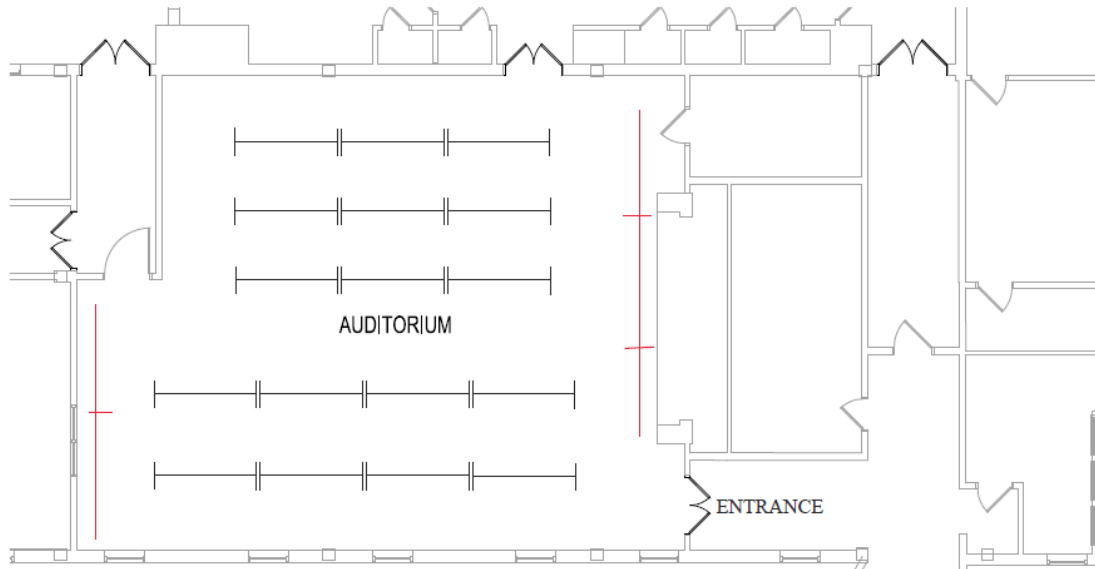
Nomogram to predict aneurysmal origin of intracranial subarachnoid hemorrhage: a user-friendly tool for clinical decision making

Kristine Ravina, MD
Carilion Clinic Neurosurgery

9:50 am

Medication Use Evaluation: Phenobarbital for Alcohol Withdrawal

Jenna Marshall
Carilion Clinic Pharmacy



H - 6th Floor Auditorium

Hospital

Faculty/ Staff Abstracts

Readiness to Practice: S.O.A.Ring to the Next Level

Brittany Ashwell, MSN, RN, NPD-BC

Carilion Clinic

Nurse Externship, New Grad RN Recruitment, Practice Readiness,

Abstract/Case Study:The purpose of this study was to examine the impact of process changes to the eight-week summer S.O.A.R (students seeking opportunities, aspirations, and results) nurse externship on the confidence level and practice readiness of nursing students as well as recruitment to our organization. Previous conversion rates for the summer nurse externs accepting Nurse Resident positions at our organization were less than fifty percent. Program changes included implementing an interview process, transitioning from one to two clinical rotations in various clinical settings, and the ability to transfer to a flex nurse extern at the end of the program. Changes to our professional development session topics included the implementation of a skills day. We also implemented the summer nurse externs attending the Nurse Extern Academy for their onboarding process. Administering the Casey-Fink Readiness for Practice Survey pre-post externship participation, we were able to evaluate the level of confidence and practice readiness of the nurse externs that participated in our summer S.O.A.R nurse externship. Qualitative data, gathered through the surveys, provided insight into the nurse externs' experiences and identified potential areas for improvement. Data continues to be collected to track recruitment progress as externs graduate from their nursing programs in December 2023 and May 2024. The study revealed an increase in level of confidence and improvements in practice readiness among nursing students following the implemented process changes in the nurse externship. Although there was an overall increase in confidence, there was a reported decrease in the externs' ability to prioritize patient care needs. This finding identifies a potential area of improvement that will contribute to enhancing the externship experience, ensuring a more thorough externship program. Current data for recruitment of those that participated in the summer nurse externship and graduated in December 2023 shows a conversion rate of sixty-five percent. The outcomes from this study highlight the importance of adapting and optimizing the summer nurse externship program to increase confidence and enhance the practice readiness of nursing students. Implementing the ability to transition to a flex nurse extern optimized the retention of summer nurse extern participants. Transitioning to two rotations in various clinical settings contributed to externs choosing positions at Carilion.

Veteran & Support Person Satisfaction with Shared Appointments in Interdisciplinary Pain Care: PREVAIL Center for Chronic Pain

Maria Stack Hankey, Nicole Linkous, Martha M. Tenzer, Rena E. Courtney

Carilion Clinic & VA Medical Center

Interdisciplinary, attitudes, chronic pain,

Abstract/Case Study:Introduction: Interdisciplinary teams are the gold standard for pain care, but there is substantial heterogeneity of IDT models, which prevents our understanding the most effective approach for which patient. The PREVAIL Center for Chronic Pain Interdisciplinary (IDT) Track at the Salem VA Health Care System, offers a unique shared medical appointment with providers from five disciplines: interventional pain, psychology, pharmacy, nutrition, and physical therapy. The goal of the appointment is to develop a patient-centered treatment plan guided by the Whole Health framework. The purpose of this study was to determine participant satisfaction with PREVAIL IDT Track. **Methods:** A program-specific satisfaction survey was given to participants at the end of their initial IDT evaluation. The quantitative portion of the survey consisted of 8 Likert-type questions, four yes/no questions, and one rating scale question; the qualitative portion consisted of five open-ended questions. A convergent mixed-methods approach was used to determine participant satisfaction. **Results:** A total of 176 participants responded to the survey; 144 veterans and 32 caregivers. Almost all reported always being treated with courtesy and respect by providers (98.9%), that providers always listened carefully (96.6%), and that providers always explained things clearly (92.6%). Every person believed staff took their preferences and those of their family into account in deciding their treatment plan. Almost all the participants (99.4%) left their appointment with a good understanding of what they are responsible for in the management of their chronic pain. Every respondent reported they would recommend PREVAIL to a friend. On a scale of 0-10, the average satisfaction rating was 9.2. Participants were complimentary of PREVAIL across all qualitative responses. The following themes emerged: positive reactions to the team aspect, with providers from different disciplines present; use of individualized treatment plans; and participants feeling that the team cared and listened to their concerns. Common recommendations for improvement were a longer appointment time and logistical concerns (e.g., room size). **Conclusion:** Veterans and caregivers were overwhelmingly satisfied with their experience in the PREVAIL program. Future studies of the PREVAIL model are warranted and could explore longitudinal outcomes, including satisfaction, compared to other IDT models.

Alpha-gal Syndrome Symptom Severity Rating & Quality of Life Continuum

Jennifer L. Hall, EdD, MCHES

Radford University

Alpha-gal Syndrome, Food Allergy, Patient Experience, Quality of Life

Abstract/Case Study: Alpha-gal Syndrome is a rapidly rising tick-borne condition leading to a potentially life-threatening allergy to mammalian meat and byproducts. It is a complex allergy that varies significantly among those diagnosed. People can be triggered through multiple exposure routes, including ingestion, inhalation, injection, or dermal absorption. Symptom severity varies from mild gastrointestinal issues and itching to life-threatening anaphylaxis. Although the prevalence is largely unknown, cases are expected to increase in the next decade, and some of the highest numbers in the nation have been reported in Central Virginia. There is an urgent need for healthcare providers to better understand AGS and how it presents itself among their patients. In 2021, 411 adults diagnosed with AGS participated in a cross-sectional mixed-method survey to explore their experiences with AGS and how their quality of life was related to their perceived symptom severity. The Rand-36 Health-Related Quality of Life Survey and the Food Allergy Quality of Life Scale were used to measure quality of life, including social, physical, and emotional role functioning. Perceived symptom severity was measured using a 5-point Likert scale with an open-ended question for participants to describe their symptom rating. Statistically significant findings revealed that as perceived Alpha-gal symptom severity ratings increased, quality of life and physical, social, and emotional functioning decreased. Qualitatively, marked differences in how participants described their experiences based on their symptom severity rating were identified, which ranged from mild with few to no reactions to severe and life-threatening reactions. An AGS Symptom Severity Rating & Quality of Life Continuum was created using the results to illustrate patient experiences. This continuum provides real-world evidence for describing this complex and inconsistent condition. Healthcare providers are encouraged to use this continuum to discuss Alpha-gal Syndrome with their patients and assess their symptoms. Doing so could lead to more personalized management and treatment plans for this life-changing condition. The original research manuscript was submitted to the Patient Experience Journal in February 2024 and is under review.

Taubman Museum Happy Hearts Program: Community Arts Accessibility

Patricia Winter, PhD, MT-BC Katrina King Singh (Taubman Museum of Art) Hannah Phillips Hale (Art Therapist Independent Contractor)

Carilion Clinic and Taubman Museum of Arts

Community Outreach, Art Therapy, ,

Abstract/Case Study:The Taubman Museum of Art is a community-based museum that has sought to develop programming in support of community members who have long been underserved by the museum community. The Happy HeARTS program is a therapeutic arts program in partnership with 17 social service organizations in Roanoke and the surrounding area that serves individuals with diverse needs including autism spectrum disorders, intellectual and developmental disabilities, substance use disorders, and other health related diagnoses. Program participants come to the museum to engage in a focused presentation on one work of art within the museum's collection, followed by an opportunity to engage in artmaking around a thematic idea that emerged during the focused presentation, such as using pastels for free-association, textiles and weaving, or mixed-media and sculpture. Following the structured portion of the program participants have unstructured art-making opportunities employing any medium they choose through the Art Venture space that includes, drawing, painting, building, theater, photography, art exploration, and other experiences that rotate on a monthly or semi-monthly basis. Museum staff partner with a Registered Art Therapist as well as national and regional artists to develop and provide the Happy HeARTs programming. Museum sessions emphasize Participant health and wellness with a focus on self-esteem, as well as cognitive, motor, social, and emotional development while supporting creative self-expression and a deeper connection to self and others. Carilion Clinic has partnered with the Taubman to engage in research and program evaluation around participant experiences in the program and the impact of art experiences specifically designed to meet the needs of the community. The researchers will present an overview of the program, current research initiatives, and the healthcare implications for intentional therapeutic arts experiences that are safe and inspire a sense of belonging for all members of our community.

It Takes a Village: Leveraging a Multidisciplinary Team and Technology for Urine Culturing Stewardship

Mandy Swann, MPH; Amy Lucas, MSN; Christian Ostrowski; Carla Bapst, BSN; Lauren Fargis, MPH; Robin Strachman, MA; Kathleen Manchin, MPH; Maribeth Greenway, PhD; Jacob Gillen, MD; Anthony Baffoe-Bonnie, MD

Carilion Clinic

Urine cultures, Diagnostic stewardship, CAUTI reduction, Clinical decisions support

Background: Patients without UTI symptoms but with a positive urine culture are considered to have asymptomatic bacteriuria (ASB). This often represents colonization and treatment is not clinically beneficial. Treatment of ASB can promote antimicrobial resistance and increased rates of C.diff infections. Many cases of ASB are incorrectly assigned as CAUTIs due to over-culturing. We hypothesized that a urine culture algorithm, embedded within a best practice alert (BPA) in the electronic medical record (EMR), would reduce urine culturing for ASB. **Methods:** From Feb 2022 through May 2023, a multidisciplinary team implemented an Inpatient Urine Culturing Stewardship Guideline. A BPA fired when a provider placed a urinalysis with reflex to culture (UACC) or urine culture (UC) order for patients who met criteria. The BPA directed providers to remove the order, select the appropriate pathway from the guideline, or provide a rationale for placing the order. The intervention was piloted on three intensive care units and two progressive care units, with both medical and surgical patients. Monthly ordering practices, CAUTI rates, and gram-negative rod (GNR) bacteremia rates from a 13-month baseline period were compared to a 16-month intervention period. We also assessed changes in ordering practices for comparison units which did not implement the intervention. Pre-and-post intervention cohorts were analyzed using median two sample tests and Exact Poisson Method, as appropriate. **Results:** On intervention units there was a 41.0% reduction in the median number of UACC and UC orders per 1000 patient days from 16.31 during the baseline period to 9.62 in the intervention period ($p=0.0036$). Pan cultures per 1000 patient days in which one of the orders was a UACC or UC fell by 42.2% from a median of 10.20 per 1000 patient days to 5.90 ($p=0.0008$). The comparison units saw no significant reductions in UACC and UC orders ($p=0.21$) or pan cultures ($p=1.0$). On the intervention units, the CAUTI rate for the baseline period was 1.31 per 1000 catheter days versus 0.79 in the intervention period (IRR = 1.65; $p=0.44$). GNR bacteremias remained stable on the intervention units between the baseline and intervention periods ($p=0.82$). **Conclusion:** Leveraging clinical decision support within the EMR reduced urine and pan culturing practices and showed a trend towards a reduced CAUTI rate. The consistent prevalence of GNR bacteremias suggests the intervention did not cause patient harm.

Mentorship Matters, A Virtual Team-based Program: One-year Outcomes

Sarah Harendt, PhD; Mariah Rudd, MEd; Shari Whicker, EDD; Paul F. Skolnik, MD; Rebecca Pauly, MD

Carilion Clinic/ VTCSOM

Mentoring , Virtual , Team-based,

Faculty mentoring can be designed, facilitated, and the outcomes measured, in various ways. Recently, online mentoring platforms and virtual mentoring have gained popularity, providing flexible and accessible mentoring opportunities with positive outcomes. We hypothesized that curricula focused on defined career needs of faculty could be delivered effectively in a virtual, team-based mentoring format. Methods: A survey assessed demographic data, knowledge and experience with mentoring, and confidence in career advancement of mentees. The Mentorship Matters 12-month pilot project began with the goal of serving 24 mentees and 8 mentors. Individuals formed teams across medical subspecialties. Each team consists of one senior mentor and two to three mentees. All teams meet every month virtually for interactive education followed by breakout style gathering into 3 or 4-member teams for targeted individual and small-group career counseling, discussion, and to provide and receive feedback. Results: A repeat survey, administered both at the midpoint of the program and post-engagement, demonstrates positive trends for mentees. Participants indicate increased confidence in their ability to present academic work and have a strategy for managing time despite competing demands. They also report having a clearer understanding of the promotions process at VTCSOM which demystifies a navigational hurdle that can impact career advancement. Both mentors and mentees found the virtual modality effective. Post-engagement data suggests a positive correlation between the virtual format and the perception the time commitment for Mentorship Matters was appropriate for participant schedules. Mentee data suggests a strong positive correlation between participants who have clearly articulated career goals, feel confident in their ability to progress in their careers, feel confident to present their academic work, and in turn, find their work to be personally satisfying. Mentees reported viewing the relationship with their mentor as one that meaningfully contributes to their success and creates an environment of support and guidance around career advancement. Implications: While implemented within the Department of Internal Medicine at VTCSOM, we believe this model is applicable and implementable within any institution or medical school department. This program demonstrates that intentionally providing structured curricula, across subspecialties, in a virtual format

Cognitive and Functional Assessment of Elderly Patients with Clostridioides difficile Infection: A Case Series

Jasmine Y. Jackson-Akers, Ann Sollinger, Adrian Aron, Kevin Parcetich, Daniel Miner, Ruth Ndolo, Aaron Phillips, Dorothy Garner, Ekta Bansal, Cirle Warren, Stephanie Nagy-Agren

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C. difficile, Elderly, cognitive function, physical function

Abstract/Case Study:Background: Clostridioides difficile infection (CDI) in the elderly has been associated with cognitive impairment and functional decline indicating that CDI may have consequences beyond acute intestinal infection. We sought to measure cognitive and physical function in hospitalized patients >60yo with CDI. Methods: A prospective case series was performed to explore the association of CDI to cognitive and functional status in the elderly. Demographic and outcome data included Charlson Index, Montreal Cognitive Assessment (MoCA), and Activity Measure for Post Acute Care (AM-PAC). Results: Six cases were followed prospectively, all female, aged 62-84 years, admitted from home. There were 3 CA-CDI, 3 HA-CDI. Charlson Index Scores ranged from 2-6 (mean 4 ± 1.55 ; median 4). Cases were treated with: 1 with vancomycin, 4 with fidaxomicin, 1 with vancomycin + fidaxomicin. All cases survived to hospital discharge, two discharged to skilled nursing facilities (SNF). There were four re-admissions and one recurrence at 30 days. One death was noted at 90-day follow-up, not attributable to CDI. Five patients showed mild cognitive impairment (MCI) at baseline. There was no clinically significant change in MoCA scores at 10-14 days. At 40-day follow-up, one subject had clinically significant improvement on MoCA and three had no change. There was nonsignificant decrease in AM-PAC in 2 subjects, no change in one subject and an increase in one subject. Of note, assessment of functional outcomes was limited by the sequelae of persistent diarrhea. Conclusion: MCI and 30-day re-admission appear to be common in elderly patients diagnosed with CDI. No significant cognitive changes during the course of CDI were noted. A prospective study is in progress to further determine the association of CDI with cognitive and functional change in elderly patients.

Revolutionizing Healthcare Research: Harnessing the Power of ArcGIS Pro

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ArcGIS, Research, Geospatial Analysis ,

Abstract/Case Study:The incorporation of ArcGIS Pro into medical research marks a revolutionary leap in understanding and tackling intricate health challenges. This abstract champions the introduction of ArcGIS Pro as a service by HART (Health Analytics Research Technologies), inviting exploration into its transformative potential. Through vivid hypothetical scenarios set in Roanoke, VA, this abstract vividly illustrates ArcGIS Pro's power in propelling forward healthcare research.

Case 1: Harnessing ArcGIS Pro for Healthcare Insights Explore a hypothetical scenario where 400 fictitious patients, each equipped with cardiac rhythm monitoring devices, confront Ischemic Heart Disease. Using ArcGIS Pro, we delve into Spatial Epidemiology and Disease Mapping, unveiling geographical disease prevalence patterns. Simultaneously, we evaluate Carilion Roanoke Memorial Hospital's responsiveness to abnormal cardiac rhythms through Health Service Accessibility Planning. This case aims to showcase how ArcGIS Pro optimizes resource allocation and enhances patient care strategies, revolutionizing healthcare research and delivery. Join us as we illuminate the transformative potential of spatial analysis in healthcare.

Case 2: Unveiling Health Hazards: Railway Pollution and Lung Cancer Embark on a medically grounded investigation involving 400 fictitious patients dwelling in close proximity to railways, exploring the ominous link between railway pollutants and lung cancer. With ArcGIS Pro as our trusted ally, we navigate the intricate terrain of Environmental Health and Exposure Assessment, illuminating potential correlations between environmental pollutants and adverse health outcomes. But our mission extends beyond mere observation. In the realm of Clinical Trial Site Selection and Patient Recruitment, ArcGIS Pro takes on a pivotal role. Witness how geospatial analysis guides the targeted recruitment of participants, ensuring meticulous research into the impact of railway pollutants on lung cancer development.

in summary, ArcGIS Pro is a cornerstone in medical research, offering unparalleled spatial analysis capabilities. From mapping disease patterns to optimizing healthcare resource allocation and conducting environmental health assessments, ArcGIS Pro contributes to informed decision-making, and fosters improved public health outcomes. The scenarios presented underscore the versatility of ArcGIS Pro in tackling diverse health challenges, emphasizing its pivotal role in shaping the future of medical research.

Transapical Access Utilizing Custom Inverted TEVAR with coverage of the Left Subclavian Artery

Cameron C. Jones, BS, and Joshua D. Adams, MD.

Carilion Clinic

Thoracic endovascular aortic repair, Vascular surgery, Custom(inverted) TEVAR, Transapical access

Abstract/Case Study:Thoracic endovascular aortic repair (TEVAR) has revolutionized the management of thoracic aortic pathologies, providing less invasive treatment options. Custom TEVAR devices have emerged as innovative solutions for complex cases. Herein, we present a case demonstrating the challenges of severe aortoiliac disease and a type III aortic arch. A transapical approach using a custom-designed-inverted stent graft effectively managed these anatomical complexities, emphasizing the pivotal role of tailored solutions. This case underscores the importance of multidisciplinary collaboration and personalized patient care in achieving optimal outcomes. Furthermore, custom inverted TEVAR devices present versatile options for addressing anatomical intricacies, advancing the field of endovascular aortic repair.

Using NVivo for Effective Qualitative Research

Maria Stack Hankey

Carilion Clinic

NVivo, Qualitative Research, ,

Introduction: Qualitative research methods are useful in exploring complex phenomena, providing in-depth insights into human behavior, beliefs, and experiences. In qualitative research, data is collected through focus groups, interviews, open-ended surveys, or observations. Qualitative researchers systematically analyze this data by developing a coding system and identifying themes in the data. NVivo, a software package designed for qualitative data analysis, offers researchers a platform to manage, analyze, and visualize this data. In this poster presentation, I will provide an overview of NVivo and its utility in qualitative research at Carilion Clinic. I will show an example of how NVivo was recently used for a needs assessment study with critical care nurses. **Methods:** For this needs assessment, a REDCap survey link was emailed to critical care nurses at Carilion inviting them to participate. The survey included quantitative and qualitative questions about clinical ethics education. Both forms of data were exported from REDCap in an Excel file and uploaded to NVivo in the secure research environment, SPARC. Using NVivo, I systematically coded the open-ended data inductively, allowing themes to emerge from the data. **Results:** I was able to successfully code and categorize the qualitative data in this study using NVivo. For purposes of this demonstration, I also coded the data through NVivo's automatic coding function and compared the results through the Kappa coefficient feature in NVivo. Two data visualizations, a word cloud and a word tree, were created to display the data. **Conclusion:** The use of NVivo software in this study helped with the thematic analysis and visualizations of the qualitative data, allowing for a deeper understanding of critical care nurses' needs for ethics education.

Automation of Patient Registries to Improve Outcomes

David Bowers Sujit Gurung

Carilion Clinic

Registry, REDCap, Clarity,

Abstract/Case Study:Title: Automation of Patient Registries to Improve Outcomes Authors: David Bowers and Sujit Gurung, Carilion Clinic **Abstract:** Patient focused registries have the potential to support quality improvement and research, but often require extensive resources to collect and transform the data into standardized structures. Frequently, valuable data are hidden in notes, requiring chart review and abstraction. In May 2022, with sponsorship from the Ardmore Institute of Health, Carilion Family Medicine launched a Lifestyle Medicine Clinic (LMC), headed by Dr. Elizabeth Polk. The goal of the LMC is to prevent or reverse disease progression through reduction of unhealthy behaviors. The Carilion Clinic Health Analytics Research Team (HART) undertook to automate the registry to minimize manual effort, enhance standardized data collection, and support the initiatives of the project. **Methods:** HART built a Lifestyle Medicine Patient Outcomes Registry (LMPOR) in REDCap to store data on demographics, visits, diagnoses, medications, vitals, medical history, lab results and health habits. Data will be captured through December 2032 and analyzed to evaluate the efficacy of lifestyle medicine therapy in improving outcomes. HART developed SQL scripts to extract data from the Epic Clarity database for seven of the eight data categories. Seven scheduled scripts, executed as Crystal Reports, run monthly on the Business Objects Enterprise (BOE) report scheduler. Results export as comma-separated value (CSV) files to a secure shared drive folder. A PowerShell script, developed with the assistance of ChatGPT, combines these files into one for easy import into REDCap. Consolidating the LMPOR into REDCap will simplify the analysis phase of the project. Through January 2024, chart review of office notes was necessary to glean health habits data for manual data entry into REDCap. In February 2024, new flowsheets and smart data elements are available in Epic to capture this data in discrete fields. HART is developing an additional SQL script to extract health habits data for incorporation into the REDCap import process. **Results:** To date, 371 patient demographic records are imported to the registry along with 824 associated visits, 10975 encounter/problem list diagnoses, 3885 family/medical history conditions, 7185 lab results, and 7496 concurrent medications. HART imported data using the REDCap Data Import Tool with no errors. Project PI reports high satisfaction wi

Anatomical Variant Case Report: Osteochondroma of the Proximal Clavicle

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chondroma, osteochondroma, clavicle, sternoclavicular joint

Abstract/Case Study:Background The anatomy course at the Virginia Tech Carilion School of Medicine comprises four independent Blocks of content over the first year of medical school. The course consists of weekly pre-recorded lectures and dissection laboratories. The dissection laboratories take place at the Virginia Intercollegiate Anatomy Laboratory located in the Carilion Roanoke Community Hospital. This finding was noted during a dissection laboratory in Block II: The Thoracic Cavity. During a dissection module on the bony thorax, a student group brought to faculty attention a mass at the right sternoclavicular joint of their male cadaver. The mass was removed and sent to Dominion Pathology Associates for a courtesy pathology examination. Suspicions of the students and faculty of a chondroma have resulted in the following case report.

Introduction An osteochondroma is a benign overgrowth of bone that arises from a cartilaginous cap overlying an osteophyte that will typically decrease in prominence following bone maturation^{1,2}. Osteochondromas are reported to account for 30% of benign bone tumors, with the majority occurring in long bones with a 2:1 ratio of occurrence in the lower extremity to upper extremity respectively³. Clinically, a solitary osteochondroma typically presents as a painless palpable mass within the first four decades of life or as an incidental radiological finding; however, there have been multiple case reports of osteochondromas causing symptoms including pain, decreased range of motion, spontaneous hemothorax, pneumothorax, and pericardial effusion warranting surgical excision^{4,5}.

Anatomy Laboratory Dissection Here we present a rare incidental finding of an osteochondroma of the right sternoclavicular joint in a 94 year old male.

Identification of an Accessory Fissure in the Middle Lobe of the Left Lung During Routine Dissection in a Medical Anatomy Course

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accessory lung fissure, bronchopulmonary segment, surgical resection,

Abstract/Case Study:Background The anatomy course at the Virginia Tech Carilion School of Medicine comprises four independent Blocks of content over the first year of medical school. The course consists of weekly pre-recorded lectures and dissection laboratories. The dissection laboratories take place at the Virginia Intercollegiate Anatomy Laboratory located in the Carilion Roanoke Community Hospital. This finding was noted during a dissection laboratory in Block II: The Thoracic Cavity. During a dissection module on the lung, a student group brought to faculty attention what appeared to be an additional lobe on the right lung of their male cadaver (see Figure 1). Upon close examination and review of the literature, an accessory lobe was determined to be present. The students and faculty report the results in the following case report.

Introduction The respiratory diverticulum develops during the 4th week of embryonic life as a diverticulum of the foregut. The distal end of the diverticulum develops into the lung bud which divides during the 5th week to form the primitive right and left main stem bronchi, airway structures subserving the right and left lungs. The left main stem bronchus subsequently divides into two secondary (lobar) bronchi serving the developing upper and lower lobes on the left side, while the right main stem bronchus divides into three secondary (lobar) bronchi serving the developing upper, middle and lower lobes on the right side. The individual lobes are separated by deep fissures clearly demarcating each lobe: an oblique fissure on each side and a horizontal fissure on the right side separating the upper lobe from the middle lobe¹. The fissures of the lungs form during embryological development when double folds of visceral pleura either completely or incompletely invaginate². During the 7th week lobar bronchi further divide into tertiary (segmental) bronchi which deliver air to individual bronchopulmonary segments within each lobe (see Figure 2). Each bronchopulmonary segment of the lung contains its own segmented pulmonary arterial branch and tertiary bronchus³. Unlike lobes, the bronchopulmonary segments are not typically separated by fissures. However, fissures separating bronchopulmonary segments within a lobe are not uncommon. Accessory fissures, defined as a complete or incomplete cleft of varying depth lined by visceral pleura, have been described in each of the five different lobes of the lungs⁴.

Observation During routine dissection activities in a medical anatomy course, we identified an accessory fissure in the middle lobe of the right lung separating the lateral and medial bronchopulmonary segments of that lobe into two distinct segments.

Clinical Implications of a Benign Renal Hemangioma Finding in an Anatomy Course Donor

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kidney, renal hemangioma, benign tumors,

Abstract/Case Study:Background The anatomy course at the Virginia Tech Carilion School of Medicine comprises four independent Blocks of content over the first year of medical school. The course consists of weekly pre-recorded lectures and dissection laboratories. The dissection laboratories take place at the Virginia Intercollegiate Anatomy Laboratory located in the Carilion Roanoke Community Hospital. This finding was noted during a dissection laboratory in Block III: The Abdominopelvic Cavity. During a dissection module on the posterior abdominal wall, a student group brought to faculty attention a mass on the right kidney of their male cadaver. The kidney was removed and sent to Dominion Pathology Associates for a courtesy pathology examination. Suspicions of the students and faculty of a hemangioma have resulted in the following case report.

Introduction During a routine dissection laboratory session on abdominopelvic anatomy, a finding suggestive of renal hemangioma involving the right kidney was made. Photographs were taken of the tumor in situ including the surrounding tissues. The kidney and the tumor were removed en bloc and further examined under a dissection microscope. Tissue samples of the tumor and the kidney were obtained and submitted for histopathological analysis. Observations On gross examination, the tumor did not appear to invade the structure of the kidney, but rather appeared to lie on the surface of the kidney including the proximal parts of the renal vessels; this leading to a significant remodeling of the kidney structure. Histopathological analysis of this renal hemangioma is pending. **Discussion and Clinical Implications:** Renal hemangiomas are rare benign tumors of the vasculature surrounding and sometimes invading the kidney. Only 200 reported cases of a renal hemangioma have been reported since their initial discovery by Rudolf Virchow in 1867.

Using Dielectric Sensing for Discharge Decision-making in Heart Failure Patients

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Carilion Clinic

ReDS vest, Heart failure, Hospital readmission, Dielectric sensing

Abstract/Case Study: Introduction: Decompensated heart failure is a leading cause of hospitalization in the USA and is driven by high readmission rates. Despite numerous advances in diagnosing and treating heart failure, there remains lack of validated measures to predict patient volume status and identify the propensity for readmission. Remote dielectric sensing (ReDS) is a non-invasive, radiation-free measure of lung fluid content. We aim to assess the utility of ReDS in guiding clinical management and predicting 30-day readmission rates. Hypothesis: We hypothesize that patients with normalization of lung fluid value before discharge (as measured by ReDS vest) will have a lower 30-day readmission rate than patients without normalized values. Methods: Lung fluid values are collected using ReDS vest for 1,224 patients with advanced heart failure. Our retrospective analysis compares patients with normalization of lung fluid values during hospitalization against patients without normalization of these measures. We compare the difference in readmission rates between the groups. Secondary analyses are performed to assess the effect of other clinical markers, including ejection fraction and age, on lung fluid values and 30-day readmission rates. Results: The primary comparison between patients with normalization of lung fluid values at discharge and patients without normalization of lung fluid values reveals a trend towards lower readmission for those with normalization of lung fluid values (16.6% vs. 29.2%, $p=0.07$). No difference is observed for patients who had non-normal repeat lung fluid values before discharge and those who did not receive a repeat measure (29.2% vs. 29.8%, $p=0.88$). Patients readmitted within 30 days ($n = 151$) have a higher initial lung fluid value (45 ± 6.6 versus 44 ± 5.9 , $p=0.02$) than patients who were not readmitted ($n = 377$). Conclusions: Remote dielectric sensing predicts lower readmission rates in patients whose values normalize during hospitalization compared to patients with non-normalized values. Future prospective studies are necessary to determine the full utility of ReDS readings in the clinical setting.

Validation Study: Enhancing Nephron Physiology Learning in Medical Education through an Interactive Manipulative

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VTCSOM

Hands-on learning, Student-centered, Manipulative, Active learning

Abstract/Case Study: **Background:** The complexity of renal physiology including secretion and absorption along the various nephron segments presents a learning challenge for medical students, often leading to forgetting of relevant concepts such as ion movements. We previously developed a Nephron Manipulative to address the need for innovative educational strategies that improve short and long-term retention of renal physiology. In the current study we update our nephron manipulative to a digital version and expand its application to clinical settings. **Objective:** Our goal is to validate the updated nephron manipulative by assessing students' knowledge acquisition. **Methods:** Our previous paper model of the nephron manipulative was updated into a user friendly, interactive PowerPoint design. Each slide in the PowerPoint prompted learners to drag and correctly place the various electrolytes and molecules onto the specific transporters in each nephron segment. Students completed pre- and post-manipulative quizzes, with the pre-manipulative quiz serving as a baseline control and a primer on key concepts, and the post-quiz to correct any possible misconceptions. The quiz included 13 knowledge questions, and 3 questions gathering feedback on student satisfaction and suggestions for improvement. **Results:** 20 first-year medical students participated in the manipulative and completed quizzes. There was a statistically significant change ($p=0.017$), with an overall knowledge improvement from 64.2% correct responses to 71.9% after the activity. Student feedback reported a better understanding of the material and appreciation for the interactive nature of the tool. **Conclusion:** We present data showing knowledge acquisition and student satisfaction using the updated digital nephron manipulative. The revised nephron manipulative is an efficient educational tool that can potentially enhance the way medical students grasp complex nephron physiology concepts. Further research will assess long-term retention, as students advance to more complex renal pathology topics in their second year, thereby validating the manipulative role in enduring knowledge acquisition.

Launching Leaders: The Impact of an Innovative Faculty Development Community on Program and Clerkship Directors' Growth and Success in Academic Medicine

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Carilion Clinic & Virginia Tech Carilion School of Medicine

Leadership, Education, Community of Practice,

Abstract/Case Study:Background: Program Director (PD) and Clerkship Director (CD) roles are complex and often come with little training for those entering these roles. Within academic medicine, building connections between UME and GME leaders is important. The EELDC was developed in collaboration with VTCSOM, Carilion Clinic, and TEACH to provide an opportunity to develop these relationships and to develop general educator leadership skills through a co-learning curriculum. EELDC was designed to offer customized, meaningful faculty development training for PDs and CDs entering these roles. Using a community of practice framework, didactic instruction, and facilitated discussion, we provided PDs and CDs with professional development to foster their growth, self-awareness, and leadership skills. **Methods:** We recruited PDs and CDs who had been in their roles for less than one year to participate in the EELDC. We asked all participants to complete a pre-assessment to determine their baseline comfort and skills relevant to their roles. We also asked them to evaluate each session. We met monthly with the participants for expert-facilitated discussions related to self-identified needs. **Results:** 12 PDs and CDs participated in the pilot. Topics included: delegation for health professions leaders, conflict management, learner assessment and evaluation, and managing remediation/struggling learners. All 12 participants completed a pre-assessment. Pre-assessments reflected an interest in increased collaboration and learning to use evidence-based strategies in their roles. Respondents (90%) indicated that they were confident that participation in EELDC would successfully help them develop better practices and 67% indicated they believe their understanding of their role would change. Participants reported low levels of agreement for current opportunities to learn in the following areas: new information critical to understanding my role and new evidence-based practices that align with my role and new evidence-based practices that align with my role. **Conclusions:** A co-learning faculty development community of practice for emerging program and clerkship directors can develop self-awareness, enhance communication across the continuum, and build community among new educational leaders. A post-assessment will be completed at the conclusion of the first year.

Multimodal educational intervention utilizing population health managers (PHMs) to reduce healthcare utilization and improve outcomes for chronic obstructive pulmonary disease (COPD)

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Carilion Clinic

COPD, antibiotic, utilization, education

Abstract/Case Study:BACKGROUND: COPD patient self-management plans, including rescue packs, have been shown to be effective in reducing respiratory related emergency department (ED) visits and hospital readmissions, however, utilization of rescue packs within Carilion Family and Community Medicine (CFCM) remains relatively limited. OBJECTIVE: The primary objective of the study was to investigate the effect of a multimodal educational intervention on evidenced based prescribing practices of rescue packs for acute exacerbations of COPD (AECOPD)s. The secondary objectives were to measure the change in the number of rescue packs prescribed and the participation of the physicians. METHODS: The study was a multimodal 2-step educational intervention delivered by PHMs to CFCM clinicians focused on the proper utilization of self-management plans and rescue packs for COPD exacerbations. Participants were primary care clinicians in 42 practices associated with CFCM in Roanoke, VA. The intervention was delivered in two waves and interrupted time series analysis was conducted on the combined data. Primary outcomes measured were differences in ED visits and inpatient hospital admissions between the intervention and control groups, the secondary outcomes measured were the extent to which the intervention influenced the number of rescue packs that were prescribed within the CFCM, and the participation of the clinicians. RESULTS: No statistically significant change was seen in ED visits or IP admits for COPD, asthma, or COPD + asthma patients post-intervention. Rescue pack usage was increased in both waves. 18 clinicians (24%) responded to the survey in wave 1 and 9 (10%) responded in wave 2. CONCLUSION: A PHM led intervention failed to significantly reduce COPD ED visits and IP admits, however, there were promising trends in visit and admission rates. Rescue pack usage was increased and the responses to surveys was relatively high. A more robust intervention may be needed to accomplish statistically significant changes in ED visits and IP admits.

Peer Observation to Enhance Teaching

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observation, teaching , feedback,

Abstract/Case Study:Teaching in academic settings encompasses multifaceted roles and responsibilities, with educators continually striving to optimize support for their learners. Despite possessing substantial subject matter expertise, educators may not always prioritize the enhancement of teaching and learning practices. Peer observations emerge as a valuable tool within educational environments, facilitating self-reflection and peer evaluation while mitigating pedagogical solitude. Drawing upon Albert Bandura's Social Learning Theory, which underscores the significance of modeling and feedback, peer observations are increasingly recognized as integral to fostering a community centered on the scholarship of teaching and learning. Recently, a new requirement for teaching observations was established for faculty promotion at VTCSOM. TEACH has established a three-phase iterative process for teaching observations. Open to clinical and non-clinical faculty, this initiative has already yielded 43 individual observations across eight departments since 2016. Future developments will involve the refinement of processes to support observation requirements, further fostering engagement within the faculty community and offering tailored feedback and development opportunities for individuals. Key takeaways from the approach to teaching observations highlight their universal applicability and benefits, emphasizing their potential to occur flexibly and confidentially, catering to diverse teaching contexts. The process offers individualized, confidential feedback aimed at immediate teaching development, while also demonstrating a commitment to ongoing improvement. Implemented through a supportive, non-judgmental framework, peer observations focus solely on teaching practices, distinct from content, and are integral to promotion portfolios.

Risk factors for failure of nonoperative management of unilateral cervical facet fractures

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risk factors, facet fracture, nonoperative management,

Abstract/Case Study: Facet fractures represent ~6.7% of all types of cervical spine fractures (1). Facet dislocation, specifically a bilateral injury, is associated with a high rate of neurologic compromise; however, there is controversy regarding treatment of unilateral facet injuries without neurologic injury or significant displacement (i.e., dislocation) (1-4). Some authors advocate for nonoperative management given the risk of complications associated with surgery or the possibility that a solid fusion may lead to either early degeneration or consequential adjacent-segment disease (1-4). Nevertheless, other authors have suggested that fusion is indicated to reduce the risk of pseudoarthrosis and / or delayed instability, including chronic neck pain, permanent neurologic deficit, or deformity (1-4). Current literature addressing isolated facet fractures is sparse, and the decision to provide operative or nonoperative management is dependent upon surgical preference as there is a lack of high-quality trials (1-4). There is currently no consensus for the selection of operative versus nonoperative management or type of surgical approach with unilateral cervical facet fractures. The primary aim of the present study is to evaluate risk factors associated with nonoperative management and consequential progression of unilateral cervical facet fractures. Moreover, a comparative analysis of anterior versus posterior instrumented stabilization approaches for fracture fixation will be secondarily assessed based upon radiographic alignment post-operatively. This study will allow the neurosurgical team to make an informed surgical decision based upon objective criteria with identification of clinical risk factors and fracture morphology that will likely fail non-operative management. Identifying patients who are high risk for fracture progression will permit earlier operative intervention and consequentially decrease patient morbidity and admission length. This study will be a retrospective chart review. The trauma database will be utilized / access requested. A chart review will be implemented from 2008 through 2020 and data will be retrospectively gathered for patients who presented with a unilateral cervical facet fracture. Data to be retrospectively collected include patient demographics (i.e., age, gender, height, weight, race), body mass index, injury severity score, Glasgow coma scale, Charlston comorbidity index, presenting symptomatology, fracture morphology, fracture displacement, fracture angle, percent facet is involved in the fracture, side of fracture, level, associated injuries, medical history, surgical history, smoking history, follow up visit at ~4-12 weeks and radiographic imaging obtained as well as type of surgical intervention and follow up imaging, if necessary.

Retrospective study of biodegradable antibiotic-loaded calcium sulphate carriers used in spine surgery and review of rate of infection.

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Carilion Clinic Neurosurgery

spine surgery, infection, antibiotic loaded beads,

Abstract/Case Study:One of the common complications of surgeries in general is surgical site infection (SCI). SCIs are prevalent among all types of spinal surgeries (1). SCIs are associated with higher morbidity and mortality as it most often requires reoperation and admission to the hospital (2). Based on cost analysis study one episode of SCI after spine surgery cost up to ~\$7000 extra when compared to non-infected patients. (3) Multiple preventive measures have been studied including intra wound betadine irrigation, vancomycin powder and antibiotic impregnated sutures which have been shown to reduce the rate of SCIs (4,5,6). Aseptic techniques, patient optimization pre/intra/post operatively, prophylactic operative antibiotics and postop wound follow up are some of the general preventive methods commonly used. (7) Despite all the above effort, SCIs are still terrible complications and continues to happen. Therefore, identifying novel ways to prevent SCIs is imperative for best cost-effective patient outcomes. Biodegradable antibiotic-loaded calcium sulphate carriers have been used to prevent SCIs in orthopedic surgeries and have shown significant decrease in infection rate (8). However, only a handful of studies were conducted regarding biodegradable antibiotic-loaded calcium sulphate carriers involving spine surgery. (9) In this study we hypothesize that calcium phosphate antibiotic beads intraoperatively in the surgical wound will help reduce SCIs.

Discounting behavior in primary care clinicians and its association with low-value care decision making

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Carilion Clinic

delay-discounting, low value care, behavioral economics,

PURPOSE: Clinician decision-making about low-value care (LVC) is not well understood. Delay discounting (DD) and probability discounting (PD) are measurable dimensions of sensitivity to delayed consequences and risk tolerance that have not been studied in clinician decision-making. DD describes the extent to which people devalue an outcome more as time to that outcome increases. PD is a similar concept that describes devaluing of an outcome as its probability decreases. This study evaluated the extent of DD and PD in primary care clinicians (PCC) and determined associations with LVC decision-making. **METHODS:** We performed a cross-sectional survey study to assess DD and PD and responses to four clinical vignettes assessing LVC decision-making. We surveyed PCC in a regional health system in the Southeastern U.S and in national samples from networks in the American Academy of Family Physicians. The electronic survey comprised standardized monetary reward-based assessments of DD and PD, four LVC clinical vignettes, and demographic questions. Outcome measures included discount rate for DD and PD, visual analog scale ratings (0-100) of likelihood to provide each LVC service, and demographics. Statistical analysis included descriptive results and regression modeling of DD and PD with likelihood of LVC decisions. **RESULTS:** 228 PCC responded. 89% were physicians, 11% NP/PA, 47% male, 33% in academic practice, 28% practiced in a rural location. The average likelihood of prescribing LVC was: 28/100 for antibiotics in uncomplicated upper respiratory infection (AB-URI), 24/100 for imaging in acute low back pain without red flags, 25/100 for screening electrocardiograms in low-risk patients (S-EKG) and 11/100 for cervical cancer screening in women after hysterectomy for benign indications. In simple regression models, DD was associated with low value prescribing of AB-URI (beta 0.09 (0.02 to 0.16), $p = 0.013$), as well as with low value ordering of S-EKG (beta 0.09 (0.01 to 0.16), $p = 0.020$). There was no association of PD with likelihood of providing low value care. We are currently refining the analyses. **CONCLUSIONS:** Delay discounting is measurable in PCC and may be associated with the likelihood of providing LVC in clinical vignettes. Next steps include replication with other LVC vignettes, study of delay discounting with actual clinical practice patterns, and possible intervention to counter the effect of delay discounting on clinical decision making.

Implementation of Multi-Language Management Module in REDCap: Improving Research Inclusivity

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REDCap, Multi-Language Management, Research Inclusivity, Linguistic Diversity

Abstract/Case Study: Abstract: In today's globalized world, research inclusivity is paramount, necessitating tools that accommodate diverse linguistic backgrounds. This abstract outlines the implementation and outcomes of the Multi-Language Management module in REDCap, within the context of a collaborative study on appendicitis care disparities between Carilion and Duke University led by Dr. Brian Meier. The module's deployment aimed to provide surveys and forms in both English and Spanish languages, enhancing accessibility for participants across linguistic spectrums. The study explores methods, results, and implications of this endeavor. **Methods:** Utilizing the Multi-Language Management module, surveys and forms were developed in both English and Spanish languages. Translated content was meticulously inputted into REDCap to ensure accuracy and consistency across languages. Participants were offered language selection options during enrollment and throughout the study, with continuous feedback guiding optimization efforts. Data collection procedures were closely monitored to assess the effectiveness of multilingual implementation. **Results:** The integration of the Multi-Language Management module facilitated successful enrollment of a diverse participant pool, encompassing both English and Spanish speakers. Participants expressed appreciation for the language options, reporting increased comfort and understanding during survey completion. Despite linguistic diversity, responses remained consistent across language versions of the surveys, ensuring data integrity and quality. Feedback from participants and researchers highlighted the module's efficacy in promoting inclusivity and accessibility in research. **Conclusion:** The implementation of the Multi-Language Management module in REDCap has proven instrumental in enhancing research inclusivity. By offering surveys and forms in multiple languages, we successfully engaged a broader spectrum of participants in our study on appendicitis care disparities. This approach not only enriched the diversity of our dataset but also underscored the importance of accommodating diverse linguistic backgrounds in scientific inquiry. Moving forward, leveraging multilingual functionalities in research tools like REDCap holds promise for advancing inclusivity and equity in research, ultimately benefiting diverse populations, and improving healthcare outcomes.

Diaphragmatic breathing to lower blood pressure remeasurements in primary care: Protocol

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Hypertension, Blood Pressure, Diaphragmatic breathing , Primary care

Abstract/Case Study:INTRODUCTION: More than 670,000 deaths in the US in 2020 were associated with hypertension (high blood pressure or requiring medication to control blood pressure) (Centers for Disease Control and Prevention [CDC], 2023). Since hypertension is commonly diagnosed and managed in primary care, obtaining a true blood pressure reading during clinic visits is essential. In addition, several primary care quality measures focus on hypertension control (<140/90 mmHg). National guidelines recommend remeasurement of elevated in-clinic BP readings with awareness of environmental factors, such as whitecoat syndrome, that can skew results. Diaphragmatic breathing (DB) is a brief minimal risk intervention that can be delivered in clinical settings to lower blood pressure (BP) and more accurately reflect true resting BP. Our research objectives include evaluating the efficacy of DB in comparison to control and usual care in lowering remeasurement BP in patients with hypertension. We will also evaluate the acceptability of DB to patients. METHODS: In this randomized controlled trial, patients with an initial BP reading of >140/90 mmHg will be assigned to a control, DB, or usual care group. We will collect data for 75 participants in each group, for a total of 225 study participants. The treatment group will watch a guided DB video, and the control group will watch an educational video about hypertension. BP will be remeasured and participants from the DB treatment and control groups will complete a questionnaire to assess the acceptability of the videos. Usual care group participants will have initial and rechecked BP measurements collected from their medical record via retrospective chart reviews monthly to ensure equal enrollment across all groups. We will compare means of the second blood pressure readings across groups by ANOVA with post-hoc testing and will summarize acceptability data using descriptive statistics. RESULTS: We hypothesize that the DB treatment group will have a greater reduction in BP remeasurement than the control or usual care groups. CONCLUSION: Increases in BP accuracy may make DB generalizable and relevant to other medical practices by ensuring better hypertension control measurements.

Resident/ Fellow Abstracts

Assessment of Appropriate Dofetilide Initiation

Kaley Hart, PharmD, Chase Barnes, PharmD, BCPS, Cody Swindall, PharmD, BCPS, Hannah Roberts, PharmD, Emily Bailey, PharmD, BCPS

CRMH

Abstract/Case Study: Assessment of Appropriate Dofetilide Initiation Kaley Hart, PharmD, Chase Barnes, PharmD, BCPS, Cody Swindall, PharmD, BCPS, Hannah Roberts, PharmD, Emily Bailey, PharmD, BCPS

Background: Dofetilide is a class III antiarrhythmic used for pharmacological rhythm control in patients with atrial fibrillation and carries a significant risk of QTc prolongation and torsades de pointes. Because of this risk, initiation and re-initiation of dofetilide should be performed in a facility that can provide continuous ECG monitoring, renal function monitoring, and cardiac resuscitation. Pharmacist involvement in dofetilide initiation can positively impact patient outcomes and ensure adherence to monitoring parameters. At Carilion Roanoke Memorial Hospital, pharmacists are expected to write consult notes, provide dosing recommendations, evaluate drug interactions, complete patient education, monitor patient labs, and help coordinate discharge prescriptions.

Objective: The purpose of this medication use evaluation is to assess appropriate dofetilide initiation based on the pharmacy department guidance document.

Methods: This retrospective cohort study assessed adult patients with new initiation or re-initiation of dofetilide between June 1, 2022 and July 1, 2023. The primary outcome was a composite of eight key components of dofetilide initiation and reported as percent adherence. These components were appropriate baseline QTc, appropriate dose based on renal function, repletion of electrolytes, dose adjustments or discontinuation based on QTC, initial labs resulting prior to pharmacist verification and administration, and pharmacy consult and education notes written. Data was analyzed utilizing descriptive statistics.

Results: The proportion of key components adhered to was 89.7%. Adherence to all eight components occurred in 41% of initiations. Appropriate baseline QTc and repletion of electrolytes had the lowest adherence rates of 75.4% and 76.3%, respectively. Pharmacy consult and education notes both had 99.1% adherence. Overall, there were 81 successful initiations, representing 71.1% of patients. Ventricular tachycardia occurred in 14.9% of patients with no other safety events reported.

Conclusion: Adherence to key components necessary for appropriate initiation of dofetilide occurred in a large majority of patients, with appropriate baseline QTc and electrolyte repletion having the greatest opportunity for improvement.

Safety and efficacy of lidocaine infusions as adjunctive pain management therapy

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Abstract/Case Study:Background: Intravenous (IV) lidocaine is often used as an adjunct therapy for pain management in a variety of clinical settings. Recent studies assessing the analgesic efficacy of IV lidocaine have yielded conflicting results regarding its impact on reducing opioid requirements, pain scores, and quality of life. Furthermore, IV lidocaine may cause neurological and cardiovascular adverse effects, and its routine use is not recommended for pain management in critically ill patients. Objectives: The goal of this study is to investigate the efficacy and safety of IV lidocaine as an adjunct therapy for acute pain management. Methods: This was a retrospective, single center, one-group pre/post quasi-experimental study conducted over one year. All patients meeting inclusion criteria were admitted for ≥ 24 hours prior to and following IV lidocaine was initiated for pain control, while patients using patient-controlled analgesia (PCA) pumps were excluded. The primary endpoint was the difference in the total average morphine milligram equivalents (MMEs) administered during the 24-hour periods prior to and following the initiation of IV lidocaine. The change in 24-hour median pain score and the incidence of lidocaine-related adverse effects were also assessed. The primary outcome was analyzed with SAS software using the Wilcoxon Signed-Rank test with a p-value of ≤ 0.05 considered statistically significant. Results: Ninety patients were included. There was no significant difference in 24-hour MME requirements (131.6 vs. 133.7; $P = 0.93$) before and after lidocaine was initiated, however, median pain scores were significantly lower (8.0 vs. 7.0; $P < 0.01$) following lidocaine initiation. Six patients (6.7%) experienced lidocaine-related adverse effects, which were mostly neurological. Conclusion: An opioid-sparing effect of IV lidocaine was not observed, however, IV lidocaine provided a modest benefit in acute multimodal pain control for hospitalized patients. Further study is needed to establish the clinical significance of this benefit.

Exercise at Your Own Risk: Unexplained Syncope and Hypertrophic Cardiomyopathy

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hypertrophic cardiomyopathy, amyloidosis, ,

Abstract/Case Study: A 73-year-old male with coronary disease and stents, atrial fibrillation (AF), hypertrophic cardiomyopathy (HCM), chronic lymphocytic leukemia (CLL) presented with syncope during exercise. Vital signs and labs were normal. ECG revealed AF, low voltage QRS and nonspecific T wave abnormality. Echocardiogram showed LVEF of 40% and mild left ventricular hypertrophy (LVH). Telemetry showed non-sustained ventricular tachycardia. Cardiac catheterization showed patent stents and nonobstructive disease. Low voltage QRS and LVH raised concern for cardiac amyloidosis. Cardiac MRI showed severe asymmetric LVH measuring 17mm, late gadolinium enhancement (LGE) in 60% of LV myocardium in septal and anterolateral walls, inadequate myocardial nulling and high extracellular volume (ECV), suggestive of cardiac amyloid. Serum kappa lambda light chains, serum and urine immunofixation were sent. Urine had abnormal free lambda light chains. Given findings, a defibrillator was implanted. He was sent for endomyocardial biopsy, which revealed myocyte hypertrophy with interstitial fibrosis and was negative for amyloid, confirming "burned out" HCM. HCM, the most common heritable CM, is defined as increased LV wall thickness > 15mm in the absence of other etiology. Other etiologies include genetic sarcomere protein alterations, amyloidosis, neuromuscular diseases (like Friedreich's ataxia), mitochondrial disease, and inborn errors of metabolism (e.g. Pompe and Fabry's disease). Cardiac MRI should be obtained to elucidate etiology. High ECV suggests amyloidosis but can be seen in conditions that increase EC space, including cardiac fibrosis with the late stages of HCM. The abnormal urine test was attributed to his CLL. Our case demonstrates an uncommon diagnostic dilemma which was resolved by endomyocardial biopsy.

Using Human Factors Engineering to Enhance New Trauma Bay Effectiveness

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Abstract/Case Study:Introduction: Spatial design can inadvertently contribute to patient harm and healthcare inefficiencies if the design process does not consider how workers interact with each other and their environments. Human factors engineering (HFE) applies human-centered design assessment to the built environment to evaluate implications for patients and healthcare workers. HFE assessment was applied to a proposed trauma bay design prior to construction. We hypothesized that HFE evaluation would produce significant changes to the trauma bay layout that would improve provider safety and decrease errors and costs. **Methods:** Cardboard mockup of the proposed trauma bay including equipment were created. Mock scenarios and two teams of front-line staff were recruited. An iterative process whereby the architectural plans were adapted by the trauma medical director and then each subsequent team was performed with changes made in real time. We utilized a mixed-methods analysis. Changes were based on qualitative comments. Participants completed a pre and post survey. A series of video analyses were performed including a link analysis, bump analysis, crossover analysis, and a qualitative video review. These data were integrated into layout design recommendations that were provided to the architects. **Results:** Mockup cost was \$2986 and required 10 hours of labor. Two teams of 13 participants completed three trauma scenarios. Staff time for participation was 70 hours while analysis took 36 hours. Survey data indicated improvements in "ability to do your job" from 3.85 to 4.25. Link analysis demonstrated areas in certain layouts that created work inefficiencies (Figure 1). Bump analysis demonstrated a decrease in bumps from 47 to 33. Crossover analysis showed a decrease in patient crossovers from 7 to 0. Estimated cost savings were estimated at \$66,640. **Conclusion:** The opportunity for HFE assessment to be integrated into the construction of new healthcare facilities is rare. Here we present a structured and iterative approach to testing new physical design changes prior to actual building. We identified improvements in staff satisfaction, staff safety and estimated cost. Our study was limited by a lack of statistical rigor due to the low numbers of scenario iterations.

The Cardiovascular Effects of Interleukin-6 Inhibition in Patients with Severe Coronavirus-19 Infection: A Retrospective Study

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IL-6, AFib, COVID-19, Arrhythmias

Background The current atrial fibrillation (AF) paradigm is a progressive fibro-inflammatory "atriomyopathy" driven by positive feedback between electrical and structural remodeling. The coronavirus-19 (COVID-19) pandemic illustrated the relationship between cardiac arrhythmias and pro-inflammatory states. Pro-inflammatory cytokines, including interleukin-6 (IL-6), have significant effects on cardiac conduction. Atrial or ventricular arrhythmias occurring while infected results in a doubling of mortality. Tocilizumab, a monoclonal antibody that blocks the IL-6 receptor, is associated with improved mortality in the critically ill COVID-19 patient. This improvement is thought to be related to immune modulation of the hyperinflammatory state from increased production of cytokines. **Objective** This study aimed to determine if in the setting of severe COVID-19 infection, tocilizumab was associated with a reduced risk of atrial and ventricular arrhythmias, thromboembolic complications, or structural heart disease. **Methods** A single-center retrospective review of all patients with severe COVID-19 infection, defined as admission to an ICU or requirement of respiratory or circulatory support, from March 2020 through March 2022, was conducted. Patients were excluded if ICU admission was not related to COVID-19 or if they had prior tocilizumab treatment. Patients who received or did not receive tocilizumab were grouped into the treatment and control groups respectively. **Results** 473 patients were reviewed and 400 met criteria for inclusion in our study. There were 305 patients in the control group and 95 in the treatment group. In-hospital mortality was greatly reduced with tocilizumab compared to controls (44.2% vs 85.9%) and new onset AF showed a statistically significant reduction (17.8% vs 29.5%). New onset wall motion abnormalities, potentially related to myocarditis or acute coronary syndrome, also trended toward significance with tocilizumab (7.7% vs 15.7%). **Conclusion** As expected, tocilizumab did show significant improvement in mortality. Tocilizumab also showed a significant reduction of new-onset AF. Other cardiac structural endpoints did not reach statistical significance potentially due to activation of multiple inflammatory pathways or the short duration of tocilizumab treatment.

Recurrent Multivessel Spontaneous Coronary Artery Dissection (SCAD) in a Male Patient Revascularized with Coronary Artery Bypass Graft

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spontaneous , coronary , dissection, ischemia

Abstract/Case Study: Conservative management is the preferred treatment for clinically stable patients with spontaneous coronary artery dissection (SCAD). Revascularization may be considered for ongoing ischemic symptoms or high-risk coronary anatomy. We present a male patient with recurrent multivessel SCAD who was ultimately revascularized with coronary artery bypass graft (CABG). A 55-year-old male with a history of hypertension presented with substernal anginal chest pain and non-ST segment myocardial infarction (NSTEMI). Coronary angiogram revealed multivessel radiolucent stenotic lesions consistent with Type 1 SCAD involving the left main, proximal left anterior descending (LAD) arteries extending to the first diagonal branch, and proximal left circumflex artery (LCX). His chest pain resolved, he remained clinically stable, and he was medically managed. He presented one year later with another NSTEMI. He again underwent coronary angiography demonstrating stable lesions in proximal LAD and LCX. There was progression of dissection into the ostial first diagonal to chronic total occlusion and in the ostial second diagonal branch with 99% stenosis. His symptoms were persistent despite medical management. Percutaneous coronary intervention was not felt to be technically feasible. He underwent successful CABG with sequential left interior mammary artery to second diagonal then mid LAD. He subsequently remained asymptomatic in outpatient follow-up. Multivessel SCAD with recurrent ischemia is a challenging clinical entity and is uncommon in men. This patient's disease proved refractory to medical management. At one year, his dissections failed to heal and instead progressed to involve the diagonal branch. Though not a PCI candidate, his disease was high risk for ongoing medical management. CABG has inherent technical limitations in SCAD due to high risk of suturing onto dissected coronary segments, lack of targets, and competitive flow. Fortunately, this patient's CABG was successful. His case offers compelling evidence for considering surgical revascularization in SCAD in specific clinical situations.

Evaluation of Weight-Based Changes to an ACS Heparin Infusion Nomogram

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ACS, Heparin, Pharmacy-Protocol, Obesity

Abstract/Case Study: Background: Literature suggests removing weight-based dosing caps on heparin infusion nomograms decreases time to therapeutic activated thromboplastin time (aPTT). Because of these findings, the heparin infusion nomogram for acute coronary syndrome (ACS) at this institution was changed on July 1, 2021. The heparin initial bolus cap changed from 4,000 to 7,500 units, and the previous maximum initial infusion rate of 1,000 units/hr was removed.

Objective: The purpose of this study is to evaluate if nomogram changes modifying dosing caps increased the incidence of patients achieving a therapeutic aPTT within 24 hours. **Methods:** This retrospective, quasi-experimental study compared patients before (June 1, 2020 to June 30, 2021) and after (August 1, 2021, to August 30, 2022) the nomogram change. Included patients were adults weighing greater than or equal to 83 kg receiving an ACS heparin infusion for at least 24 hours.

Exclusion criteria included any alterations to the standard ACS heparin nomogram, receipt of fibrinolytics, transfer from an outside facility, monitoring with anti-Xa levels, and baseline aPTT greater than 45 seconds. **Results:** One hundred sixty-two patients were included (81 in pre-group, 81 in post-group). There was no significant difference in the incidence of therapeutic aPTT within 24 hours of infusion initiation between groups (66.7% vs. 71.6%, $p = 0.5$) or in time to therapeutic aPTT (13.6 vs 14.1 hours, $p = 0.99$). Initial aPTT was significantly higher in the post group (53 seconds vs. 66 seconds, $p = 0.003$), in addition to a higher incidence of supra-therapeutic initial aPTT in the post group (14.8% vs. 32.1%, $p = 0.009$). There was no difference in the number of bleeding events (5 vs. 1, $p = 0.09$) and no bleeding-related mortalities. **Conclusion:** Modifications to the ACS heparin nomogram dosing caps did not result in a difference in incidence of patients achieving therapeutic aPTT within 24 hours. While these changes resulted in more patients with a supra-therapeutic initial aPTT, there did not appear to be an increase in bleeding events. Including more patients with class 3 obesity may be beneficial in future studies.

Post Occluded Artery Trial (OAT) Management of Late Presenting MI: A Case Report

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Acute, Coronary, Occluded, Cardiac MRI

Abstract/Case Study:Intro Acute STEMI is managed with door to balloon time of 90 minutes, yet data regarding late presenting STEMI remains unclear. The occluded artery trial (OAT) demonstrated successful PCI for this subset of patients provided no clinical benefit in respect to death, heart failure, and reinfarction. Thus, this subset of cardiac patients receive medical therapy alone for an ACS event. Our case seeks to demonstrate that select patients with late presenting STEMI may benefit from PCI contrary to OAT data. Case A 70-yo F with a PMHx of HTN, T2DM, HLD, and GERD presented to the ED for SOB of 1 week duration. She was tachycardic to 114, bp 155/103, 20 bpm, saturating 96% RA. EKG revealed Q waves in leads V1-V3, as well as ST segment elevation in V2. Troponin I 1.46 with proBNP of 4736. Patient was aspirin loaded and started on IV heparin. TTE revealed EF of 20 to 25% with severely decreased systolic function and an aneurysmal LV apex with a mural thrombus. She was started on metoprolol, atorvastatin, Plavix, and Lasix. Cardiac MRI demonstrated dilated LV cavity with EF 25%, aneurysmal apex, LAD wall motion abnormalities consistent with ischemic disease. Cardiac catheterization revealed mild disease of the Left circumflex and RCA along with critical ostial and proximal LAD thrombosis with 99% stenosis with TIMI II flow to the distal LAD and underwent PCI with implantation of DES. TTE performed 3 months later revealed EF to 45-50% with residual mildly decreased global LV dysfunction. Repeat TTE and cardiac MRI 16 months later revealed recovery of EF to 66% with resolution of LV aneurysm and WMA as well as resolution of HF symptoms. Discuss Our case is unique in that the patient continued to have minimal TIMI flow after presenting with STEMI with decreasing troponin. She continued to have significant SOB, her presenting symptom, and shared decision making with the patient resulted in pursuing coronary angiography with PCI. We hypothesize antiplatelet agents along with heparin allowed an avenue for preservation of coronary perfusion, thus allowing for successful PCI and ultimate recovery of EF and resolution of symptoms. The preservation of TIMI I-II flow likely led to decreased reperfusion injury post-PCI as well. We conclude that further studies and a more granular approach is necessary for patients with late presenting STEMI, as this case highlights the importance of multimodality imaging to determine appropriate treatment for this subset of patients.

Effect of aminoglycoside irrigation on cardiac implantable electronic device infection rates

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aminoglycoside, pocket irrigation, infection prevention, cardiac implantable electronic device

Abstract/Case Study:Over the past decade, there has been a dramatic increase in the number of cardiac implantable electronic device (CIED) implants. The incidence of CIED-related infection ranges from 0.1% to 12.6% in de novo implantation and remains a devastating complication of the procedure. The benefit of pre-operative systemic antibiotics and antibiotic-eluting envelopes in reducing infection rates has been well-documented, but the use of direct pocket irrigation with antibiotics remains controversial with limited data to support its use. This study evaluated the effectiveness of aminoglycoside irrigation in reducing CIED-related infection as adjunctive therapy to standard infection-prevention strategies. In this retrospective, single center cohort study, data were collected from de novo CIED implantation procedures in adult patients between July 2022 and March 2023 at Carilion Roanoke Memorial Hospital. Patients were categorized into the aminoglycoside irrigation cohort and the crystalloid-only irrigation cohort based on the presence or absence of irrigant administration data in the EMR and the MAR. The primary outcome was the presence of CIED infection 6 months postoperatively. Secondary outcomes included individual infection subtype, time to infection diagnosis, device complications and outcomes (including device removal, lead extraction, device reimplantation, or isolated pocket erosion), and duration of hospitalization. Of 496 patient records assessed for eligibility, 303 (61%) were excluded and 193 (39%) records were included. Only 1 CIED-related infection, an uncomplicated generator pocket infection, was identified in a patient of the crystalloid-only cohort within one month of CIED implantation. This was managed with topical antimicrobial therapy. The patient did not require hospitalization, device manipulation or removal, and no culture data was available for review. This outcome reflects a CIED-related infection incidence rate of 0.5% in our cohort. The choice of pocket irrigation did not significantly impact CIED infection rates ($p = 1$).

The Comparison of Crystalloids and 5% Albumin for Post-Cardiac Surgery Fluid Resuscitation

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Fluid Resuscitation, Crystalloids, Albumin, Cardiovascular

Abstract/Case Study: Introduction/Hypothesis: Patients undergoing cardiac surgery often require post-operative volume expansion. The type of fluid used for volume expansion remains debated between crystalloids and colloids. The purpose of this study is to evaluate the impact of crystalloid fluid administration compared to 5% albumin for post-cardiac surgery resuscitation on the incidence of adverse events. **Methods:** This was a single-center, quasi-experimental study that reviewed post-cardiac surgery patients who received 5% albumin vs crystalloids for post-operative fluid resuscitation. The primary outcome measured the incidence of ≥ 1 adverse event as a composite outcome of acute heart failure, acute kidney injury, new onset arrhythmia, and volume overload. Secondary outcomes measured the incidences of each adverse event measured in the primary outcome, total fluid volume administered post-operatively, in-hospital mortality, length of stay (LOS), and cost of fluids. Data was analyzed using descriptive statistics, Chi-squared, and Mann-Whitney tests via SAS® Viya. **Results:** One hundred seventy-two patients were included. No statistically significant differences in baseline characteristics were noted. The primary outcome did not demonstrate a difference in the presence of at least one adverse event (77.5% vs 83.7%, $p = 0.30$). For secondary outcomes, there were no differences in the incidence of adverse events included in the composite outcome, but the albumin group was noted to have increased BARC Type 4 bleeding and longer duration of vasopressors. At 72 hours, the crystalloid group was associated with higher volume administered. The total cost was significantly different in comparing the albumin vs crystalloid groups (\$493.30 vs \$12.79, $p < 0.0001$). **Conclusions:** Use of 5% albumin compared to crystalloids in post-cardiac surgery fluid resuscitation did not demonstrate differences in the incidence of adverse events associated with fluid administration despite a large amount of volume being administered in the crystalloid group. The albumin group showed higher rates of BARC type 4 bleeding, longer duration of vasopressors, and increased cost of fluids. The use of crystalloids in post-cardiac surgery patients for volume expansion may provide a cost-saving opportunity without increasing adverse events in patients undergoing cardiac surgery.

Evaluation of Intravenous Push Levetiracetam in Pediatrics

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keppra, levetiracetam, pediatric, intravenous-push

Abstract/Case Study: Purpose: Administration of levetiracetam as an undiluted intravenous push (IVP) rather than a diluted intravenous piggyback (IVPB) can be a potential cost and time-saving measure. Recently, IVP levetiracetam has been shown to be safe at doses up to 40 mg/kg (up to 3000 mg) in pediatric patients. This retrospective, quasi-experimental study was designed to characterize the safety profile and time to administration in pediatric patients after a practice change from IVPB to IVP administration for doses up to 60 mg/kg or 4500 mg. Methods: Patients aged 3 months to 18 years of age, not in the neonatal intensive care unit, were eligible for inclusion if they received a loading dose or once dose of intravenous (IV) levetiracetam. Patients were grouped based on receipt of IVPB or IVP levetiracetam. The primary outcome was the time to administration. Key secondary outcomes included incidence of post-dose bradycardia and hypotension. Results: A total of 178 patients were included in this study. There was a non-statistically significant decrease in time to administration in the IVP group compared to the IVPB group (26.9 minutes vs 33 minutes, $p = 0.071$). No difference in key secondary outcomes, including post-dose hypotension and bradycardia, was detected. Conclusion: Changing from IVPB to undiluted IVP levetiracetam in pediatric patients, with a maximum dose of 60 mg/kg or 4500 mg, led to decrease in time from order entry to administration and was not associated with an increase in adverse safety events.

Comparison of Misoprostol and Dinoprostone for Labor Induction

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Labor, Delivery , Obstetrics,

Abstract/Case Study:Objective: Prostaglandin analogs are utilized for cervical ripening resulting in the induction of labor. In the literature, preference between using misoprostol or dinoprostone based on efficacy alone for labor induction has not been established. The purpose of this study was to determine whether misoprostol or dinoprostone had more favorable safety and efficacy outcomes in the induction of labor. **Methods:** This was a single-center, retrospective cohort review of labor and delivery patients with orders for misoprostol or dinoprostone from June 1, 2022, to May 31, 2023. The study sample size was limited to 300 patients, split in a 1:1 ratio. Adult patients receiving misoprostol or dinoprostone admitted to Carilion Roanoke Memorial Hospital for labor induction were included. The primary endpoint was rate of vaginal delivery within 24 hours. Secondary endpoints included a subgroup analysis of vaginal delivery within 24 hours for oral and vaginal misoprostol, average time to vaginal delivery from first dose of labor induction agent (hours), rate of uterine hyperstimulation, rate of fetal tachycardia, frequency of postpartum hemorrhage, frequency of Cesarean delivery, and average total doses of labor induction agent administered. **Results:** The odds of a vaginal delivery within 24 hours were 5.11 times more likely in the misoprostol treatment group (OR=6.11; 95% CI = 2.09-17.83, p=0.0006). **Conclusion:** Use of misoprostol increased the likelihood of vaginal delivery within 24 hours when compared to dinoprostone and showed no differences in safety.

Emergent therapy for Sympathetic Crashing Acute Pulmonary Edema with High-dose Nitroglycerin

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Abstract/Case Study:Introduction/Hypothesis: Sympathetic Crashing Acute Pulmonary Edema (SCAPE) is a life-threatening complication in patients with heart failure. The management of SCAPE primarily focuses on respiratory support with non-invasive ventilation and afterload reduction, necessitating the need for high-dose nitroglycerin (HDN) infusions. The purpose of this study is to determine the timing of SCAPE resolution due to HDN for patients in the emergency department of a large academic medical center and to determine optimal dosing strategies while mitigating risks associated with SCAPE and HDN. **Methods:** This retrospective, descriptive, cross-sectional study included adult patients ≥ 18 years old who were prescribed nitroglycerin (NTG) infusions that reached rates ≥ 100 mcg/min in the emergency department (ED) between January 1, 2019 and January 31, 2023. Patients were included if they had an initial systolic blood pressure (SBP) ≥ 160 mmHg and respiratory distress noted by an ED physician. Patients who were pregnant or were incarcerated were excluded from this study. Primary outcome measure was median time to normalization of SBP based on the NTG infusion order. Secondary outcomes included incidence of unfavorable outcomes, median patient hospital length of stay, and median ED length of stay. **Results:** A total of 236 patients were screened from January 1, 2019 to January 31, 2023. Of those patients, 61 patients were included in the study and analyzed. The median time to SCAPE resolution based on blood pressure parameters set by the nitroglycerin infusion orders was 116 minutes. The incidence of reported adverse effects were hypotension 13.1% (8/61), headache 8.2% (5/61), endotracheal intubation 8.2% (5/61), and syncope 3.3% (2/61). The median ED length of stay was 9.4 hours and median hospital length of stay was 3.2 days. **Conclusions:** The use of high-dose nitroglycerin (≥ 100 mcg/min) was demonstrated to be safe and led to the successful resolution of SCAPE. Additional studies are needed to determine appropriate dosing and titration strategies for the role of high dose nitroglycerin in SCAPE.

Failure in re-implantation of avulsed teeth stabilized with a flexible splint

Zachary Rubin

Abstract/Case Study:After avulsion of teeth, a flexible splint may be used to stabilize re-implanted teeth in an attempt to preserve them. The success of the re-integration of the avulsed teeth depends on the time since the trauma, the medium in which the teeth are stored before re-implantation, and the type of splint used, among other factors. A 17-year-old female was involved in a motor vehicle accident, after which the teeth were stored in milk and then re-implanted 16 hours later. While the teeth initially appeared to be re-integrating well, at a six-week follow-up the roots showed signs of advanced resorption. Prior to the crash, the patient's medical history included depression and migraines. She fractured her C7 left lamina, nasal bone, and nasal spine, as well as avulsing #8 and #9. The patient was aesthetically motivated to preserve or replace her maxillary central incisors. Upon examination, her alveolar bone was without fracture. Teeth #8 and #9 were re-implanted and stabilized from right canine to left canine with a semi-rigid nylon splint and secured with flowable composite, etched and bonded to each tooth. When the teeth were re-implanted, clotting had already begun and was not sufficiently disrupted, so the teeth were further displaced in the incisal direction. The patient was then seen for a two-week follow-up appointment, per the recommended interval. The teeth were still mobile but the roots appeared normal. It was then planned for the patient to come back one month later for another follow-up and to remove the splint and initiate begin endodontic therapy. At the next follow-up appointment, root resorption was evident and the radiograph and the tissues surrounding the maxillary incisors were tender and inflamed. The teeth no longer appeared restorable. Instead, the splint was removed and an impression was taken and an acrylic appliance was designed and fabricated. The patient was then seen another month later for extraction of #8 and #9 and delivery of the appliance.

Splinting should be considered a last resort to save avulsed teeth. To maximize the chance of success, the patient should be seen within 30 minutes of the trauma. Milk is a good but not ideal medium for preservation. In situations where less than ideal conditions exist for re-implantation, the patients should be made very clear that failure to re-integrate is likely and alternative plans should be considered, although splinting can still be considered as a temporary treatment.

Effect of an Albumin 5% Drug Shortage on Patient Outcomes in Elective Hip and Knee Joint Arthroplasty

Emily Conard, PharmD, Kristen Ritchie, PharmD, Ashley Milkovits, PharmD, BCCCP, Allyson Cuddy, PharmD, Brad McDaniel, PharmD, MBA, BCCCP

Carilion Roanoke Memorial Hospital

Albumin, Knee Arthroplasty, Hip Arthroplasty, Albumin Shortage

Abstract/Case Study: Albumin 5% usage remains at the center of a clinical debate on intravenous fluid selection and the need for blood products in perioperative care. Albumin, a colloid, was used with crystalloid fluids for elective hip and knee arthroplasties at this institution before the 2022 national albumin shortage. This study aimed to evaluate the need for blood products in elective hip and knee arthroplasty patients during the shortage compared to a pre-shortage group. This quasi-experimental study was undertaken as a healthcare delivery quality assurance project, and as such, was not reviewed as human subjects research. The Health Analytics Research Team at Carilion Clinic Roanoke Memorial Hospital extracted data on 1086 surgical encounters from October 18, 2021 to February 13, 2022 for the pre-shortage group and from October 18, 2022 to February 13, 2023 for the during-shortage group. Inclusion criteria for both groups included individuals ≥ 18 years old who underwent elective hip or knee arthroplasty. Patients met inclusion criteria for the pre-shortage group if they received albumin intraoperatively, and they were included for analysis during the shortage if they received crystalloid fluid alone intraoperatively. Patients were excluded if they were pregnant, had end stage renal disease defined as $eGFR < 15$ mL/min/1.73 m², refused blood products, or received albumin during the shortage. The primary outcome was blood product use during the encounter. Key secondary endpoints included incidence of vasopressor administration and 30-day hospital readmission rate. A random sample of 164 total encounters were reviewed, comprised of 51 encounters in the pre-shortage group and 49 in the during-shortage group with 65 encounters excluded. Baseline characteristics were similar between both groups except for the type of elective procedure, with more patients in the pre-shortage group undergoing anterior total hip arthroplasty ($p < 0.01$). For the primary outcome, no patients in either group received blood products intraoperatively ($p = 0.49$); however, one patient did receive blood products post-operatively ($p = 0.49$). Vasopressor use ($p = 0.22$) and 30-day hospital readmissions ($p = 0.17$) did not differ significantly between groups. Discussions regarding the role of colloid/albumin therapy may lead towards improved resource utilization. Further studies may be helpful to investigate the optimal fluid resuscitation selection for elective knee and hip arthroplasties.

Two Case Reports of Osteonecrosis of the Jaw

Joanna Al Obaidi

Abstract/Case Study: Osteonecrosis is defined as the death of bone cells. It is classified as drug-induced osteonecrosis, osteoradionecrosis, traumatic, non-traumatic, and spontaneous osteonecrosis. Drug induced osteonecrosis is caused by Antiresorptive or antiangiogenic drugs. Osteoradionecrosis is induced by severe radiation therapy for head and neck cancer. The main aim of this poster is to introduce two cases of osteonecrosis of the jaw, with similar clinical presentation, and different backgrounds, in addition to discussing the various treatment modalities.

Nomogram to predict aneurysmal origin of intracranial subarachnoid hemorrhage: a user-friendly tool for clinical decision making

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subdural hemorrhage, clinical, decision making, nomogram

Abstract/Case Study:Introduction While intracranial aneurysm rupture is the most common etiology of intracranial subarachnoid hemorrhage (SAH), up to 20% of cases are reported to be of non-aneurysmal origin. There is lack of user-friendly prediction systems to aid in clinical decision making after initial negative angiogram to optimize further patient disposition and clinical management. Objective To develop a predictive nomogram tool incorporating significant clinical and radiographic predictors of aneurysmal SAH. Methods Demographic, clinical, and radiographic data of non-traumatic SAH patients treated at our institution between 2013 and 2021 were collected and analyzed. Univariate and multivariate statistical analyses were performed yielding significant SAH origin predictors that were incorporated into a predictive nomogram. Results A total of 167 patients were included with 70 patients in the aneurysmal and 98 patients in the non-aneurysmal SAH groups. Univariate analyses identified patient sex ($p=0.01$), modified Fisher grades ($p<0.0001$), presence of hydrocephalus ($p<0.0001$) and intraventricular hemorrhage ($p<0.0001$) to be significantly different between the aneurysmal versus non-aneurysmal origin SAH groups. Multivariate logistic regression identified hemorrhage presence in the suprasellar cistern (OR 8.4, 95% CI 2.6 - 32.1, $p=0.0008$), hemorrhage absence in the foramen magnum (OR 0.13, 95% CI 0.04 - 0.39, $p=0.007$) and hydrocephalus (OR 8.6, 95% CI 3.3 - 24.5, $p<0.0001$) to be independent predictors of aneurysmal origin SAH. A nomogram incorporating these factors was created, internally validated, and confirmed using bootstrapping. It demonstrated good accuracy in estimating the risk of aneurysmal origin SAH with a C-index of 0.83 (95% CI 0.72 - 0.95). Conclusions Our study provides a convenient nomogram that incorporates easily identifiable factors determining aneurysmal origin of SAH. The nomogram can be easily used at the point-of-care setting to aid in disposition and clinical decision making in cases of initial angioneegative SAH.

Synchronous multifocal spinal undifferentiated pleomorphic osteosarcoma with a novel TDP52L2:AHRR fusion mutation

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osteosarcoma, mutation, ,

Abstract/Case Study: Synchronous multifocal osteosarcoma of the spine is a rare and poorly understood subtype of osteosarcoma. Indeed, the synchronous subtype accounts for only 0.4% to 4.2% of all osteosarcoma cases and involves the vertebral column in 8% cases. Given the rarity of this neoplastic process, the natural history, pathophysiology, and mutational diversity of this lesion remain largely unknown. Here, we present a case of a 56-year-old female with synchronous multifocal spinal undifferentiated pleomorphic osteosarcoma with a novel TDP52L2:AHRR fusion mutation. Furthermore, we emphasize the current genetic landscape of osteosarcoma and the pathogenic implications of a TDP52L2:AHRR fusion gene.

Talonavicular Fusion Rates with Augment: Comparing Dorsal Plate with Lag Screw versus Nitinol Staple Constructs

Kelly Kugach, Blayne Patton, John R. Clements

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Fusion, Orthopedics, Constructs,

Abstract/Case Study: Purpose: Talonavicular arthrodesis (TNA) is indicated for many pathologies including arthritis, flatfoot, and coalitions. There are several fixation constructs including dorsal plating, lag screw, and staples. The aim of this study is to assess the fusion rates across various TNA constructs. Methodology & Procedure: A retrospective multi-surgeon study identified 19 patients with TNA utilizing various fixation constructs: dorsal plate with lag screw, nitinol staple, and nitinol staple with lag screw with the use of augment from May 2019-March 2023. Fusion rates across the talonavicular joint were obtained using AP, oblique, and lateral radiographs. Fusion was defined as presence of bony bridging and obliteration of joint space across the arthrodesis site.⁴ Results: All constructs achieved fusion. There was no significant difference in time to union between dorsal plate with lag screw (104.1 ± 38.7 days) vs. all nitinol staple cohorts (130.5 ± 53.5 days). Within the nitinol staple cohort there were 3 distinct constructs: two staples, 3 staples, and staple with lag screw. Nitinol staples with lag screw (102.7 ± 30.1 days) had similar time to union as the dorsal plate with lag screw (104.1 ± 38.7 days). Analysis & Discussion: Fusion will occur across the TNA site regardless of fixation construct. This study shows no statistical difference between plating and nitinol staple cohorts but shows similar fusion rates between dorsal plates and nitinol staple cohorts with lag screws. Staples are known to be easy to use and have faster application rates. Given their faster application rates and similar fusion rate to dorsal plate with lag screws, nitinol staples can be used as a viable alternative fixation construct in TNA.

First Episode Psychosis in a Teen with Narcolepsy and Cataplexy

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Psychosis, Narcolepsy, First episode psychosis,

Abstract/Case Study: Narcolepsy with cataplexy (NT1) is a sleep disorder very rarely associated with early-onset psychosis. The incidence of this association is unknown but appears to be more common in children and adolescents. This combination of diagnoses presents a diagnostic and therapeutic challenge. This case report discusses an adolescent female with first-episode psychosis who was being treated for NT1 and had no prior psychiatric history. After ruling out other possible medical causes, she was given an initial diagnosis of a brief psychotic episode and treated with Risperidone while continuing treatment for NT1 with Modafinil and Venlafaxine. Following partial response to Risperidone, her psychosis improved with Chlorpromazine, one of the first documented cases of successful use of this medication for first-episode psychosis with NT1.

Rate of Recurrent Osteomyelitis after Partial Foot Amputation in Diabetics

David Calderwood DPM, Isabella Saley DPM, Jessica Katzer DPM, Kelly Kugach DPM, Blayne Patton DPM

Carilion Clinic

Osteomyelitis, Amputation, Diabetic,

Abstract/Case Study: Purpose: Limb salvage is a balance between surgical and medical therapies in order to treat infection, while still maintaining essential ligamentous and tendinous attachments required to maintain a plantigrade foot and prevent further transfer ulceration. IDSA guidelines currently guide treatment. Although there is only 'weak recommendation, low evidence' to support this. Furthermore, there is no description of the effect residual osteomyelitis after surgical resection has on healing rates or prognosis. The aim of this study is to evaluate re-amputation rates in patients with negative margins not requiring IV antibiotics vs positive (residual OM) margins subsequently treated with IV antibiotic therapy. Methodology & Procedure: Data was collected for 116 patients who underwent a forefoot amputation, including digital, partial ray and transmetatarsal amputations, for treatment of osteomyelitis secondary to a diabetic foot infection at a single institution. The data included demographics, laboratory findings, method of diagnosis, pathology results, antibiotics treatment course, and subsequent procedures. Power analysis was performed to estimate the required sample size using a significant alpha level of 5% and power level of 0.8. A Chi-Square test was performed to test the association between having histologically positive margins after a foot amputation and the risk of returning to the OR within 1 year even after completing a 6-week course of antibiotics. Results: Among our population of 116 patients, 99 patients had surgical margins negative for acute osteomyelitis and 17 patients had positive margins with subsequent treatment with 6 weeks of IV antibiotics after an initial forefoot amputation procedure. 33% (33/99) of patients with initial negative margins had a recurrent infection resulting in a more proximal amputation within a year. 64% (11/17) of patients with initial positive margins and treatment with the standard 6 weeks of IV antibiotics had to return for a re-amputation. We found a statistically significant association between positive margins post amputation and the likelihood of returning for re-amputation despite IV antibiotic therapy. Analysis & Discussion: This study shows aggressive resection to ensure removal of all bone infection is advantageous to healing potential, preventing further infection and improving patient prognosis. Our findings support physicians a more aggressive approach to limb salvage.

Comparison of First Metatarsal Phalangeal Joint Arthrodesis Fusion Rates with and without use of interfragmentary screw fixation.

Jennifer Wentz, Jessica Katzer, Kelly Kugach, Jason Naldo

Carilion Clinic

Arthrodesis, Post-op Outcomes, First MPJ,

Abstract/Case Study: Purpose: Current fusion rates for first metatarsophalangeal joint (MPJ) are quoted ~90% in the literature. Biomechanical studies have shown the plate with interfragmentary screw construct to be about 3x more stable than a lag screw alone and 10x stronger than a plate alone. The aim of this study is to determine if the decreased stability in a plate alone construct places a patient at increased risk for post-operative complications or elongated recovery time by evaluating time to weight bearing, fusion rates and complication rates. **Methodology & Procedure:** 50 patients underwent 1st MPJ arthrodesis without addition of a lag screw by a single provider for treatment of hallux limitus/rigidus or hallux valgus. The minimum follow-up time was 1 year. Time to weightbearing, fusion rates, complications, adjunctive procedures, and patient demographics were evaluated. **Results:** 50 patients underwent 1st MPJ arthrodesis without use of a lag screw with average age of 59 (range 32-81). Average time to radiographic fusion was 48 days. Average time to protected weightbearing was 13.5 days and time to unprotected weightbearing was 48 days. Three patients experienced complications, including nonunion or delayed union, resulting in a 94% union rate. Four (8%) patients had difficulty with hardware irritation/pain and underwent subsequent hardware removal. **Analysis & Discussion:** Although a plate only construct lacks stability biomechanically when compared to the standard screw/plate construct, we determined patient outcomes and recovery times are not affected by omission of the lag screw. This information is beneficial to surgeons, as performing 1st MPJ arthrodesis without an interfragmentary screw could cut down OR time, patient anesthesia, and implant costs.

Medication Use Evaluation: Phenobarbital for Alcohol Withdrawal

Jenna Marshall, PharmD, Megan Rhoten, PharmD, BCCP, Jessica Daniell, PharmD, Jessica Schad, PharmD, BCPS, Tamara Davidson, PharmD, BCPS

Abstract/Case Study: Purpose: Phenobarbital is an alternative medication to benzodiazepines for treatment of alcohol withdrawal, both alone and as an adjunct to other medications. Advantages of phenobarbital include its long half-life, which is anywhere from 80-120 hours, however it has many drug interactions which can make it seem like a less favorable option. The American Society of Addiction Medicine published guidelines in 2020 for alcohol withdrawal, which includes dosing of PHB, offer multiple different dosing strategies. Currently at Carilion Roanoke Memorial Hospital, there is not an established protocol for optimal phenobarbital dosing strategies in patients with alcohol withdrawal. This study aimed to assess the current phenobarbital dosing strategies used at this institution. Methods: This retrospective chart review included adult patients receiving phenobarbital for alcohol withdrawal from March 16, 2022 to September 16, 2023. Outcomes of interest include cumulative doses of phenobarbital administered (both in mg and mg/kg of ideal body weight unless otherwise specified) at 24, 48, and 72 hours. Concomitant medications were also collected including how many milligrams of benzodiazepines (in lorazepam equivalents) were administered during the 24 hours prior and post-phenobarbital initiation, as well as clonidine, gabapentin, dexmedetomidine, propofol, and antipsychotics. Additional outcomes including the revised Clinical Institute Withdrawal Assessment for Alcohol scores (CIWA-Ar scores) prior to and during treatment, respiratory failure requiring intubation, and breakthrough seizures were collected. Results: A total of 19 patients with 23 encounters thus far have been collected and analyzed. The median dose of phenobarbital administered at 24, 48, and 72 hours was 389.4 mg, 648 mg, and 649.8 mg, respectively; and weight-based dose was 6 mg/kg, 9.5 mg/kg, and 10.5 mg/kg, respectively. In addition, the median benzodiazepine dose administered prior to phenobarbital initiation was 4 mg and the median 24 hours after initiation was 2 mg. These are interim results and full results will be available at Carilion Research Day. Conclusion: Further analyses should be performed to develop a protocol for safe and effective use for the prevention/treatment of alcohol withdrawal in patients admitted to CRMH.

Post and Core Technique in the Restoration of Damaged Dentition: Two Case Studies

David Tang, DMD

Carilion Clinic GPR

post and core, root canal therapy, dental crown, retention

Abstract/Case Study:In dentistry, a post and core is a type of restoration used to rebuild a tooth that has been extensively damaged by decay or trauma. Typically, a post and core is used after root canal therapy to provide a stable foundation for the retention of a full-coverage restoration, such as a crown. The main aim of this poster is to discuss treatment modalities of post and core placement after root canal therapy and their subsequent use to retain a permanent restoration. It details two cases how this restoration technique can restore function to damaged teeth.

Effect of an Albumin 5% Drug Shortage on Patient Outcomes in Elective Hip and Knee Joint Arthroplasty

Emily Conard, PharmD; Kristen Ritchie, PharmD; Ashley Milkovits, PharmD, BCCCP; Allyson Cuddy, PharmD; Brad McDaniel, PharmD, MBA, BCCCP

Carilion Roanoke Memorial Hospital

Albumin, Fluid Resuscitation, Hip and Knee Arthroplasty, Drug Shortage

Abstract/Case Study: Albumin 5% usage remains at the center of a clinical debate on intravenous fluid selection and the need for blood products in perioperative care. Albumin, a colloid, was used with crystalloid fluids for elective hip and knee arthroplasties at this institution before the 2022 national albumin shortage. This study aimed to evaluate the need for blood products in elective hip and knee arthroplasty patients during the shortage compared to a pre-shortage group. This quasi-experimental study was undertaken as a healthcare delivery quality assurance project, and as such, was not reviewed as human subjects research. The Health Analytics Research Team at Carilion Clinic Roanoke Memorial Hospital extracted data on 1086 surgical encounters from October 18, 2021 to February 13, 2022 for the pre-shortage group and from October 18, 2022 to February 13, 2023 for the during-shortage group. Inclusion criteria for both groups included individuals ≥ 18 years old who underwent elective hip or knee arthroplasty. Patients met inclusion criteria for the pre-shortage group if they received albumin intraoperatively, and they were included for analysis during the shortage if they received crystalloid fluid alone intraoperatively. Patients were excluded if they were pregnant, had end stage renal disease defined as $eGFR < 15$ mL/min/1.73 m², refused blood products, or received albumin during the shortage. The primary outcome was blood product use during the encounter. Key secondary endpoints included incidence of vasopressor administration and 30-day hospital readmission rate. A random sample of 164 total encounters were reviewed, comprised of 51 encounters in the pre-shortage group and 49 in the during-shortage group with 65 encounters excluded. Baseline characteristics were similar between both groups except for the type of elective procedure, with more patients in the pre-shortage group undergoing anterior total hip arthroplasty ($p < 0.01$). For the primary outcome, no patients in either group received blood products intraoperatively ($p = 0.49$); however, one patient did receive blood products post-operatively ($p = 0.49$). Vasopressor use ($p = 0.22$) and 30-day hospital readmissions ($p = 0.17$) did not differ significantly between groups. Discussions regarding the role of colloid/albumin therapy may lead towards improved resource utilization. Further studies may be helpful to investigate the optimal fluid resuscitation selection for elective knee and hip arthroplasties.

A Case of Congenital Bicuspid Aortic Valve with Moderate to Severe Aortic Regurgitation in a 33-year-old male

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Carilion Clinic

Aortic regurgitation, Bicuspid aortic valve, Pre-syncope, Holodiastolic murmur

Abstract/Case Study:In the young adult, pre-syncope can have a variety of etiologies which should all be considered when evaluating the patient. This case reviews a 33-year-old male who presented with post viral cough and a documented history of intermittent pre-syncopal episodes, which had been attributed to pre-existing anxiety with physical manifestations. During this encounter, the patient's previous imaging was reviewed which demonstrated hyperinflated lungs in a non-smoker and non-asthmatic. Physical exam was notable for a holodiastolic murmur not noted on previous examinations. The patient was ultimately found to have a congenital bicuspid aortic valve with moderate to severe aortic regurgitation, prompting cardiology evaluation for mechanical valve replacement. Congenital valvular abnormalities can be a cause of pre-syncope and syncope in a young healthy adult. Those that present with features of marfanoid body habitus should receive thorough cardiac examination with a low threshold for echocardiogram evaluation.

Herpetic Keratitis Manifesting as Recurrent Preseptal Cellulitis

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Preseptal cellulitis, Periorbital cellulitis, Herpes simplex virus, Herpetic Keratitis

Abstract/Case Study: Introduction: Preseptal cellulitis is typically caused by the spread of bacteria from rhinosinusitis or direct trauma. We present a case of HSV-1 keratitis manifesting as preseptal cellulitis. Given the risk to ocular structures and the need for antivirals, viral etiologies should be considered in immunocompromised patients, cases of recurrent disease, or in cases unresponsive to antibiotic treatment. Case Presentation: A 42-year-old male with end-stage kidney disease secondary to lupus nephritis presented with recurrent acute painless unilateral left periorbital erythema and upper eyelid edema. The patient denied visual changes or restriction of movement in the left eye but did endorse clear watery discharge. CT orbit supported preseptal cellulitis without evidence of abscess. The patient was empirically treated with ampicillin-sulbactam and vancomycin without improvement. The patient was started on empiric prednisone and valacyclovir, and a sample of eye drainage was sent for HSV PCR. The patient had rapid improvement of tissue swelling and the swab resulted positive for HSV-1. Antibiotics were discontinued and the patient was initiated on lifelong suppressive antiviral therapy. Discussion: Preseptal cellulitis is most commonly associated with staphylococcus, streptococcus, and H. Influenzae bacterial infections. There are only three case reports in the literature discussing the presentation of herpes viruses (HSV-1 and VZV) as panophthalmitis. We believe our case is the fourth. HSV-1 is responsible for the feared complication of herpes keratitis--a leading cause of corneal blindness, as well as conjunctivitis, blepharitis, chorioretinitis, and acute retinal necrosis. Given the risk of blindness from untreated HSV keratitis, it is important to consider alternative etiologies in immunocompromised individuals with suspected preseptal cellulitis as atypical presentation is more likely in the population.

Triple Valve Endocarditis- A Comprehensive Review of the Literature

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Endocarditis, Multi-valve, ,

Abstract/Case Study: Introduction: Multi-valve endocarditis with triple valve involvement is a rare phenomenon and presents a unique management challenge to physicians given the paucity of summative analyses. Methods: Google Scholar and PubMed databases were searched for terms related to triple valve endocarditis (TVE). Articles published up until Dec 31st, 2023 were included. Results: We identified 42 published cases of triple valve endocarditis. The most frequent comorbidities observed were preexisting valvular and structural pathology (n=9), diabetes (n=7), IVDU (n=7), and dental/oral disease (n=6). Aortic, tricuspid, and mitral valve involvement occurred at similar frequencies (n=40, 38, and 37 instances, respectively), and pulmonic valve involvement occurred far less frequently (n=11). The most common source of infection was dental/oral (n=11). Streptococcus spp was the most common organism isolated (n=16), followed by Staphylococcus spp (n=9). Surgical repair occurred in 64.3% (n=27) of cases, and the most common surgery was valve replacement (n=23) followed by valve repair (n=10). Endocarditis complications included valvular insufficiency (n=33) and heart failure (n=15). Most patients were discharged from the hospital (n=27), but there were 10 in-hospital deaths and four discharged to hospice care. Discussion: Our findings indicate that TVE is a pathology with a high in-hospital mortality rate of 27.0% (causes of unknown mortality were excluded), which is comparable to single-valve endocarditis (SVE) mortality (17.2-28.0%). Of the patients who died, 50% did receive surgery. A review of the literature found that multi-valve surgery rates are comparable to that of single-valve. Aggressive surgical intervention is likely a necessity for salvageable patients. Whether early or more frequent multi-valve surgery results in outcomes similar to that of surgery for SVE remains unclear. Conclusion: TVE is a morbid condition with high in-hospital mortality and one that usually requires surgical treatment of one or more valves. While a majority of patients can be discharged from the hospital, the longer-term survival compared with single-valve endocarditis is unknown and warrants further investigation.

Utility of PET-CT scan in patients with Staphylococcus aureus bacteremia

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PET-CT, Staphylococcus bacteremia, ,

Abstract/Case Study: Introduction: Staphylococcus aureus bacteremia is a common yet serious infection with high morbidity and mortality. Our investigation aims to show that PET-CT is a useful modality with respect to improving mortality in patients with Staph aureus bacteremia. Methods: Data collection involved retrieving information from two primary sources: the EPIC Clarity database and manual chart reviews within the Epic electronic health record system. The study included hospitalized patients at CMC diagnosed with Staph aureus bacteremia from November 2020 to November 2022. Logistic regression analysis was employed to evaluate the association between the performance of a PET-CT scan and mortality, while controlling for potential confounding variables. Results: A total of 132 patients with Staph aureus bacteremia were split into two, equal subgroups based on if they underwent PET-CT or not. The mean age of the study population was 57.22 years \pm 17.34, with. The majority of patients were of White or Caucasian race (PET group: 95.45%, without PET group: 84.85%). There was a relatively balanced distribution of sex among the groups PET and without PET groups (60.61% males vs 59.09%, respectively). Patients who underwent a PET-CT had lower odds of mortality compared to those who did not undergo the scan (OR=0.404, 95% CI: 0.167-0.980, p=0.0451). In the PET-CT group, PET-CT detected a new foci of infection in 57.6% of cases and a source control procedure was performed in 25.8% of cases as a result of PET-CT findings. Conclusions: These results underscore the potential clinical utility of PET-CT in guiding therapeutic interventions. PET-CT scans offer a comprehensive assessment of infection localization and disease extent, enabling clinicians to identify occult foci of infection and tailor treatment strategies accordingly. The ability of PET-CT scans to detect additional sources of infection beyond the bloodstream may facilitate prompt and targeted interventions.

Medication Use Evaluation of Angiotensin II

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Angiotensin II, Shock, Vasopressors, Medication Use Evaluation

Abstract/Case Study: Angiotensin II (ATII) is a synthetic peptide approved for hypotension in patients presenting with septic shock. By targeting a different mechanism of vasoconstriction, it's hypothesized to further improve mean arterial pressure (MAP) when patients have reached maximal catecholamine vasopressor doses. Carilion added ATII to formulary with specific use criteria. This medication use evaluation aims to determine whether the use criteria are adequate in identifying patients who are most likely to benefit from ATII. **Methods:** Patients who received ATII from July 2020 to November 2023 were identified and randomized for data collection. Each encounter was evaluated for eligibility based on indication and use criteria. Rates and number of vasopressors at ATII initiation were collected. Evaluation of efficacy occurred 3 hours after initiation of ATII for MAP ≥ 65 mmHg, increase in MAP ≥ 10 mmHg, and stable/reduced vasopressor doses. Additional endpoints such as appropriateness of use based on current use criteria, survival to ICU discharge, and survival to hospital discharge were documented. **Results:** Sixty patients were included in this evaluation; 33% of patients met exclusion criteria, 65% of which were excluded for use in cardiogenic shock. Of those treated for vasodilatory shock, 51% of patients were deemed to have appropriate ATII use and 63% met at least one efficacy criteria at 3 hours. The most common reason for inappropriate use in vasodilatory shock was the lack of maximal doses of two or more vasopressors prior to initiation of ATII (32%). No patients receiving ATII for perioperative vasoplegia met vasopressor requirements prior to ATII initiation and were all deemed inappropriate. In evaluating overall mortality, 48% of patients expired on ATII, 28% survived to ICU discharge, and 20% survived to hospital discharge. Patients treated for vasodilatory shock who did not meet use criteria had a higher survival rate (17.4%) compared to those who did meet use criteria (12.5%). **Conclusion:** Initial results demonstrate that only half of patients receiving ATII for vasodilatory shock met current use criteria. Based on efficacy results and survival rates in those who did not meet use criteria, updates to current criteria such as decreasing the required vasopressor requirements and time spent persistently hypotensive may be warranted. Additionally, continued guidance and education to providers on the appropriate indications for AT

Evaluation of Weight-Based Changes to an ACS Heparin Infusion Nomogram

Albert Thompson, PharmD; Kaley Hart, PharmD; Hannah Hall, PharmD, BCPS; Melissa Hobbins, PharmD, BCPS; Megan Rhoten, PharmD, BCPS, BCCP; Jennifer Wright, PharmD, BCPS

CRMH

Abstract/Case Study: Evaluation of Weight-Based Changes to an ACS Heparin Infusion Nomogram
Albert Thompson, PharmD; Kaley Hart, PharmD; Hannah Hall, PharmD, BCPS; Melissa Hobbins, PharmD, BCPS; Megan Rhoten, PharmD, BCPS, BCCP; Jennifer Wright, PharmD, BCPS

Background: Literature suggests removing weight-based dosing caps on heparin infusion nomograms decreases time to therapeutic activated thromboplastin time (aPTT). Because of these findings, the heparin infusion nomogram for acute coronary syndrome (ACS) at this institution was changed on July 1, 2021. The heparin initial bolus cap changed from 4,000 to 7,500 units, and the previous maximum initial infusion rate of 1,000 units/hr was removed. **Objective:** The purpose of this study is to evaluate if nomogram changes modifying dosing caps increased the incidence of patients achieving a therapeutic aPTT within 24 hours. **Methods:** This retrospective, quasi-experimental study compared patients before (June 1, 2020 to June 30, 2021) and after (August 1, 2021, to August 30, 2022) the nomogram change. Included patients were adults weighing greater than or equal to 83 kg receiving an ACS heparin infusion for at least 24 hours. Exclusion criteria included any alterations to the standard ACS heparin nomogram, receipt of fibrinolytics, transfer from an outside facility, monitoring with anti-Xa levels, and baseline aPTT greater than 45 seconds. **Results:** One hundred sixty-two patients were included (81 in pre-group, 81 in post-group). There was no significant difference in the incidence of therapeutic aPTT within 24 hours of infusion initiation between groups (66.7% vs. 71.6%, $p = 0.5$) or in time to therapeutic aPTT (13.6 vs 14.1 hours, $p = 0.99$). Initial aPTT was significantly higher in the post group (53 seconds vs. 66 seconds, $p = 0.003$), in addition to a higher incidence of supra-therapeutic initial aPTT in the post group (14.8% vs. 32.1%, $p = 0.009$). There was no difference in the number of bleeding events (5 vs. 1, $p = 0.09$) and no bleeding-related mortalities. **Conclusion:** Modifications to the ACS heparin nomogram dosing caps did not result in a difference in incidence of patients achieving therapeutic aPTT within 24 hours. While these changes resulted in more patients with a supra-therapeutic initial aPTT, there did not appear to be an increase in bleeding events. Including more patients with class 3 obesity may be beneficial in future studies.

Enhancing Advance Care Planning Through Education (ACP Navigator Study)

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Advance Directive, Advance Care Planning, Emergency Medicine, Internal Medicine

Abstract/Case Study: Introduction: Advance Care Planning (ACP) is a crucial component of patient care, yet many patients lack ACP documents. Healthcare providers may also feel uncomfortable with having ACP discussions. Systematic reviews suggest nearly 2/3 of adults in the United States have not completed ACP. Our intention is twofold, (1) provide targeted education to IM/EM residents to improve ACP completion in their patient encounters, and (2) identify ACP deficiencies that can be addressed in future studies. Our hypothesis was that providing education on ACP, both in person and online, to Internal Medicine (IM) and Emergency Medicine (EM) trainees would increase ACP documentation within Epic. **Methods:** A 15-minute in person education session about ACP, including material from the ACP cornerstone module, was separately delivered to available IM and EM residents. Additionally, the ACP Navigator cornerstone module was assigned to IM and EM residents to reinforce the learning points from the in person educational session. Data was reviewed and compared from one month before the educational session (October 2023) and one month after (December 2023). **Results:** The combined number of visits for IM and EM residents pre-intervention was 5,222 and 5,486 post-intervention. Advance Directive (AD) and DDNR (Durable Do Not Resuscitate) documentation was similar in both pre and post-intervention data for all patients ($p=0.95$; $p=0.92$). On review of the encounters for patients 18+, Advance Directives were documented for 28.1% pre-intervention and 28.4% post-intervention ($p=0.87$). Advance Directives were documented for 23.4% of EM resident encounters pre-intervention and 22.7% post-intervention ($p=0.74$). For IM residents, AD documentation was noted to be 25.6% pre-intervention and 26.8% post-intervention ($p=0.66$). When the data was separated by ED triage acuity, there was an increase in documentation of AD for both emergent and immediate acuity patients ($p=0.80$; $p=0.90$). **Conclusion:** While some increases in ACP documentation were seen, the findings were not statistically significant. Further studies may focus on tailoring education towards specific medical specialties and trying to identify specialty specific barriers to ACP.

Menstrual health program harnesses existing protective factors to support resiliency across poor communities in rural Intibucá, Honduras

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menstrual health, menstrual hygiene, adolescent health, protective factors

Abstract/Case Study:Background Socioeconomic status (SES) has been shown to have an association with health and outcomes across the world. Stressors created and exacerbated by SES can be mitigated through various protective factors, many of which may be inherent to individual, group, or community. Menstrual health and hygiene programs are recognized worldwide as ways to address critically needed support for women, girls, and young men. The objective of this program is to improve protective factors through increased MHH awareness and provide supplies with the long term goal to reduce teen pregnancy and negative health outcomes. The eight communities engaged with this program cover a large population sparse region of Intibuca, Honduras, with populations estimates of approximately 3,000-4,000 total individuals. **Methods** 32 classes were conducted by 4 teachers from the communities in this study. Curriculum for classes was developed using validated UNICEF MHH materials and surveys with modifications made for cultural differences and education levels of the Honduran communities. Data was collected utilizing surveys and focus groups. Participants in the classes were provided a MHH kit which included a tote bag, washcloth, soap, hygiene info sheet, reusable/washable fabric menstrual pad, and underwear. Project is currently ongoing. **Preliminary Results** Basic knowledge of menstruation is intact (age of first menses, normal part of life), with the mother responsible for the teaching and reinforcement of knowledge and practices. 95% of women and girls surveyed reported no feelings of shame or embarrassment when talking about their periods, and the majority also believed menstruation was a normal part of life. The majority of individuals surveyed believed that menstruation should not prevent attending church or school, however, low SES leads to restrictions on life due to poor infrastructure and lack of supplies. Focus group feedback emphasized the need for ongoing education regarding sex education and puberty for both males and females. Interviews with the government health clinic doctors emphasized the need for education about common genitourinary infections, birth control options, natural family planning, and teen pregnancy (<18yo). **Conclusion** Rural Intibucá, Honduras region is an understudied region, in part due to its low population, remoteness, and poor infrastructure. The tight knit communities and family structures that retain strong ties to the Christian faith, protective factors which foster resiliency among its members. MHH support in this area has garnered positive feedback from the community; however, more feedback needs to be collected to better assess long-term metrics, such as impact on infections, teen pregnancy rates, and overall health and well-being.

Patient-Specific 3D Tissue Engineered Model for Glioblastoma Microenvironment Analysis and Therapeutic Screening

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Glioblastoma, patient-specific, 3D model, tissue engineered

Abstract/Case Study: Glioblastoma (GBM) represents a formidable challenge in the realm of cancer treatment, with limited advancements made in the past two decades. Despite the incorporation of temozolomide into the standard therapeutic regimen, patient survival remains discouragingly low. It is increasingly evident that the microenvironment surrounding GBM plays a pivotal role in therapeutic resistance, encompassing factors such as the enrichment of cancer stem cells, apoptosis resistance, increased proliferation, invasion promotion, immune interaction alterations, and reduced drug transport to tumor cells. Furthermore, the unique composition of this microenvironment, particularly the involvement of glial cells in invasive regions, has been shown to correlate with patient survival. Historically, the evaluation of potential therapies and the study of cancer mechanisms have been hampered by the reliance on 2D cell culture models. Recent developments in the cultivation of patient-derived glioma stem cells in 3D spheroid cultures have revolutionized our ability to assess therapeutics that were ineffective in conventional models. Nevertheless, these systems, while useful for examining patient-relevant cells in a 3D context, fail to replicate the host tissue microenvironment and primarily yield binary outcomes, such as cell death. In the preclinical domain, orthotopic xenograft models have been the gold standard, but their limitations, including the use of murine cells, high cost, low throughput, and the inability to test immunotherapies, have become increasingly apparent. To address this gap, a platform that combines physiological relevance with high throughput must be developed, allowing for a multifaceted approach: A) identification of novel mechanisms underlying GBM progression, B) testing of new therapeutic agents in a patient-specific context, and C) offering tunability to simulate inter- and intra-patient heterogeneity. Our preliminary findings indicate that the integration of glial cells and fluid flow into a physiologically relevant 3D tissue engineered system (TME Model) alongside patient-derived glioma stem cells can significantly alter the behavior of glioma and glial cells in a patient-specific manner. This technology effectively replicates the infiltrative front of glioma, accounting for the residual tumor mass after surgical resection, incorporates physiologically relevant interstitial fluid flow, and can be readily tailored to mimic the unique microenvironment of individual patients or study cell-mediated phenomena. We can assess not only cell viability but also proliferation, stem-like markers, and invasion, providing a comprehensive view of disease malignancy while maintaining a patient-specific design. In this proposal, we outline the development of multiple patient-specific TME systems, encompassing both human and canine models, utilizing a histology-based approach. By comparing outcomes across patient samples, our TME model, and standard spheroid cultures, we aim to demonstrate the relevance of our model in the context of therapeutic testing, endpoint prognosis, discovery of novel mechanisms, and the realization of personalized medicine for GBM patients. This innovative approach holds the promise of transforming the landscape of GBM research and treatment.

Theranostics In Recurrent Gliomas: A Review

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glioma, recurrent, thernostics,

Abstract/Case Study: Gliomas represent the most commonly occurring tumors in the central nervous system and account for approximately 80% of all malignant primary brain tumors. With a high malignancy and recurrence risk, the prognosis of high-grade gliomas is poor, with a mean survival time of 12-18 months. While contrast-enhanced MRI serves as the standard imaging modality for gliomas, it faces limitations in evaluating recurrent gliomas, failing to distinguish between treatment-related changes and tumor progression. Recent advances in imaging modalities have attempted to address some of these limitations, including positron emission tomography (PET), which has demonstrated success in more effectively delineating tumor margins and guiding treatment in recurrent gliomas. With the advent of theranostics in nuclear medicine, PET has also evolved beyond a purely diagnostic modality, serving both an imaging and therapeutic role. This review will discuss the growing involvement of theranostics in diagnosing and treating recurrent gliomas.

Solitary Fibrous Tumor

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solitary fibrous tumor, malignant, rare, SEER

Abstract/Case Study:Background: Grade 3 solitary fibrous tumor, previously known as anaplastic hemangiopericytoma, is a rare and highly malignant intracranial tumor with a limited understanding of its natural history and treatment outcomes. Methods: We conducted a retrospective analysis using the Surveillance, Epidemiology, and End Results (SEER) database spanning 2000-2019 to evaluate the clinical characteristics and treatment modalities that influence overall survival in this tumor entity. A cohort of 249 patients with intracranial grade 3 solitary fibrous tumors was identified. Univariate and multivariable Cox proportional hazard models were employed to determine significant prognostic factors for overall survival. Kaplan-Meier models were used to visualize survival curves, and a nomogram was constructed to predict survival probabilities at 6- and 12-months following diagnosis. Results: Our findings indicated that patient age (<65 years), localized or regional disease burden, surgical resection, and radiation therapy were significant predictors of better overall survival. Combination therapies showed improved survival, with surgery and radiation therapy having the most significant impact. However, chemotherapy alone or in combination did not demonstrate a significant survival benefit, likely due to limited sample size. The nomogram provided personalized prognosis predictions based on significant clinical factors. Conclusions: These data emphasize the importance of surgical resection and radiation therapy in the management of grade 3 solitary fibrous tumors, supporting the use of combination therapies to improve overall survival in this rare and aggressive intracranial neoplasm.

Economic Evaluation of Inhaled Respiratory Medication Use at a Community Hospital (ECO-INSPIRE)

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Abstract/Case Study:Background: Inhaler-delivered respiratory medication acquisition costs often exceed those of therapeutically comparable nebulizer-delivered medications. 1-4 Multiple reports of automatic interchanges from inhaler to nebulizer delivered respiratory medications suggest significant cost reductions for many hospitals and health systems.1-4. **Objective:** The purpose of this study was to evaluate inhaled respiratory medication use at a 146-bed community hospital to explore potential opportunities to reduce inhaled respiratory medication expenditures. **Methods:** This was a retrospective cost minimization study of orders for formulary inhaler-delivered respiratory medications between April 1, 2022, and March 31, 2023. We obtained a list of all orders for either Combivent Respimat soft mist inhalers (SMIs) or Ellipta dry powder inhalers (DPIs). To investigate potential seasonal differences in inhaler costs, orders were further grouped into two time periods (April 1, 2022, to September 30, 2022) and (October 1, 2022, to March 31, 2023) per inhaler type. We then randomly sampled orders from each of the four groups. All sampled orders were reviewed for dispensing and dose administration. The primary outcome of interest was acquisition cost in dollars of inhaled respiratory medications per year. Secondary outcomes included the number of premature inhaler redispenses, number of wasted inhaler doses, and number of extra inhaler doses dispensed. **Results:** From April 1, 2022 - March 31, 2023, there was a total of 51 Combivent Respimat inhalers dispensed, and 447 doses given. During the same time period, 66 14-dose/inhaler Ellipta products dispensed, 186 doses given, and 738 wasted. By switching from Combivent Respimat, Breo 100-25 mcg, Breo 200-25 mcg, and Trelegy Ellipta to therapeutically equivalent nebulizer regimens, there is a potential to achieve cost reductions of 99%, 68%, 68%, and 80% respectively for medication expenditure. **Conclusion:** Similar to other studies that have been conducted, a conversion of SMI and DPI products to therapeutically equivalent nebulizer regimens has the potential to reduce estimated direct medication acquisition costs by an 80% difference.

Implementation of a Standardized Pharmaceutical Care Patient Assessment, Handoff, and Intervention Documentation Process for Pharmacists Rounding in a Community Hospital Critical Care Unit

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Abstract/Case Study: Purpose: Critically ill patients require intensive care from multiple disciplines. Evidence suggests that inclusion of pharmacists in intensive care unit (ICU) rounding teams improves patient mortality. Additional pharmacist interventions that target improved communication also appear to improve pharmacotherapeutic efficacy. We report the implementation of a quality improvement project of pharmacist communication at a 146-bed community hospital with a 12-bed critical care unit (CCU). The objective of this project was to promote basic critical care pharmacotherapy for critically ill patients and effective handoffs between pharmacists. Methods: This was a quality improvement initiative at Carilion New River Valley Medical Center implemented in a critical care unit between July 24, 2023, and September 29, 2023. A new pharmacist workflow was developed, which included the use of a pre-rounding tool for patient assessments and a post-rounding tool for documenting interventions. Pharmacists were educated on the process and questions were answered. The primary outcome of interest was the clinical significance of interventions made, signified by a clinical impact score (CIS). Secondary outcomes included the number of interventions documented by pharmacists during and/or after interprofessional rounds, intervention source, and disposition of recommendations made. Results: A total of 43 interventions were documented during the study period. The most common types of interventions related to optimizing therapy, initiating medication for an untreated indication, and dose adjustments. Over 60% of the interventions had a CIS of 3 or greater, with 21 interventions being CIS 3 and 6 interventions being CIS 4. Conclusion: Overall, this study showed that there are positive effects from establishing a standardized pharmacist workflow in the critical care unit. The interventions made by pharmacists had clinical significance. This workflow also helps with the goal of pharmacists being better equipped to maintain continuity of care and a high quality of care.

Identifying the Unicuspid Aortic Valve in an Asymptomatic Patient

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Cardiology, Echocardiography, Congenital Valve Defects, Aortic Stenosis

Clinical Presentation: A 42-year-old female was incidentally found to have a systolic murmur during a visit to an urgent care facility for a sore throat. She was referred to cardiology for further review. At her cardiology visit, she noted that she had never been told she had a murmur before, denied any chest pain, dyspnea on exertion, dizziness, or shortness of breath. Medical history was notable for seasonal allergies and asthma. Due to concerns of visualized vegetation and severe aortic stenosis on office transthoracic echocardiogram (TTE), she was sent to the hospital for concern of endocarditis. During evaluation, the patient remained without symptoms. Further imaging demonstrated a unicuspid aortic valve (UAV), and this was confirmed by direct visualization and pathology during surgery. The patient underwent surgical AV replacement with 19 mm On-X mechanical valve successfully.

Imaging Findings: Initial transesophageal echocardiogram (TEE) demonstrated severe aortic stenosis with aortic valve (AV) peak gradients 100 mmHg, mean gradient 61 mmHg, and AV area of 0.83 cm², with severely thickened leaflets. No obvious mobile vegetation was present. The morphology of the valve was felt most likely to be bicuspid. The ascending aorta was normal in size. Repeat TEE was performed prior to aortic valve replacement. The morphology of the valve was more suggestive of a unicuspid AV with a 0.9 x 1.7 cm non-mobile hyperechoic mass adhered to the aortic side of the cusp.

Role of Imaging in Patient Care: UAV pathology is most often identified after surgical resection. Though management remains similar to other aortic valvulopathies, proper diagnosis and visualization of this rare congenital variant is important for surgical planning. TEE remains the best imaging method to confirm the diagnosis and can be supplemented by TTE and cardiac MRI for further characterization.

Summary/Discussion Points: While the bicuspid aortic valve remains the most common congenital valve defect, its unicuspid variant is a rare and more challenging diagnosis to make. Our patient remained asymptomatic and required multiple studies to confirm the etiology prior to surgery. Unfortunately, there is no current established consensus on imaging criteria for diagnosis, with only a few proposed criteria in prior studies. This case highlights the importance of considering UAV as a cause of abnormal AV pathology.

Characteristics of Fusobacterium Bacteremia in Southwest Virginia: A 15-year Retrospective Study at Carilion Clinic

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Fusobacterium, anaerobic bacteremia, ,

Abstract/Case Study: Fusobacterium are gram-negative bacilli and obligate anaerobes found in the normal flora of the oropharyngeal, gastrointestinal, and genital tracts. Fusobacterium bacteremia is an uncommon yet virulent infection, with mortality rates as high as 40.7%, with infection rates increasing over the past decade. This is particularly relevant given the continued discussion about the utility of routine anaerobic bacterial blood cultures. Here we describe the epidemiology, risk factors, and outcomes of patients with Fusobacterium bacteremia. We searched the Carilion database from January 1st, 2006 to Dec 31st, 2021 for ICD codes related to Fusobacterium infection, identifying 43 cases of Fusobacterium bacteremia. Average age was 52.4 years with a near-equal distribution between males (n=24, 51%) and females (n=19, 49%). There were a total of 8 deaths. *F. nucleatum* (n=24) and *F. necrophorum* (n=9) were the most common species isolated. Age (p=0.04461) and Charlson comorbidity score (p=0.0214) were associated with increased mortality, with those with older age and higher scores more likely to die. While select laboratory values were considered possible indicators of severe infection, there was no statistical relationship between WBC and creatinine, and outcome. Annual cases trended towards an increased incidence over time, though they were ultimately not statistically significant. There was no significant seasonality (month) in relationship to infection. Of note, patients were significantly more likely to survive (p=0.037) if they received antibiotics with anaerobic coverage during inpatient stay. Ultimately, Fusobacterium infection continues to be a rare event with changing epidemiology and our findings would support the continued relevance of routine anaerobic blood cultures.

Partial Courses of Fidaxomicin and the Effect of Recurrence of *Clostridioides difficile* Infections

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Clostridioides difficile, fidaxomicin, transitions of care,

Abstract/Case Study:Background: *Clostridioides difficile* infection (CDI) rates of recurrence range from 25 to 65 percent in people who have experienced multiple previous CDI episodes. Previous literature has demonstrated lower rates of CDI recurrence with fidaxomicin compared to oral vancomycin. However, patients are sometimes switched to oral vancomycin prior to completion of a full fidaxomicin course which may impact the reduction in recurrences. The objective of this study is to evaluate rates of recurrence in full courses of fidaxomicin versus partial courses of fidaxomicin. **Methods:** This was a single-center, retrospective, cohort study of adults with CDI and was reviewed by IRB review to commencement. Patients were screened for inclusion if they were diagnosed with CDI between May 1, 2018 and May 1, 2023 and received either a full 10-day course of fidaxomicin or partial course of fidaxomicin followed by a switch to oral vancomycin. The primary outcome was the rate of CDI recurrence within 30 days after completion of initial therapy determined by a positive CDI test and initiation of treatment. Secondary outcomes included CDI related readmission within 30 days and 90 days of initial treatment completion. A total sample of 197 participants was deemed to be required to meet 80% power to detect a 20% relative risk reduction in recurrence using an alpha of 0.05. **Results:** Ninety-nine patients received a full course of fidaxomicin and 95 patients received a partial course of fidaxomicin followed by oral vancomycin. Approximately half of the partial course patients received ≤ 3 days of fidaxomicin before being switched to oral vancomycin. Severe CDI was more common in the partial therapy arm (34.3% vs 45.3%, $p=0.120$). The primary outcome of CDI recurrence at 30 days occurred in 5.1% of the full course arm and 7.4% of the partial therapy arm, $p=0.503$. CDI recurrence at 90 days was similar between the full course and partial course group (11.1% vs 11.6%, $p=0.918$). Similarly, CDI related readmissions at 30 days were similar in the full course and partial course groups (7.1% vs 4.2%, $p=0.389$). All-cause mortality at 30 days was similar (4.0% vs 4.2%, $p=1.000$). **Conclusion:** Findings suggest that partial courses of fidaxomicin followed by oral vancomycin to complete therapy, had similar 30-day CDI recurrence compared to full course fidaxomicin.

Student Abstracts

Factors Impacting Mortality and Withdrawal of Life Sustaining Care in Severe TBI: A Retrospective Single-Center Study

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VTCSOM

TBI, Coma, Prognostication, Functional Recovery

Abstract/Case Study: **Title:** Factors Impacting Mortality and Withdrawal of Life Sustaining Therapy in Severe Traumatic Brain Injury **Objectives:** The objective was to evaluate the correlation between withdrawal of life-sustaining therapy (WLST) and established prognostic predictors, as well as identify additional factors that may influence the timing of WLST. **Design:** This case-control study analyzed adult patients (aged 18-100) admitted between 8/1/2018 and 7/31/2021 with severe TBI. The case group consisted of 164 individuals who underwent WLST after TBI, while the control group included 164 individuals with TBI who did not undergo WLST. Case and control patients were matched 1:1 based on injury severity score, mechanism of injury, age, and sex. Prognostic indicators such as bilateral grade 3 diffuse axonal injury, absent pupillary responses, absent somatosensory evoked potentials, midline shift size, and duration of coma (>28 days) were recorded. Other factors assessed included cerebral hemorrhage, herniation, Glasgow Coma Scale (GCS) score on admission, length of hospital stay, anticoagulation therapy, craniectomy, Do-Not-Resuscitate code status, and palliative care consultation. Functional recovery of control subjects was evaluated using Glasgow Outcome Scale Extended (GOSE) scores at discharge and during follow-up 10-14 months later. **Results:** The study involved 328 individuals (66±19.9 years). Significant findings revealed lower GCS scores and shorter hospital stays in the case group compared to controls. Bilaterally absent pupillary responses were more common in cases (54.8%) and associated with shorter time to WLST and poorer functional outcomes in controls. Brain herniation was more prevalent in cases (25%) and midline shift predicted WLST only in geriatric population. Palliative care consultations, craniectomy procedures, and DNR code status were associated with time to WLST and functional outcomes. In the control group, 58% overall and 97% in non-geriatric individuals had good outcomes (GOSE 4-8) at follow-up. **Conclusions:** This study highlights the challenges of making WLST decisions, emphasizing the importance of standardized guidelines, objective indicators, and avoiding nihilism in WLST discussions as many control subjects experienced a good outcome.

Novel use of High-Frequency Trans-rectal Micro-Ultrasound in the Evaluation of Rectal Mass with Urogenital Invasion: A Case Report

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Carilion Clinic

micro-ultrasound, high-frequency, rectal cancer, abdominoperineal resection

Abstract/Case Study:(Images will accompany this abstract) High-frequency micro-ultrasound (mUS) is a novel sonographic imaging modality in the repertoire of tools for prostate cancer diagnosis. At a frequency of 29MHz, mUS improves resolution by 300% when compared to the traditional 9-12 MHz ultrasound. Images acquired by mUS achieve a remarkable resolution of 70 microns, enabling detailed visualization of the glandular ducts and acini of the prostate, which typically measure 150-300 microns. Standard frequency trans-rectal ultrasound has long been the standard, despite missing 30% of clinically significant prostate cancer. Recently, multiparametric magnetic resonance imaging (mpMRI) has revolutionized imaging of prostate cancer. However, this technology is both expensive and time consuming. As a result, mUS was developed to perform targeted biopsies for prostate cancer at lower costs and in real-time in a single office visit. Research has shown that mUS maintains similar sensitivity, specificity, positive predictive value, and negative predictive value in comparison to mpMRI for prostate cancer detection. However, mUS has rarely been described for other uses in human studies. The use of mUS for evaluation of a rectal mass invading the prostate has not yet been reported. A 76-year-old male with a past medical history of prostatic brachytherapy 25 years prior developed rectal cancer. Computed tomography (CT) and magnetic resonance imaging (MRI) scans insufficiently detailed the relation of the rectal mass to the urogenital organs, leaving uncertainty before surgical resection. Images obtained via transrectal mUS demonstrated invasion of the prostate and seminal vesicles, with sparing of the bladder neck. An en bloc radical prostatectomy with bladder sparing and suprapubic cystostomy tube was planned in conjunction with recto-colonic resection. The patient underwent a successful multidisciplinary surgery. Intraoperative and histopathological findings confirmed findings seen on mUS. In the absence of mUS, the patient would have undergone bladder resection with percutaneous nephrostomy tube placement. This case report demonstrates the utility of mUS for preoperative evaluation of a rectal mass infiltrating the prostate.

Racial Disparities in Pediatric Spinal Fusion Surgery Outcomes: A Multicenter Study

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Racial Disparities, Pediatric Spinal Fusion, complications, spinal fusion

Abstract/Case Study:Background: Racial disparities are a well-documented issue in adult spine surgery. However, the literature is scarce when concerning the pediatric population. Purpose: To evaluate the effect of race and ethnic differences in perioperative outcomes and short-term complications in patients undergoing pediatric spinal fusion (PSF) surgery. Study Design/Setting: A retrospective cohort, large multicenter database study. Patient Sample: A retrospective cohort study was performed using prospectively collected data from the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) Pediatric database merged with the PSF Procedure Targeted database from 2016 to 2022 to identify patients who had undergone an PSF procedure using Common Procedural Terminology codes. The study population was divided into four distinct groups 1) White, 2) Black or African American, 3) Asian, and 4) Other or Unknown. Outcome Measures: Perioperative surgical and medical complications, extended hospital length of stay, and intensive care unit stay (ICU). Methods: One-way ANOVA for continuous variables and chi-square tests for categorical variables were used to identify differences in perioperative variables between the four groups. Multivariable logistic regression analysis assessed the effect of race on post-operative surgical outcomes. Significance was defined as $p < 0.05$. Results: A total of 39,666 PSF patients were identified between 2016 and 2022, of which 25,521 were White, 6,007 were Black or African American, 1,342 were Asian, and 6,796 were Unknown or Other. Black or African American and Asian patients experienced significantly higher rates of postoperative medical complications at 75.70% and 74.52%, compared with 69.03% for White patients ($p < 0.001$). Both Black or African American (OR: 1.383, 95% CI (1.292-1.481) and Asian (OR: 1.320, 95% CI (1.157-1.509) patients had an independently increased risk for medical complications whereas only Black or African American patients had an increased risk for ICU stay (OR: 1.222, 95% CI (1.143-1.306) complications following a multivariate logistic regression analysis ($p < 0.001$). Conclusion: This study provides evidence of racial disparities in outcomes after pediatric spine surgery, even after controlling for demographic and health factors. Pediatric Black or African American and Asian patients undergoing PSF have a significantly higher risk of postoperative medical complications compared with White patients. These findings emphasize the need to focus on identifying the root cause and ways to reduce racial disparities in pediatric spine surgery. The present study brings awareness to the disparity in the pediatric spine population and is useful as we work towards the reduction in such disparities and their root causes.

The Impact of Insulin Dependence on Lumbar Spine Surgery Outcomes: An Analysis of 349,520 Patients

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Diabetes Mellitus, Lumbar Spine Surgery, Complications , Outcomes

Abstract/Case Study:Background: Although the negative effects of diabetes mellitus have been previously documented in spine surgery as the population of patients with diabetes grows, there is a scarcity of literature focusing on insulin-dependence as a risk-factor for post-operative lumbar spine surgery complications. Purpose: To evaluate the differential impact of insulin dependence on perioperative outcomes including surgical and medical complications, extended hospital length of stay, reoperation, and non-home discharge within thirty days following lumbar spine surgery. Study Design/Setting: A retrospective cohort, large multicenter database study. Patient Sample: The American College of Surgeons National Surgical Quality Improvement Program database was queried to retrospectively identify patients who had undergone lumbar spine surgery between 2011 and 2022 using Current Procedural Terminology codes. The study population was divided into three distinct groups based on diabetic status: insulin-dependent (IDDM), insulin-independent (NIDDM), and no diabetes mellitus (non-DM). Outcome Measures: Perioperative surgical and medical complications Methods: One-way ANOVA for continuous variables and X2 tests for categorical variables were used to identify differences in perioperative variables between the three groups. Multivariable logistic regression analysis assessed the effect of diabetes mellitus status on post-operative surgical outcomes. Significance was defined as $p < 0.05$. Results: A total of 349,520 lumbar spine patients were identified between 2011 and 2022, of whom 20,159 were IDDM, 43,402 were NIDDM, and 285,959 were non-DM. The NIDDM and IDDM groups experienced significantly longer total hospital length of stays at 3.7 and 3.0 days, compared with 2.5 days for the non-DM group ($p < 0.001$). Both IDDM (OR: 1.488, 95% CI (1.372-1.612) and NIDDM (OR: 1.134, 95% CI (1.1059-1.214) independently increased the risk for surgical complications whereas only IDDM increased the risk for medical (OR: 1.256, 95% CI (1.194-1.320) complications following a multivariate logistic regression analysis. Conclusions: This study highlights the increased risk of surgical and medical complications in patients with IDDM undergoing lumbar spine surgery. Both NIDDM and IDDM are independent risk factors for postoperative medical and surgical complications. These findings can be used to improve preoperative management and risk stratification for DM patients who are insulin dependent.

The Impact of Developmental Delay on Pediatric Spinal Fusion Surgery Outcomes: An Analysis of 32,621 Patients

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Pediatric Spinal Fusion, Pediatrics, Complications, Developmental Delay

Abstract/Case Study:Background: Although neurodevelopmental delay is frequently linked with spinal and limb deformities necessitating surgical intervention, there is a paucity of literature focusing on developmental delay itself as a risk-factor for post-operative complications following pediatric spinal fusion (PSF). Purpose: The purpose of this study is to analyze the impact of developmental delay on perioperative complication rates in patients undergoing PSF. Study Design/Setting: A retrospective cohort, large multicenter database study. Patient Sample: The American College of Surgeons National Surgical Quality Improvement Program Pediatric (ACS-NSQIP) database merged with the PSF Procedure Targeted database was queried to retrospectively identify patients who had undergone spinal fusions between 2016 and 2021 using the Current Procedural Terminology codes 22800, 22802, 22804, 22808, 22810, 22812. The study population was divided into two distinct groups 1) Patients with developmental delay 2) who have no delay. Outcome Measures: Perioperative surgical and medical complications Methods: T-tests for continuous variables and X2 tests for categorical variables were used to identify differences in perioperative variables between the two groups. Multivariable logistic regression analysis assessed the effect of preoperative developmental delay on post-operative surgical outcomes. Significance was defined as $p < 0.05$. Results: A total of 32,621 PSF patients were identified, of which 7,637 had developmental delay and 24,948 had no delay. The developmental delay group had a higher rate of surgical complications and medical complications (5.38% vs 1.41%, $p < 0.001$). Patients with developmental delay had greater average length of hospital stay compared to patients with no delay (7.1 days vs. 4.3 days, $p < 0.001$) Developmental delay independently increased the risk for surgical complications (OR: 1.4833, 95% CI (1.197-1.838) and intensive care unit stay (OR: 1.333, 95% CI (1.227-1.446) following a multivariate logistic regression analysis. Conclusions: Patients with developmental delay undergoing PSF have an elevated risk for medical and surgical complications, which may necessitate an extended postoperative stay in the intensive care unit. These data underscore the importance of preoperative risk assessment and further inform preoperative conversations with caregivers of pediatric spine surgical patients with developmental delay.

Congenital Airway Anomalies Predict Intensive Care Unit Stay after Pediatric Spinal Fusion Surgery

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Pediatric Spinal Fusion, Pediatrics, Complications , Outcomes

Abstract/Case Study:Background: Congenital airway anomalies occur at various anatomic levels and cause a wide range of symptoms in pediatric patients. Previous studies have shown that children with airway anomalies have an increased risk of respiratory illness and perioperative complications. The impact of airway anomalies in pediatric spine surgical outcomes remains unclear. Purpose: The purpose of this study is to evaluate the differential impact of structural pulmonary and airway anomalies on perioperative outcomes within thirty days following pediatric spinal fusion (PSF) surgery. Study Design/Setting: A retrospective cohort, large multicenter database study. Patient Sample: The American College of Surgeons National Surgical Quality Improvement Program Pediatric (ACS-NSQIP) database merged with the PSF Procedure Targeted database was queried to retrospectively identify patients who had undergone spinal fusions between 2016 and 2021 using the Current Procedural Terminology codes 22800, 22802, 22804, 22808, 22810, 22812. The population was divided into two groups: those with and without pulmonary abnormalities. Outcome Measures: Perioperative surgical and medical complications. Methods: T-tests for continuous variables and X2 tests for categorical variables were used to identify differences in perioperative variables between the two groups. Multivariable logistic regression analysis assessed the effect of preoperative pulmonary abnormalities on post-operative surgical outcomes. Significance was defined as $p < 0.05$. Results: A total of 32,621 PSF procedures were identified between 2016 and 2021, of which 2,243 had pulmonary abnormalities and 30,378 had no pulmonary abnormalities. The pulmonary abnormalities group had a higher rate of medical complications (5.7% vs 2.1%, $p < 0.001$), surgical complications (5.7% vs 2.1%, $p < 0.001$), and reoperation (24.6% vs 9.8% $p < 0.001$). Pre-operative pulmonary abnormalities only independently increased the risk for ICU stay (OR: 1.469, 95% CI (1.304-1.1655) following a multivariate logistic regression analysis. Conclusions: Patients with pulmonary abnormalities who underwent PSF were more likely to be admitted to the ICU and experience an extended length of stay and twice as likely to have medical and surgical complications. It is critical to identify and optimize pulmonary abnormalities using a multidisciplinary approach prior to surgery.

Influence of Baseline Kidney Dysfunction on Perioperative Outcomes in Anterior Cervical Discectomies and Fusions: An Analysis of 75,508 Patients

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Chronic Kidney Disease, Anterior Cervical Discectomy and Fusion, Complications , Outcomes

Abstract/Case Study: **Background:** Although anterior cervical discectomy and fusion (ACDF) procedures for cervical spine disease have been increasing amid a growing population of patients with kidney dysfunction, there is a scarcity of literature focusing on kidney dysfunction as a risk-factor for post-operative ACDF complications. **Purpose:** To evaluate the differential impact of kidney dysfunction on perioperative outcomes including surgical and medical complications, extended length of hospital stay, and death within thirty days following ACDF. **Study Design/Setting:** A retrospective cohort, large multicenter database study. **Patient Sample:** This was a retrospective cohort study of prospectively collected data using the American College of Surgeons National Surgical Quality Improvement Program database to identify patients who had undergone an elective ACDF procedure between 2011 and 2021 using Current Procedural Terminology code 22551. **Outcome Measures:** Perioperative surgical and medical complications **Methods:** 75,508 patients were categorized into five cohorts based on eGFR according to the "Kidney Disease: Improving Global Outcomes" Classification: values of: ≥ 90 (reference cohort), 60-89 (G2), 30-59 (G3), 15-29 (G4), and <15 (G5). One-way ANOVA for continuous variables and X2 tests for categorical variables were used to identify differences in perioperative variables between the five groups. Multivariable logistic regression analysis assessed the effect of kidney dysfunction on post-operative surgical outcomes. Significance was defined as $p < 0.05$. **Results:** G4 and G5 independently increased the risk of medical complications (OR: 1.898, 95% CI [1.299-2.713]; OR: 2.25, 95% CI [1.225-3.984]) and bleeding transfusions. Only G5 independently increased the risk for extended length of hospital stay (OR: 2.410, 95% CI [1.281-4.392], $p = 0.005$) and death (OR: 2.073, 95% CI [0.91-4.048], $p = 0.044$). **Conclusions:** Preoperative renal dysfunction has a high prevalence in ACDF patients. This underscores the importance of risk stratification to optimize perioperative management and reduce the burden of complications and healthcare costs.

Pilot study utilizing wastewater-based epidemiology to determine presence of gram-negative enterobacterial targets in Southwest Virginia sewersheds

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Abstract/Case Study: Wastewater-Based Epidemiology (WBE) is a tool utilized to detect and mitigate pathogen outbreaks by evaluating conditions in a specific community. The microbial total nucleic acids (TNA) were collected from wastewater samples to detect and quantify pathogens by using quantitative polymerase chain reaction (qPCR) assays. Results are reported to the Virginia Department of Health (VDH) to enable effective outbreak preparedness and response. This pilot study attempted to detect and quantitatively assess the prevalence of 4 bacterial pathogens (*Escherichia coli*, *Citrobacter freundii*, *Pseudomonas aeruginosa*, and *Salmonella enterica*) in the wastewater from local sewersheds in eight community locations including two healthcare facilities in Roanoke and Salem, VA. Eighty-three, wastewater (100 mL) samples were collected over a 12-week period (February-May, 2023). The TNA was extracted from 50 mL of wastewater with the Promega Wizard enviro kit, and the TNA was quantified by using Nanodrop. Bacterial DNA gene specific target detection was performed using 4 gene specific forward and reverse primers (*E. coli*; *gadA*, *C. freundii*; *tpl*, *P. aeruginosa*; 23S rDNA, and *S. enterica*; *invA*) and unique TaqMan probe sets used in PCR analysis. Calibrations were performed generating standard curves for each known bacterial gDNA template used including slope and y-intercept. Amplification efficiency was measured by using Cq value $[(y-C)/m = x]$. *E. coli* (average of Cq 26.6); *C. freundii*, (Cq 28.3) and *P. aeruginosa* (Cq 20.8) were detected in all the locations and not significantly different with copies/L. *S. enterica* (Cq 44.1) was identified sporadically in some of the locations such as hospital and influent collections (1.52×10^{11}) copies/L, which is significantly different at ($P < 0.001$). Interestingly, *C. freundii* (1.63×10^{14}) was found in a wastewater collection near a hospital. This study revealed that utilizing WBE can help identify quantitative characteristics of bacterial pathogens in the community and healthcare facilities which are important for public health assessments.

The Role of Human Serum Angiopoietins in Assessing Pial Collateral Function Following a Large Vessel Occlusion Stroke: A Pilot Study

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Ischemic Stroke, Collateral vessels, Angiopoietin,

Abstract/Case Study: Pial collaterals are specialized vascular networks that preserve cerebral perfusion following an acute ischemic stroke caused by a large vessel occlusion. Patients with good pial collateral function recover better than those with poor function, however, the underlying etiology for this difference remains unknown. Angiopoietins, circulating vascular endothelial growth factor ligands, may serve as prognostic biomarkers for vascular-immune derived signaling pathways involved in tissue stability regulation during pial collateral engagement due to ischemic injury. Currently, there are no safe and effective therapies to support tissue stability and recovery in acute ischemic stroke. This prospective pilot study was conducted at Carilion Roanoke Memorial Hospital, Roanoke, VA, in which whole blood samples collected from stroke patients undergoing a mechanical thrombectomy were analyzed at 3 distinct time points. Serum levels of angiopoietin subtypes, such as angiopoietin-1 (Ang1) and angiopoietin-2 (Ang2), were quantified for protein expression via ELISA assays and compared to healthy control serum. Standard-of-care imaging with CT angiography was evaluated to assess subject collateral function and further correlated with our angiopoietin biomarkers. Moreover, subjects with higher collateral scores are associated with decreased levels of Ang1, the subtype responsible for vascular stabilization, and conversely, elevated concentrations of Ang2, the subtype linked to vascular destabilization. These findings suggest that greater pial collateral function might require less modulation of the angiopoietin-mediated signaling pathway during ischemic injury due to an adequately maintained penumbral perfusion.

Investigating the Efficacy of Chemical, Mechanical, and Enzymatic Methods of *Candida albicans* Cell Lysis with Respect to Wastewater-Based Epidemiology

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Candida, DNA Extraction, Chemical Lysis, Mechanical Lysis

Abstract/Case Study: *Candida auris* is a nosocomial yeast increasingly identified as a cause of severe illness in immunocompromised patients. There has been an escalation in the prevalence of clinical and screening cases of *C. auris* in healthcare settings. Wastewater-based epidemiology and diagnostic testing both use DNA extraction techniques. This is followed by quantitative polymerase chain reaction to determine the presence and amount of a specific pathogen. However, the cell wall rigidity of *C. auris* renders it resistant to DNA extraction resulting in a limited ability to accurately quantitate it. Globally, scientists are attempting to determine and optimize a method for the best recovery of DNA from *C. auris*. The primary aim of this study is to evaluate different yeast DNA extraction techniques to determine which method results in the greatest recovery of DNA. Since *Candida albicans* is a closely related yeast, it was used as a model organism for this investigation. The three methods of cell lysis compared were chemical, mechanical, and enzymatic, using the Qiagen AllPrep PowerViral DNA/RNA, Qiagen DNeasy, and ThermoFisher Yeast DNA Extraction kits. The ThermoFisher kit, which utilized chemical lysis, yielded the highest mean concentration of gDNA, followed closely by mechanical lysis. The ThermoFisher chemical and the mechanical methods yielded higher concentrations of DNA ($P < 0.001$, One-way ANOVA). The concentration of gDNA produced by each kit was also inconsistent, which may be attributed to the layered cell wall of *C. albicans*. Therefore, a more effective and consistent method of DNA extraction for *Candida* must be developed.

Bilateral panuveitis associated with anti-PD-1 immune checkpoint inhibitor therapy

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panuveitis, immune checkpoint inhibitor therapy, vision, corticosteroid

Abstract/Case Study: Bilateral panuveitis is a rare, but vision-threatening complication of immune checkpoint inhibitors (ICIs). Panuveitis is characterized by inflammation of all the uvea, which includes the iris, ciliary body, and choroid. The etiologies of uveitis are divided into infectious and non-infectious causes. Immune checkpoint inhibitors (ICIs) are being utilized in an increasing number of solid tumor types and have been notoriously associated with the development of autoimmunity in various "off-target" organs in the body. Although the side effect profiles of ICIs remain safer and more tolerable than that of conventional anticancer therapy, ICI-induced immune-related adverse events (irAEs) may exacerbate or develop into new autoimmune conditions. Ocular irAEs secondary to immunotherapies are rare with 1-3% of patients affected. As ICI therapy has been increasingly utilized in the last decade, there have reports of bilateral or unilateral anterior uveitis, posterior uveitis, or panuveitis secondary to ICIs. Here, we present a novel case of immunotherapy-induced bilateral panuveitis that was managed successfully with a long-acting, local delivery dexamethasone implant for long-term treatment while the patient continued to receive anticancer immunotherapy. A 52-year-old female who received four months of ICI therapy for metastatic melanoma presented with floaters, blurry vision, eye pain, and photophobia in her left eye. Physical exam and imaging was consistent with bilateral panuveitis and retinal vasculitis. Laboratory studies ruled out autoimmune and infectious etiologies. Oral prednisone and a sub-Tenon's injection of triamcinolone decreased her central cystoid macular edema (CME) and improved visual acuity. Given the patient was committed to several years of ICI therapy for metastatic melanoma, a localized, longer acting treatment solution was needed and intravitreal dexamethasone implantation was given to control ocular inflammation. The patient's visual acuity continued to improve to 20/20 OD and 20/30 OS and she remained having complete resolution of her CME bilaterally as shown on optical coherence tomography (OCT) imaging of her macula. Here lies a novel treatment strategy of intravitreal dexamethasone implants in a case of bilateral panuveitis secondary to immune checkpoint inhibitor (ICI) therapy that can potentially be incorporated as a standard of care in the future.

Improving patient adherence in rural populations by reducing pain after intravitreal injections for age-related macular degeneration!

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Intravitreal Injections, AMD, Age-related macular degeneration, pain

Abstract/Case Study: Intravitreal injections (IVI) are a primary method of treatment for a variety of retinal conditions such as age-related macular degeneration (AMD). Patients often report significant post-injection pain and there is no definitive pain management in place. Controlling this is critical for patient comfort and consequently compliance. Loteprednol drops are widely used to treat pain and inflammation, however, it has not been studied as a treatment for pain following IVI. This study aims to explore the role of loteprednol in reducing pain after IVI and hypothesizes that topical administration of loteprednol immediately after IVI will significantly lessen postoperative pain. 64 participants receiving routine IVI for AMD were randomized into two groups of a double-blinded placebo-controlled study receiving either 1 drop of loteprednol or artificial tears immediately after the IVI procedure. Pain scores were measured at 2-hours, 1-day, and 1-week post IVI. Pain was assessed using a numeric pain rating scale on a 10-pt range. Patients were given an analgesic pill log and artificial tear log to track any analgesic or artificial tear use during the first week after injection. Following IVI the average pain score 2 hours afterward was 3.31 and 2.41, and at 1 day, 0.97 and 0.71, for control and treatment groups respectively. Loteprednol patients had a 27% ($p = 0.13$) and 26% ($p = 0.77$) decrease in their pain score compared to the control at 2 hours and 1 day respectively. There was greater variance in the control group compared to the treatment group (2.40 and 2.05 at 2 hours and 1.75 and 1.14 at 1 day for control and treatment respectively). 22% of the treatment arm reported no pain at all compared to 12.5% in the control arm. The treatment arm had 3 times more qualitative improved experience compared to the control arm. Our study shows a clinically significant trend towards improved pain control with loteprednol after IVI, although statistical significance was not achieved in this trial. The treatment arm had nearly twice the number of people who experienced no pain at all and 3 times more qualitative improved experience compared to the control. The difference in variance also indicates more consistent pain control using loteprednol. Possible improvements for future studies include increasing the power and refining methods for data collection.

Microultrasound for Index Lesion Detection and Intraoperative Cryoablation of Localized Prostate Cancer: A Pictorial Essay

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Micro-ultrasound (mUS), Focal Cryoablation, Prostate Cancer, Index Lesion (IL)

Abstract/Case Study: Prostate cancer treatment relies heavily on imaging for index lesion (IL) identification and biopsy for subsequent risk stratification. Initially performed without imaging guidance or with low resolution trans-rectal ultrasound, significant post-operative complications made cryoablation less efficacious. Technological advancement in multiparametric magnetic resonance imaging (mpMRI) has greatly improved cryotherapy precision, revitalizing cryoablation as a great alternative focal therapy for clinically significant prostate cancer (csPC). However, this technology is both expensive and requires a second patient visit for fusion overlay. The introduction of high-frequency, high-resolution ultrasound poses an inexpensive alternative with real-time imaging and biopsy, and recent literature continually proves to highlight the non-inferiority of microultrasound (mUS) relative to mpMRI for prostate cancer detection. Additionally, with an improved resolution of 300% that of TRUS, mUS is an intraoperative imaging modality for csPC cryoablation that does not require fusion overlay. This pictorial essay aims to offer sonographic illustrations with descriptive insight of mUS utilization from biopsy to intraoperative cryoablation of csPC. Images will accompany the abstract.

Renal Artery Thrombosis: Anti Phospholipid Syndrome Secondary to COVID-19

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Renal Artery Thrombosis, Anti Phospholipid Syndrome, COVID-19,

Abstract/Case Study:Case Description: A thirty-six-year-old male with past medical history significant for hypertension and ADHD presented with sudden-onset 10/10 stabbing right-sided flank pain which radiated to groin with associated nausea and vomiting. Initial CT imaging of abdomen was unremarkable, and the patient was discharged after pain management. Patient re-presented to ED hours later with the same unremitting pain. A repeat CT scan of the abdomen, this time with contrast, revealed heterogeneous enhancement of the right kidney concerning pyelonephritis versus renal infarct. MRA of the abdomen showed multifocal right sided renal infarct with filling defects noted in the segmental branches of the renal artery, consistent with renal artery thrombus. Upon investigation for thrombus' cause, the patient was positive for COVID-19 and lupus anticoagulant antibodies concerning for anti-phospholipid syndrome (APLS). Discussion: Renal infarcts are rare. Even rarer is the interplay between COVID-19 and APLS leading to a renal infarct. No case of renal infarct resulting simultaneously from COVID-19 and APLS is reported in literature to date. Therefore, our case provides a unique window into the world of renal infarcts. A "double hit" of hypercoagulability likely explains this unusual presentation of renal artery thrombus and infarction in an otherwise healthy young male. Furthermore, a reevaluation of labs at 90 days revealed that the APLS antibodies were transient and likely secondary to COVID-19. Conclusion: This case highlights a unique mechanism of renal infarction associated with APLS secondary to COVID-19 infection. It also provides emphasis on the need to retain renal infarction on the differential in patients with acute-onset abdominal pain, to avoid life threatening complications.

Gender Non-Conforming Adults: Effects of hormone therapy on depression and anxiety.

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VTCSOM

Hormone, Gender , Depression, Anxiety

Abstract/Case Study: Gender non-conforming individuals experience a gender identity that is different from their assigned sex at birth. In many circumstances this results in psychological distress known as gender dysphoria, that may be addressed through treatment with feminizing and masculinizing hormone therapy (F/M HT). A small number of studies have determined that F/M HT can help decrease feelings of gender dysphoria and improve emotional well-being; however, even fewer have evaluated its impacts on depression and anxiety. We seek to assess how gender-affirming care, specifically F/M HT, impacts mental health. We hypothesize that adults seeking F/M HT will experience a decrease in symptoms of anxiety and depression following therapy initiation. We are recruiting 52 adult participants from a local gender clinic. Through a within-subjects study design, participants fill out PHQ-9 and GAD-7 surveys as evaluations of depression and anxiety, respectively, at each visit. Confounding variables are also evaluated via an additional survey and through data collection from the EMR. The baseline visit is immediately prior to initiating F/M HT, then follow-ups occur at months 3, 6 and 12. As of January 2024, we have enrolled 18 participants, all of whom have completed their baseline surveys, with 9 having completed month 3, 6 through month 6, and 2 participants who have completed the study. Both means of baseline PHQ-9 (10.7) and GAD-7 (10.1) survey responses decreased at the month 3 follow-up (PHQ-9: 8; GAD-7: 6.8). The average scores of completed month 6 surveys continue the downward trend for GAD-7 (5.8), while the PHQ-9 still remains lower than the baseline (8.5). As expected, baseline scores also revealed an average depression and anxiety severity of "moderate." As we seek to maximize the power of our study, we aim to continue enrolling participants until we reach our goal of 52 participants. In accordance with previous research, our results have so far demonstrated that our participants' reported symptoms of both depression and anxiety are decreasing over time, following the initiation of F/M HT. We have even seen this change based on the average of both PHQ-9 and GAD-7 scores after just 3 months of therapy. Thus far, this data is showing that in addition to the physical changes and benefits, F/M HT could offer positive psychological effects for gender non-conforming patients.

Telehealth in a Rural Setting: Keys for Connection

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telehealth, rural, connection, patient-provider

Abstract: Introduction. The COVID-19 pandemic and 2020 CARES Act spurred telehealth services in many practice settings. However, not all populations or morbidities are equally suited to telehealth care. Rural patients often disproportionately experience health conditions that may benefit from telehealth. This study explored patients' perceptions on how telehealth may be best delivered and utilized at a rural primary care clinic. Deciphering patient perspectives could assist local practices in implementing targeted telehealth services. Methods. A qualitative focus group study was conducted with patients at a primary health care clinic located in rural Cana, Virginia. Discussion questions were guided by the Technology Acceptance Model (TAM2) and Unified Theory of Acceptance in Technology (UTAUT) theories. Eligibility criteria included age, diagnosis of chronic disease or mental health condition, English-speaking, resident of Virginia, and patient at the clinic. Transcribed recordings were analyzed using Dedoose. Results. Nine patients participated in two focus groups. Seventy percent of patients were 45-64 years; race (82% white), and gender (78% female). Thirty percent described their physical health as fair/poor, and 30% described their mental health as fair/poor. Patients felt telehealth would especially benefit those with children, anxiety/depression, or those lacking transportation. All believed a provider, with whom the patient had a trusting relationship, should conduct or monitor telehealth sessions. Telehealth was reported to be well-suited for follow-up visits and medication refills. Five major themes emerged: telehealth perceptions, delivery format, who conducts telehealth service, telehealth for follow-up visits, and telehealth cost/value. Conclusion. Although rural patients express frustration with technical barriers, they support using telehealth for follow-up visits and addressing their chronic disease and mental health. The major theme for telehealth acceptance is the patient-provider connection. Personal connection is as important as expanding broadband connection for successfully implementing telehealth services with rural primary care. These findings correlate with the therapeutic relational connection (TRC), which is a new concept demonstrating intentional effort between patients and providers. More empirical research is needed on the application of TRC as it applies to practice in rural communities.

Prior impulsivity is associated with suicide risk in traumatic brain injury patients

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impulsivity, traumatic brain injury, suicide attempt, suicide ideation

Abstract/Case Study:Intro Traumatic brain injury (TBI) affects over 69 million people worldwide each year. TBI patients are predominantly male, and age-at-onset is bimodal, with adolescent and elderly patients at greatest risk. Suicide is common in TBI, and the risk of suicide following TBI has been associated with severe TBI, skull fractures, male sex, depression, and alcohol use. Recently, impulsivity was proven a driver of suicidal ideation and suicide attempts in a veteran population; similarly, a 1995 study demonstrated that several TBI patients with suicidal ideation acquired their head injury through impulsive behavior. Although there is a likely association between impulsivity and suicidality following TBI, little is known of the risk of suicidality in patients with a history of impulsivity prior to a TBI. **Methods** This is a retrospective cohort study conducted using the TriNetX Research Network between June 1, 2016 to February 22, 2024. The impulsivity cohort was defined as adult patients with impulsivity prior to a TBI. The control cohort was defined as adult patients with a known TBI but no impulsivity. Patients in each cohort were 1:1 propensity score-matched by age, sex, race, ethnicity, and psychiatric diagnoses including mood disorders, anxiety disorders, and substance use disorder. Statistics included a chi-square test for categorical variables, a t-test for numerical variables, and a risk ratio [RR] for outcomes. Significance was set at $P < 0.05$. **Results** There were 1,031,252 TBI patients including 3,544 with impulsivity prior to the TBI as the impulsivity cohort and 1,028,138 without impulsivity as the control cohort. After matching, patients with impulsivity were more likely to exhibit a suicide attempt following a TBI, with 23 of 3,544 (0.65%) in the impulsivity cohort, compared to 10 of 3,544 (0.28%) in the control cohort (RR, 2.366; 95% CI, 1.128-4.963; $P = 0.019$). Patients with impulsivity were at greater risk of developing suicidal ideation following a TBI, with 70 of 3,544 (1.98%) in the impulsivity cohort, compared to 45 of 3,544 (1.27%) in the control cohort (RR, 1.737; 95% CI, 1.198-2.517; $P = 0.003$). **Conclusions** These data confirm that prior impulsivity in a TBI patient is associated with greater risk of post-traumatic suicidality. This identifies a subset of patients for which improved risk-reduction strategies are necessary, both in preventing the TBI and in providing adequate psychiatric resources after the TBI.

Health Disparities in the Management of Cervical Stenosis and Spinal Cord Injury: A Propensity Score-Matched Analysis

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Health Disparities, Spinal Cord Injury, Cervical Stenosis, Propensity Score Matching

Abstract/Case Study: Cervical stenosis (CS) is a risk factor for traumatic cervical spinal cord injury (SCI) and is treated with decompressive surgery when associated with myelopathy. In patients with traumatic SCI and underlying CS, surgical intervention is proven to minimize secondary injury. However, minority patients are less likely to receive decompressive surgery and experience worse outcomes compared to non-minority patients. While many studies have highlighted these disparities, there is a lack of research studying the associations between SCI outcomes and minority status in large datasets. We examined adults treated for traumatic cervical SCI with a diagnosis of cervical spondylosis. We conducted a chart review of demographic and outcome-related data, in addition to a study using the TriNetX Research Network. Patients were grouped based on minority (Non-White) and non-minority (White) status. To minimize confounders, 1:1 tight caliper (0.01) nearest neighbor propensity score matching was performed based on age, sex and race. Chi-square tests were conducted for categorical variables and Student's T for numerical variables. There were 14 minority subjects in the Carilion study and 14 non-minority subjects. Patients in the minority group had an elevated likelihood of receiving laminectomies compared to non-minorities ($p=0.058$). There were 5,194 minority subjects in the TriNetX study and 5,194 non-minority subjects. The non-minority group had an increased chance of being injured by falling ($p=0.004$). The minority group was less likely to receive any surgery compared to the non-minority group ($p=0.046$), specifically, less anterior cervical discectomy and fusion (ACDF) ($p<0.001$). The non-minority group was more likely to require tracheostomy and die within 1 year post-injury ($p=0.005$, $p=0.002$, respectively). There was no difference between groups in receiving rehabilitation services ($p=0.718$). Minorities were overall less likely than non-minorities to receive surgery, especially ACDF, for SCI than non-minorities. In this study, we provide evidence of race-based disparities in the surgical management of traumatic cervical SCI with CS, although the root causes remain unknown. By highlighting these differences, we provide a framework for future studies and changes in clinical practice.

Evaluating short-term functional performance following direct lateral interbody fusion

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Lumbar Spine Fusion, Orthopaedic Spine Surgery, Functional Performance, DLIF/PSF

Abstract/Case Study: Posterior fusion (PSF) has long been utilized to treat degenerative lumbar spine disease. Incorporating direct lateral interbody fusion (DLIF) increases fusion rates, which is correlated with less reoperation compared to isolated PSF. Transient ipsilateral hip flexion weakness and sensory loss are potential complications of DLIF/PSF, presumably due to intra-operative psoas retraction and possible nerve irritation. This study aims to compare the recovery trajectory between DLIF/PSF and PSF, investigating if DLIF addition affects functional performance. We hypothesize patients undergoing isolated PSF will have a faster rate of recovery than those undergoing DLIF/PSF, with no differences between groups by 12 months post-op. This clinical observational study is targeting 36 patients (18 per group) aged 45-80 undergoing DLIF/PSF or PSF at a single site. Performance metrics include a 10-meter walk test (primary outcome), Berg balance scale (BBS), timed stair climbing task (SC), and isometric hip flexion (HF) and knee extension (KE) strength measured with a handheld dynamometer. Patient-reported outcomes include the Wong-Baker pain scale and the PROMIS Physical Function short form 10b. Evaluations occur 0-2 weeks pre-op, and at 2-6 weeks, 3 months, 6 months, and 12 months post-op. The current study assessed post-op recovery at the 2-6 week and 3-month post-op timepoints using a linear mixed effects model in R, characterizing each outcome as a function of: surgery type, time, and their interaction. 27 patients (12 PSF, 15 DLIF/PSF) completed 2-6 week testing and 19 patients (9 PSF, 10 DLIF/PSF) completed 3-month testing. There were no significant changes from baseline between surgical groups in 10-meter walking time, SC, BBS scores, or strength measures (HF and KE) at either timepoint. Our results indicate no differences between surgical groups in functional performance outcomes at the 2-6 week or 3-month post-op timepoints, refuting our initial hypothesis. However, this study has limitations, including sample size and less than one-year follow-up, hindering the evaluation of recovery trajectory. Further enrollment and follow-up are needed to better assess the stated hypothesis. In summary, our preliminary results suggest no early recovery advantage when comparing isolated PSF to DLIF/PSF.

Investigation of Histotripsy for the Precise, Non-invasive, Non-thermal Ablation of Keloid Scars

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keloid, histotripsy, noninvasive, ablation

Abstract/Case Study:Background: Keloids are raised scars originating from an aberrant wound healing process extending beyond the original wound margin. Keloids rarely regress with time and have high rates of re-keloiding once surgically excised. There is currently a dearth in consistent treatment options that can remove keloids non-invasively, improve skin function and mitigate rescarring. Objective: This study seeks to investigate whether histotripsy, a specialized form of focused ultrasound, can provide an alternative therapy for non-invasive debulking of keloid scars. Hypothesis: Histotripsy can generate precise cavitation bubble clouds inside ex-vivo keloid samples, ultimately causing complete disintegration of keloids into acellular debris. Methods: 2 patients have so far been recruited from Carilion Clinic Dermatology Department. Enrollment will be ongoing until a sample size of 25 is reached. Surgically removed keloids are degassed for 2 hrs, embedded in 1% agarose tissue phantoms and submerged inside a deionized water tank. A miniature handheld 6.3 MHz histotripsy transducer then delivers multi-cycle histotripsy treatments at a pulse repetition frequency of 1kHz and treatment doses ranging from 100-10,000 pulses/point. A 30 MHz co-axially aligned ultrasound imaging probe is used to guide the treatment. Treatment outcomes are assessed through real time ultrasound analysis (b-mode, shear wave elastography) and histological analysis (H&E, Trichrome) scored by a board-certified pathologist. Expected outcomes: We expect that histotripsy will generate precise cavitation bubble clouds inside ex-vivo keloid samples and cause complete disintegration into acellular debris. Given their fibrous nature, we expect that >4,000 pulses/point will be needed to fully ablate the keloids. This is supported by preliminary data from the few histotripsy treatments performed thus far on ex-vivo keloid specimens. Additionally, we expect that high frequency ultrasound can be used to simultaneously diagnose and guide histotripsy treatment for precise keloid ablation.

Prognostic factors affecting survival in prostate metastases to the brain: a population-based retrospective SEER database study

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prostate cancer, brain metastases, nomogram, SEER

Abstract/Case Study:Objective Brain metastases are an uncommon yet life-limiting manifestation of prostate cancer. However, our understanding of the natural progression, therapeutics, and patient outcomes for prostate metastases to the brain remains limited. This study aims to identify factors that influence overall survival (OS) in prostate metastases to the brain. **Methods** This is a population-based retrospective study of OS of 461 patients with prostate metastases to the brain using the Surveillance, Epidemiology, and End Results (SEER) database. Cox regression univariate and multivariable analyses were utilized to assess outcome-modifying risk factors, and a corresponding nomogram was developed. **Results** All patients had a median OS of 15 months. Regarding demographics, Hispanic patients had significantly increased OS ($p = 0.005$). Patients with tumor sizes greater than three centimeters exhibited significantly reduced OS (median OS 19 months, $p = 0.014$). Patients with additional metastases to the liver exhibited significantly reduced OS (median OS 3.5 months, $p < 0.001$). The nomogram had a C-index of 0.625, which combined with the calibration curve and receiver operating characteristic curve confirmed good performance of the model. **Conclusions** For patients with prostate metastases to the brain, median OS is influenced by race, tumor size, and presence of additional metastases. The lack of an association between traditional prostate cancer prognosis metrics, including Gleason and ISUP grading, and mortality highlights the need for individualized, metastasis-specific prognosis metrics. Here, we developed a prognostic nomogram for prostate metastases to the brain that can be used to guide the management of this pathology.

Anterior Vaginal Wall and Periurethral Growths Imaged with the ExactVu™ Micro-Ultrasound System

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Micro-ultrasound (mUS), Urethral diverticulum, Vaginal leiomyoma, Periurethral cyst

Abstract/Case Study: Micro-ultrasound (mUS) is an innovative tool commonly used to provide high-resolution imaging of the prostate, giving urologists the ability to perform in-office targeted biopsies. It has comparable or higher sensitivity for clinically significant prostate cancer compared to multiparametric MRI, with similar specificity.¹ Besides the prostate, it has been proven to be an effective tool for bladder cancer detection and staging.² The use of mUS for the evaluation of anterior vaginal wall and periurethral growths has not yet been reported. We report three cases: a 48 year-old female with an urethral diverticulum, a 43 year-old female with a vaginal leiomyoma, and a 32 year-old female with a periurethral cyst, each visualized using the the ExactVu™ mUS system, along with a description of image characteristics. 1. Klotz L, Lughezzani G, Maffei D, et al. Comparison of micro-ultrasound and multiparametric magnetic resonance imaging for prostate cancer: A multicenter, prospective analysis [published correction appears in *Can Urol Assoc J*. 2022 Feb;16(2):E1111]. *Can Urol Assoc J*. 2021;15(1):E11-E16. doi:10.5489/cuaj.6712 2. Saita A, Lughezzani G, Buffi NM, et al. Assessing the Feasibility and Accuracy of High-resolution Microultrasound Imaging for Bladder Cancer Detection and Staging. *Eur Urol*. 2020;77(6):727-732. doi:10.1016/j.eururo.2019.03.044 NOTE: images will accompany the abstract

Substance Fixation in Autism Spectrum Disorder with resultant Anorexia Nervosa: A Case Report and Literature Review.

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Autism Spectrum Disorder, Substance Use Disorder, Anorexia Nervosa, Eating Disorders

Abstract/Case Study: A 26-year-old Caucasian male in Southwest Virginia with past psychiatric history of Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Substance Use Disorder (SUD), Major Depressive Disorder (MDD), and Generalized Anxiety Disorder (GAD) was voluntarily admitted to the inpatient psychiatric unit for suicidal ideation following a car accident. The patient arrives having not eaten for five days, sleeping only an average of three hours each night, and with a heavy reliance on cannabis to suppress his anxiety and appetite. Autism spectrum disorder (ASD) is a complex developmental diagnosis comprised of repetitive behaviors, constricted interests, cognitive rigidity, and obsessive fixations. Combined with ASD's numerous comorbidities, this internal drive for a sense of sameness and repetition has led researchers into exploring the interconnection between ASD and Substance Use Disorder (SUD). SUD can have numerous effects on the body, depending on the specific substance utilized. Our patient initially struggled with alcohol and weight gain prior to development of an eating disorder and subsequently transitioning to cannabis. Chronic Cannabis Use often causes decreased appetite. Combined with this patient's worsening depression, CUD likely contributed to this patient's ability to withstand his desire for food, leading the patient to meeting diagnostic criteria for Anorexia Nervosa (AN). Further evaluation establishes how ASD symptomology contributes to an SUD comorbidity with the subsequent potential for AN development.

Combining Trigger Point Lidocaine Injections and BOTOX Injections for Cervical Dystonia

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Cervical Dystonia, BOTOX, Trigger Point Injection, Lidocaine

Abstract/Case Study: Cervical dystonia is characterized as a brain disorder that causes involuntary spasms of neck muscles. These spasms lead to abnormal head and neck movements and postures. An effective treatment that has been utilized is injecting BOTOX into the affected muscles. This leads to a blocking signal that causes muscles to contract in the first place. As a result, these involuntary muscle spasms can be significantly reduced. Unfortunately, there also remain side effects that may have costs that outweigh the benefits. For example, patients who have progressively worsening dysphagia by taking BOTOX may have to reconsider taking these injections. Trigger point injections are also a powerful method for relieving dystonia which can cause muscle aches. The injections cause muscles to relax by being administered to the muscle spasm directly. Although this is useful for patients, the pain-relieving effect has a much smaller lifespan. Combining both BOTOX and trigger point lidocaine injections may offer a happy medium as a lower dose of BOTOX would be needed to have fewer side effects while still maintaining the lifespan of treatment. This case study explores the utilization of combining trigger point lidocaine injection and BOTOX injections for cervical dystonia. This information will be helpful to explore the therapeutic efficacy of combining these injections for overall pain relief. Here, we present a 62-year-old lady with cervical dystonia who had received BOTOX injections for years. Earlier on, the BOTOX injections alone would work in alleviating the involuntary muscle spasms throughout the day and would last 3 months until she would have another injection. Over time, the BOTOX injection had a stronger side effect of dysphagia. To circumvent this, a lower dose of BOTOX was given but as a result, it would not treat the cervical dystonia for the entire 3-month time frame and her pain would come back within 2 months. Since BOTOX cannot be given sooner than 3 months due to the risk of generating antibodies, this caused a dilemma regarding how to treat this patient. The patient also specified that she was not open to oral spasticity medications due to the sedative effect. To approach this, trigger point injections were considered. Trigger point injections with lidocaine and steroids within the cervical muscles lasted 2 weeks. Combining trigger point injections with BOTOX injections helped decrease side effects and maintain therapeutic efficacy.

Management Challenges and Potential Malabsorption of Valproic Acid in a Patient with Bipolar 1 Disorder and Gastrointestinal History: A Case Report

James Kwok Kye Kim

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Bipolar 1 disorder, Valproic acid, Depakote, gastric bypass

Abstract/Case Study: Bipolar 1 disorder is a chronic psychiatric condition often managed using mood stabilizers such as valproic acid and lithium, the former which is absorbed in the gastrointestinal tract. This case report presents the challenges encountered in managing bipolar 1 disorder in a 65-year-old Caucasian female with a history of extensive gastrointestinal (GI) issues. The patient was initially treated with lithium but experienced adverse effects, prompting a switch to valproic acid (VPA) tablets. However, due to ongoing GI problems unrelated to her medication and to help improve tolerability, the patient underwent multiple medication formulation changes, including Depakote delayed release tablets, Depakene liquid, and Depakote sprinkle capsules. However, the patient's VPA levels decreased below therapeutic levels after the formulation changes despite medication compliance. This case highlights the importance of considering GI issues in optimization of a treatment plan for patients with Bipolar 1 disorder.

Developing novel precision medicine for glioblastoma.

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Glioblastoma, Precision medicine, Therapeutic targets, Prognostication

Abstract/Case Study: Glioblastoma (GBM) is an incurable brain tumor lacking major advancements in treatment over the past two decades. Previously, our lab identified the GBM progression gene signature (GBM-PGS) that captures GBM heterogeneity and accurately predicts risk of GBM progression based on the patient's tumor genetics. **Objective:** The purpose of this study is three-fold: (1) to develop a droplet digital PCR (ddPCR)-based GBM-PGS clinical prognostic test, (2) to identify targeted therapeutics specific to each of the progression risk groups stratified by GBM-PGS, and (3) to investigate if the pipeline used to derive the GBM-PGS is generalizable to other cancer models, namely pediatric high-grade glioma (pHGG). Ultimately, this study aims to investigate whether the GBM-PGS pipeline can form the basis of a precision medicine approach for GBM prognostication and treatment. **Methods:** A ddPCR-based assay was developed, optimized, and validated using GBM patient samples to correlate risk scores with survival. Highly expressed and essential survival genes in each GBM-PGS progression risk group were identified and grouped by common functions or signaling pathways to identify risk group-specific enriched druggable pathways and thus targeted therapeutics. A pHGG survival gene signature (pHGG-SGS) and predictive model were identified, trained, and validated. **Results:** Risk scores generated from ddPCR-quantified GBM-PGS expression were inversely related with patient survival. Risk group-specific candidate targets, enriched pathways, and targeted therapeutics were identified. Two high risk-targeted therapeutics demonstrated significantly increased sensitivity in one high-risk versus low-risk cell line in vitro. To combat overfitting to a small pHGG dataset, a novel machine learning pipeline was developed, identifying a 200-gene pHGG-SGS strongly predictive of pHGG overall survival. **Conclusions/Future Work:** The foundation provided by this study suggests that the GBM-PGS pipeline can form the basis for a generalizable precision medicine approach. More risk group-specific targeted therapeutics need to be tested for group-specific sensitivity in more GBM cell lines, and more robust pHGG datasets will be awaited to permit identification of survival group-specific therapeutic targets.

Advanced Battlefield Acupuncture for Pain Management in Sickle Cell Crisis: A Case Report

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sickle cell disease, acupuncture, pain ,

Abstract/Case Study: A 28-year-old male with a past medical history of sickle cell disease, pulmonary embolism (on Eliquis), avascular necrosis of bilateral hips, for which he had total hip arthroplasties, and avascular necrosis of bilateral shoulders presents to the emergency department for pain control. He had multiple recent admissions due to sick-cell-related pain, with the most recent admission two weeks prior. On hospital day 3, the patient continued to have persistent aching, throbbing pain and had a pain scale score of 8/10. At this point, acupuncture treatment was introduced. Auricular acupuncture was done in the ears bilaterally using acupuncture semi-permanent needles. Specifically, a type of auricular acupuncture that gained traction due to its use in the management of pain for injured U.S. soldiers on the battlefield, and therefore was dubbed "advanced battlefield acupuncture." Following a battlefield acupuncture treatment, he rated his pain at a 6/10. Three needles were left in the right ear, and one in the left ear for a total of 4 needles. The needles were removed around ten hours later. The following day the patient reported improved pain control and was discharged. During follow-up, the patient was concerned about the inability to access hydromorphone patient-controlled analgesia (PCA) during a sickle-cell crisis if he were to start acupuncture treatment. This highlights the need for education about the possible benefits and risks of acupuncture and how it can be incorporated into the treatment plan. PCA is the current gold standard for the treatment of sickle cell crisis requiring hospitalization. However, acupuncture can be an adjuvant therapy in the acute setting of hospitalization or to better manage the maintenance management of pain outpatient. This is crucial to consider in cases of patients requiring frequent hospitalization and hydromorphone usage. Further, this case underscores the need for a prospective controlled study to further investigate the efficacy and safety of advanced battlefield acupuncture in managing pain associated with sickle cell crisis.

Preliminary Investigation: Evaluating the Impact of High-Intensity Treadmill Gait Training on Locomotion Recovery among Traumatic Brain Injury Patients

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TBI, Treatment, HIGT, Clinical Study

Abstract/Case Study: Objectives The purpose of this study was to investigate the effectiveness of High Intensity Gait Training (HIGT) compared to the standard physical therapy program prescribed to adults after a traumatic brain injury (TBI). **Design** Adult subjects (18-75yrs) who have suffered mild (n=6), moderate (n=1), or severe (n=2) TBI (initial or recurrence) were placed in either an Intervention (n=5) or Control (n=4) group. Programs of HIGT followed by standard physical therapy (Intervention) or standard physical therapy alone (Control) were given 3-days/week for 1-hour over four weeks. HIGT participants began with a 3-min warmup, followed by treadmill walking speed set at 85% heart rate reserve for 25-mins, and ending with a 2-min cool down. Standard physical therapy consisted of exercises, stretches, and balance activities. At day one, two weeks, four weeks, and four weeks post-discharge (follow-up), participants in both groups were assessed using the 10-Meter Walk Test for gait speed, 6-Minute Walk Test for gait distance and endurance, Berg Balance Scale for balance, 5-times sit-to-stand (5TSTS) and Timed Up and Go (TUG) tests for mobility, and Cognitive TUG and Montreal Cognitive Assessment (MoCA) for cognitive function. **Results:** In addition to improved gait speed ($p < 0.1$) and endurance ($p < 0.05$) in the HIGT group (n=5), both the control (n=4) and HIGT groups demonstrated a significant main effect of time for mobility (5TSTS; $p < 0.1$, TUG; $p < 0.1$) and cognition (cognitive TUG; $p < 0.01$, MoCA; $p < 0.05$). HIGT, moreover, showed longer-lasting rehabilitative effects on gait distance, endurance, mobility, and cognitive function compared to standard physical therapy during the four-week follow-up. HIGT was found to be safe and well tolerated by the TBI population. **Conclusions** Our data suggests that HIGT may support functional recovery and have longer-lasting rehabilitative effects during the four-week follow-up. Future work will involve increasing sample size to expand upon these promising results.

Use of Topical Ketamine for Phantom Limb Pain in Pediatrics: A Case Report

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above-the-knee amputation, multimodal analgesia, neuropathic pain management, topical ketamine cream

Abstract/Case Study: Phantom limb pain (PLP) presents a significant challenge in pediatric patients following limb amputation, with traditional management strategies often falling short of providing effective relief. This case report describes the successful utilization of topical ketamine cream as an adjunctive therapy in the multimodal pain management of a 12-year-old female patient who underwent left above-knee amputation (AKA) following traumatic injuries. Despite receiving standard analgesic therapy post-surgery, the patient reported persistent pain at the surgical site and phantom limb sensations, prompting consultation for pain management. Subsequent initiation of topical ketamine cream resulted in marked improvement in pain control and reduction in opioid requirements. The patient's pain continued to decrease over the course of treatment, facilitating the discontinuation of opioids and demonstrating sustained pain relief. This case highlights the unique challenges of managing PLP in pediatric patients and the potential of non-opioid alternatives, such as topical ketamine, in improving pain management outcomes. This case report underscores the feasibility and efficacy of topical ketamine cream in pediatric PLP management, emphasizing the need for further research to establish optimal dosing regimens and long-term safety profiles. By expanding our understanding of alternative analgesic modalities, we can enhance pain management outcomes and improve the quality of life for pediatric patients living with PLP.

Case of Cocaine Induced Psychotic disease with atypical formications.

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Psychiatry, Cocaine Induced Psychotic Disorder , Substance Use Disorder,

Abstract/Case Study: A case of a 69-year old woman suffering from Cocaine-Induced Psychotic Disorder (CIPD) is described. The patient presented first to the emergency department with the differential diagnoses of first 'acute paranoid delusion' and next 'substance-induced psychotic disorder'. She was then referred to inpatient psychiatry for crisis stabilization where the patient was given antipsychotic treatment resulting in complete remission of the symptoms. CIPD is a documented potential result of cocaine abuse accompanied by symptoms such as hallucinations, delusions, disorganized thoughts, and paranoia. Occasionally, cocaine use can be accompanied with Delusional Parasitosis (DP), in which patients experience formication, a sensation of insects crawling on or under the skin, leading to the false belief that they are infested with parasites. The patient's extensive and varied delusions suggest a broader psychotic disorder such as CIPD, however the patient's tactile and visceral hallucinations are atypical of both CIPD but still cannot be explained by DP and may suggest a novel disease presentation.

Do minimally invasive surgical therapy procedures play a protective role in development of persistent postoperative opioid use following benign prostatic hyperplasia surgery?: A retrospective cohort study

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Postoperative, Opioids, BPH, MIST

Abstract/Case Study:Background: The opioid epidemic has prompted a reevaluation of postoperative pain management strategies, particularly in the context of benign prostatic hyperplasia (BPH) surgeries. Enhanced recovery after surgery (ERAS) protocols and minimally invasive surgical therapies (MIST) have emerged as potential solutions to mitigate postoperative opioid use (PPOU). However, their impact remains unclear, especially in opioid-naïve patients. Methods: Using a retrospective cohort study design, we analyzed data from the TriNetX Research Network to assess PPOU rates following various BPH procedures. Propensity score matching (PSM) was utilized to control for potential confounders and compare MIST and non-MIST procedure cohorts. We also examined the influence of ERAS implementation on PPOU rates, and opioid prescription patterns stratified by procedure type. Results: A total of 9,035 and 80,859 men comprised the MIST and non-MIST cohorts respectively. MIST procedures (11.00%, [10.36%, 11.65%]) demonstrated a lower risk of PPOU compared to non-MIST procedures (13.38% absolute risk, [12.68%, 14.08%]) in the general population (RR: 1.22 [1.12, 1.32], $p < 0.0001$). However, this protective effect was attenuated in opioid-naïve patients (RR 1.12 [0.97, 1.28], $p = 0.1265$). Opioid prescribing patterns varied significantly by procedure type, with higher early postoperative exposure correlating with increased PPOU rates. Transient influence of ERAS implementation did not significantly affect PPOU rates for BPH surgeries (TURP RR: 0.93 [0.78, 1.11], LVP RR: 1.07 [0.88, 1.30]). Conclusion: MIST procedures may offer a relative protective factor against PPOU, particularly in opioid-exposed patients. Opioid prescribing practices significantly impact PPOU rates, highlighting the need for judicious use of opioids in postoperative pain management. Further research is warranted to optimize opioid-sparing strategies in BPH surgeries and to evaluate the efficacy of ERAS protocols in this context.

Splenic arteriogastric fistula following previous complicated sleeve gastrectomy: a surgical case report and literature review

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fistula, splenic artery, gastric remnant, bariatric

Abstract/Case Study: Splenic Arteriogastric Fistulas are a rare and deadly cause of upper gastrointestinal bleeding consisting of an abnormal connection between the stomach and the splenic artery. We present a patient who underwent a sleeve gastrectomy that was later complicated by a perforated marginal ulcer one year later. This was repaired primarily and reinforced with an omental patch. She then suffered a fistula formation between the gastric remnant and splenic artery 6 months later, initially presenting with an episode of hematemesis which ultimately led to massive hemorrhage. Other published cases of arterial enteric fistulas following bariatric surgery are reviewed and the signs, symptoms, and potential management approaches of splenic arteriogastric fistulas are discussed.

Silent Harm: Hematologic Manifestations of Systemic Lupus Erythematosus

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SLE, Lupus, Leukopenia, Lymphopenia

Background: Prior research on Systemic Lupus Erythematosus (SLE) demonstrated that leukopenia and lymphopenia are associated with disease activity, although the relationship between these hematologic manifestations and health-related quality of life (HRQoL) has not been well examined. Furthermore, the clinical utility of HRQoL as an indicator of SLE disease activity remains unclear. **Objective:** This study aims to evaluate the clinical utility of HRQoL as an indicator of disease activity in patients with hematologic SLE by examining the relationship between HRQoL and other measures of disease activity. We hypothesize that leukopenia and lymphopenia will correlate with greater disease activity and worse HRQoL. **Methods:** 25 SLE patients will be enrolled in this prospective cohort study. HRQoL will be quantified using Medical Outcome Study Short Form 36 (SF-36) surveys. Pearson's correlation and multivariable linear regression will be used for analysis. **Results:** Initial analysis of 12 currently enrolled patients revealed that WBC was strongly correlated with C3 levels ($r=0.7103$, $p<.01$) and ALC was moderately correlated with C3 levels ($r=0.3370$, $p<.1$). WBC and ALC were strongly correlated with C4 levels ($r=0.6678$, $p<.01$; $r=0.8177$, $p<.01$) and moderately negatively correlated with dsDNA antibody levels ($r=-0.4917$, $p<.05$, $r=-0.2680$, $p=.2402$). In contrast, a greater severity of leukopenia and lymphopenia were correlated with higher SF-36 scores. Multivariable linear regression demonstrated that a single point increase any of the SF-36 sub-scores were predictive of a <0.1 change in WBC (F statistic=3.109, $p<0.1$) and <0.02 change in ALC (F statistic=5.923, $p<.05$). **Conclusions:** Results from this study demonstrate that the severity of leukopenia and lymphopenia is associated with markers of immunologic disease activity. However, contrary to our expected results, the severity of leukopenia and lymphopenia were associated with better HRQoL scores, and none of the SF-36 subscores provided meaningful prediction of change in WBC or ALC in multivariable regression models. These results suggest that HRQoL may not be a reliable indicator of disease activity in patients with hematologic SLE. Perhaps unique from other manifestations of SLE, the hematologic manifestations of the disease may have minimal discernable impact on patients' HRQoL and may necessitate laboratory examination as a routine and crucial aspect of evaluation in this SLE subpopulation.

Enhancing Long-Term Diabetes Management: A Clinical Trial on the Efficacy of Episodic Future Thinking

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Introduction: Type 2 diabetes (T2D), affecting over 30 million Americans, significantly burdens the healthcare system due to suboptimal adherence to care plans, leading to increased morbidity and mortality. Episodic Future Thinking (EFT), a cognitive strategy to reduce bias for immediate gratification, involves vividly imagining future events and shows promise in enhancing motivation for behavioral change in T2D. This abstract details preliminary findings from an ongoing clinical trial evaluating EFT's efficacy in T2D management. **Methods:** This 24-week remote clinical trial assigned participants to either an EFT or control group, matched by baseline HbA1c levels and BMI. Preliminary analyses at weeks 8 and 24 during the intervention and post-intervention at week 36 included EFT (n=9) and control (n=10) participants. Both groups received an intervention bundle entailing behavior-change coaching, ADA-aligned diet and exercise guidelines, and online self-monitoring capabilities. **Results:** Initial results demonstrate significant improvements in HbA1c and weight among EFT participants. Specifically, from baseline to Week 24, EFT participants experienced a notable decrease in HbA1c levels ($p < 0.05$), which further improved or sustained by the 36-week follow-up ($p < 0.001$). Weight assessments echoed these positive shifts, with EFT participants showing a significant reduction from baseline to Week 24 ($p < 0.001$), and these changes remained significant at the 36-week follow-up ($p < 0.001$). Control group comparisons in weight at Week 36 also indicated significant differences ($p < 0.05$) but no other significant differences. **Discussion:** Preliminary findings confirm the feasibility and effectiveness of the EFT intervention in T2D management. Sustained improvements observed up to 36 weeks post-intervention show promising long-term effects of EFT, addressing whether its impact plateaus or diminishes over time to help gauge the necessary frequency of EFT administration for optimal, sustained health goal achievement in T2D patients. The ongoing trial aims to expand its cohort to n=120 (60 per group), including diverse settings to explore broader implications. This approach promises to enhance T2D management accessibility and efficiency, especially in underserved areas, by minimizing delivery costs and maximizing the intervention's longevity and impact.

Management of May Thurner Syndrome in a Patient with existing Chronic Pain: A Case Report

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May-Thurner, DVT, compression, Iliac

Abstract/Case Study:Background: May-Thurner Syndrome (MTS), characterized by the compression of the left common iliac vein by the right common iliac artery, is a known but often underdiagnosed cause of iliofemoral deep venous thrombosis (DVT). The management of MTS can be challenging, particularly in patients with complex medical histories and chronic pain conditions. Objective: This case report highlights the complexities involved in diagnosing and managing MTS in a patient with a history of chronic pain managed with opioids. Materials and Methods: A 55-year-old female with a complex past medical history, including chronic opioid therapy, presented with left leg DVT. Diagnostic evaluations included venous duplex ultrasound, CT scan with IV contrast, and further assessments confirming MTS. The management strategy focused on both the acute pain due to DVT and the underlying MTS. Heparin drip, followed by a venogram, thrombectomy, left common iliac vein angioplasty, and stent placement were performed. Post-procedural management included transitioning to enoxaparin and plans for direct oral anticoagulants, alongside adjustments in pain management strategies. Results: Mechanical intervention and pain management strategies yielded significant improvements in the patient's symptoms. Following the venogram, thrombectomy, angioplasty, and stenting, the patient experienced a significant reduction in leg pain and swelling, with a noticeable improvement in mobility. Adjustments to pain management approach also facilitated effective pain control while mitigating the risks associated with increased opioid dependence. Conclusion: The management of May-Thurner Syndrome (MTS) in patients with concurrent medical conditions necessitates a personalized, multidisciplinary approach. This case highlights the diagnostic and therapeutic challenges posed by MTS and the importance of considering it in the differential diagnosis of unexplained DVT. There is a need for heightened awareness of MTS among healthcare professionals to ensure timely diagnosis, appropriate intervention, and effective pain management, ultimately improving patient outcomes.

Evaluating the Interaction Between Sludge and Multiple Chronic Conditions on Treatment Burden in Colorectal Cancer Screening

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colon cancer screening, preventive services delivery, disparities, administrative burden

Abstract/Case Study: **BACKGROUND:** Treatment burden, the impact of receiving healthcare on patient functioning and well-being, is associated with numerous negative health outcomes, including reduced completion of preventive healthcare services. The purpose of this study was to evaluate the influence of two factors hypothesized to impact treatment burden: sludge (administrative burden or frictions) and multiple chronic conditions (MCC) on completion of colorectal cancer (CRC) screening services. We define patients with "MCC" as having more than one diagnosed chronic health condition for which they require ongoing medical care. **METHODS:** Participants were patients in southwest and south central Virginia, identified via health records or targeted regional Facebook ads, who had either completed or been referred for CRC screening within the previous 12 months. We distributed an electronic survey to eligible participants, designed to evaluate the amount of sludge that they encountered during their most recent CRC screening (on a 500 point scale) and how it affected the amount of burden they felt in meeting their healthcare needs as evaluated by the Treatment Burden Questionnaire (TBQ). MCC status (no conditions, physical only, mental only, both physical and mental) was determined from participant health records using ICD-10 codes and a Medicare algorithm. A linear regression model was fit to determine the moderating relationship of reported sludge and MCC status on treatment burden. **RESULTS:** 242 participants completed the survey and had health records available (75% female, 16% Medicaid/Medicare). There was a significant positive relationship between sludge and burden ($t(239) = 4.9, p < 0.001$), but no difference in ratings of sludge across MCC groups (none 89.3, physical 83.8, mental 122.0, both 100.8, $F(3,237) = 0.578, p = 0.63$). Patients with both physical and mental conditions experienced a greater amount of burden (both vs. physical only, average difference 10.940, $p = 0.04$; both vs. none, average difference 12.442, $p = 0.02$). No moderating relationship between sludge and MCC status was found to be significant ($F(3,237) = 0.578, p = 0.21$). **CONCLUSION:** Our findings suggest that sludge in the CRC screening process increases healthcare burden similarly in all patients, regardless of MCC status. Future studies are necessary to identify and understand other moderating factors of sludge that impact burden in people seeking preventive healthcare services.

Characterizing Outcomes in the Surgical Management of Adult Chiari Malformation in Southwest Virginia: A Pilot Study for an International Collaboration

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chiari malformation, outcomes, strategies,

Abstract/Case Study:Type 1 Chiari malformation (CM-1) is defined by an isolated descent of the cerebellar tonsils below the foramen magnum. Consequently impingement or relative crowding of the cervico-medullary spinal cord junction occurs. This anatomical distortion produces a characteristic set of symptoms. Patients frequently complain of headaches worsened by valsalva, dysphagia, balance problems, nausea and vomiting. The most frequently reported comorbidity is the presence of a spinal cord syrinx, which produces syringomyelia, a pattern of symptoms explaining upper extremity paresthesias and weakness. CM-1 represents a significant global health burden and represents a chronic condition resulting in reduced quality of life. While this condition has been most heavily studied in the pediatric population, many adults have an emergence of associated symptoms as a result of rapid development of the skull. Severe symptoms can limit productivity and have a negative economic burden. Additionally severe progression of the disease process can lead to malignant intracranial pressure elevations with neuro-deterioration. Furthermore, CM-1 likely exists asymptotically in a high proportion of individuals, however this entity has become increasingly diagnosed with the advent of advanced neuroimaging. One must consider then what the indications for surgical management are in both symptomatic and asymptomatic individuals with appropriate balance against potential poor outcomes. Therefore, it is critical to understand the most appropriate and effective evaluation and management of such patients. The use of historical data records and their assimilation into larger data sets can aid in understanding the optimal management of CM-1. We performed a retrospective chart review of 25 patients who underwent surgical intervention for CM-1 at our institution. 148 records were identified based on ICD-10 and procedure codes. From 148 records 25 met inclusion criteria and underwent further evaluation. Carilion RedCap was used for storage of de-identified patient data, corresponding EMPI codes were transferred to EPIC and patient charts were accessed. Data was extracted for symptomatology at presentation, surgical approach, 30-day and beyond 30-day complications (CSF leak, pseudomeningocele, wound infection), re-operation rate, mean Chicago Chiari Outcome Scores (CCOS), and radiographic evidence of syrinx resolution at follow up. These parameters were placed in the context of the surgical approach utilized, primarily focusing on bone only decompression versus bony decompression with duraplasty. We found that the majority of our surgeons utilized one of three general approaches: posterior fossa decompression, posterior fossa decompression with duraplasty, and posterior fossa decompression with tonsillar manipulation. Re-operation rates greater than 30 days from initial surgery were 16% overall regardless of approach. Within 30 days post operative complications were relatively low: CSF leak (8.0%) and wound complication (12.0%). The most common clinical manifestation beyond 30 days from initial surgery was persistent headache (84%). Out of 15 patients with comorbid syrinx on initial imaging

26.7% had evidence of radiographic resolution on 6 month follow up MRI. Our results indicate that re-operation rates and immediate complications are low with respect to surgical management at our institution. Furthermore, our study highlights the challenge of syrinx persistence despite surgical management. Many of our patients continued to experience headaches long term. This may be a reflection of the natural history of the disease process, or consequence of a craniotomy procedure of the posterior fossa. Through a collaboration with our international partners we hope to accumulate large enough data with sufficient power to detect a reliable pattern of outcomes in the surgical management of CM-1. With this information we will be able to better understand the pitfalls of current management strategies and direct future research.

Culturally Grounded Interventions: A Review of Behavioral Health and Psychiatric Outcomes in North American Indigenous Communities

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Psychiatry, Indigenous Health, Anxiety, Depression

Abstract/Case Study: Native Americans face significant mental and physical health challenges, with lower life expectancies compared to other demographics in the U.S. This review focuses on the role of indigenous culture, language, and spirituality in enhancing mental health and positive life effect outcomes. Only studies that had a culture intervention (no healthcare intervention) were included. Studies included assessing the effect of cultural learning on behavioral health measures or acquisition of protective factors. Relevant articles were selected from PubMed, National Library of Medicine, and Google Scholar. MeSH terms such as "Indigenous Peoples, Mental Health, Culture, Social Identification, Indians, North American, American Indian or Alaska Native, Adolescent, Language, Anxiety, Depression," were used. The literature already indicates that cultural connectedness links to improved life satisfaction, hope, and depression outcomes. In their study titled "The Culture is Prevention Project" Masotti et al. found in multi-tribal Native Americans in California, cultural ties positively correlated with hope, life satisfaction, depression, substance abuse, and quality of life. These findings extend to substance abuse. Greenfield et al. demonstrated that among college students who identify as Native American, students with a higher level of involvement in their tribe's culture and language had lower rates of substance use. Culture-centric interventions -teaching culture as opposed direct health interventions- may robustly generate protective factors that are associated with better mental health outcomes. Shea et al. demonstrated that students from the Myaamia tribe that partook in a curriculum designed to teach Myaamia knoweldge graduated at higher rates than those who did not. In addition, Lewis et al. carried out a program teaching culture, language, and history to Cherokee youth. This program involved a 1000-mile bicycle ride along the route of the historic forced removal of the Cherokee. It featured classroom lectures, readings, and site visits. Participants reported significant reductions in anxiety, stress, and depression, alongside heightened positive mental health. A six-month follow-up showed sustained improvements in mental health, including reduced depression and anger. Studies are scarce in the 'culture as a treatment' paradigm for Native American health and there is an urgent need for quantitative research on this topic.

Exploring the Benefits of Acupuncture in Sickle Cell Patients

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Pain management, Chronic pain, Acupuncture, Sickle cell disease

Abstract/Case Study: Acupuncture has been used for centuries as a reliable technique in pain management. Many studies have explored how acupuncture can be used in chronic pain including in sickle cell disease for adult and pediatric patients. Currently, managing pain in sickle cell disease is difficult especially as long-term management protocols are considered for chronic pain, acute pain crisis, pain from organ damage, joint pain and priapism. The feasibility and accessibility of acupuncture along with the growing evidence of the benefits of acupuncture make this an option that should be more thoroughly explored and considered for pain management. This case study explores the utilization of acupuncture in patients who have sickle cell disease. This information will be helpful to explore the therapeutic efficacy of incorporating acupuncture treatment for overall pain relief, decreasing the need for opioids, and improving anxiety and insomnia which may result in a decrease in the overall incidence of crises. Here, we present a male 21-year-old and female 54-year-old patient with sickle cell disease. For the 21-year-old patient, a Ming men acupuncture protocol was administered for pain relief. The patient reported a significant improvement in energy and her general well-being afterwards. Regarding the 54-year-old patient, a Ming men acupuncture protocol in addition to French energetics was administered to the patient for her chronic pain secondary to sickle cell disease. The patient reported feeling moderately better but had some difficulty tolerating the needles used for acupuncture. To address this, we can explore the use of laser acupuncture if tolerating acupuncture needles is an issue for any patient. In the future, we will need more patients willing to receive this treatment so that efficacy can be more broadly studied as acupuncture has the potential to decrease overall pain as in these two cases, decrease opioid requirements, improve anxiety and insomnia, and potentially decrease the overall incidence of crises.

The Rate of Regular Over-the-Counter NSAID Use Among Patients with Heart Failure, Hypertension, and Chronic Kidney Disease

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NSAIDs, Over-the-counter Medications, Heart Failure, Hypertension

Abstract/Case Study: Nonsteroidal anti-inflammatory drugs (NSAIDs) are common prescription and over-the-counter (OTC) drugs that are generally safe, but sometimes used inappropriately. Many organizations have issued recommendations to avoid regular NSAID use in certain patients, such as those with heart failure (HF), hypertension (HTN), or chronic kidney disease (CKD). Research has shown that 10-35% of patients with HF, HTN, and CKD are prescribed NSAIDs on a regular basis, but minimal data on OTC NSAID use is available. This study took place within a southeastern U.S. health system in summer/fall 2023. Participants were adults, had a diagnosis of HF, HTN, and/or CKD, and an email address on file. Participants self-reported via an electronic survey how often they have taken four categories of OTC NSAIDs over the past three months. These categories included: 1) Ibuprofen or Naproxen, 2) Aspirin (excluding low-dose Aspirin taken for heart disease or stroke prevention,) 3) Headache Tablets and Powders, and 4) Other NSAIDs such as cold & sinus medications and menstrual pain medications. Examples of each category were included for reference. The frequency options included: Not at all, A few times per year, 1-3 days per month, 1-2 days per week, 3-5 days per week, and almost daily or daily. Regular OTC NSAID use was defined as taking any dose or type of OTC NSAID >3 days per week for the last 3 months. We evaluated the proportion of participants with HF, HTN, and/or CKD who self-identified as regular OTC NSAID users. Of 3136 participants who completed the qualifying survey, 917 (29.2%) were classified as regular NSAID users. 2 (0.2%) of regular NSAID users had HF only. 615 (67.1%) of regular NSAID users had HTN only. 92 (10%) of regular NSAID users had both HF and HTN. 3 (0.31%) of regular NSAID users had both HF and CKD. 131 (14.3%) of regular NSAID users had both HTN and CKD. 74 (8.1%) of regular NSAID users had all three HF, HTN, and CKD. Nearly 1 in 3 high-risk patients reported regular OTC NSAID use. The overwhelming majority of regular OTC NSAID users held the diagnosis of HTN either alone or in conjunction with HF and/or CKD. These findings emphasize the need for further efforts to promote safe OTC medication use among patients with HF, HTN, and CKD.

Angiopietin single-nucleotide polymorphism expression as a diagnostic and prognostic biomarker in traumatic brain injury

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traumatic brain injury, angiopoietins, diagnostic biomarker, prognostic biomarker

Abstract/Case Study: Traumatic brain injury (TBI) affects upwards of two million people in the United States each year, yet current assessment scales have limited functional predictive value. Efforts to elucidate serum biomarkers reflective of TBI outcomes seek to address this gap in clinical acuity. Accordingly, TBI pathophysiology has been subclassified into three distinct endophenotypes: diffuse axonal injury, inflammatory, and vascular. One vascular pathway of interest involves Angiopietin-1 (Ang1) and Angiopietin-2 (Ang2), which modulate the blood-brain barrier. In preclinical models, Ang1 and Ang2 have been implicated in post-TBI vascular permeability and neuroinflammation. Moreover, Ang2 single-nucleotide polymorphisms (SNPs) have been implicated in the development and progression of diseases with vascular-immune dysregulation, including systematic lupus erythematosus, rheumatoid arthritis, and acute kidney injury. These SNPs reflect a substitution of one base in the Ang2 gene and may demonstrate a predisposition to aberrant Ang2 functioning and subsequent vascular permeability. To our knowledge, no study to date has investigated expression of these polymorphisms in a TBI population. In this study, we measured serum expression of Ang2 via enzyme-linked immunosorbent assays and Ang2 SNPs via Kompetitive allele specific PCR genotyping in patients with moderate-severe TBI at 24 hours post-injury. SNPs included were rs12674822, rs1823375, rs734701, rs2442598, and rs11137037. We then determined the expression of Ang2 over time and in association with TBI severity (measured via Glasgow Coma Scale) and long-term functional outcomes (measured via Glasgow Outcome Scale). The associations between Ang2 expression, Ang2 SNP expression and clinical characteristics, injury features, and long-term recovery (measured via Glasgow Outcome Scale) were then evaluated. Student's T tests were performed for quantitative data and chi-square for categorical data. P values < 0.05 were deemed significant. These findings will elucidate the role of Ang2 genetic variants as potential patient-specific diagnostic and prognostic biomarkers.

Income, race, and geographic distribution influence survival in pediatric brain tumors

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neurooncology, pediatric neurosurgery, socioeconomic, disparities

Abstract/Case Study:Intro Tumors of the central nervous system are the most common solid malignancies in children. Despite advances in diagnosis, treatments, and surgical techniques, there exist socioeconomic disparities in cancer outcomes. These discrepancies are poorly defined in pediatric patients with brain tumors. In this study, we seek to define the influence of income, race, and geographic distribution on the diagnosis, treatment, and survival of pediatric brain tumors. **Methods** This is a population-based retrospective study of overall survival in 14,519 pediatric patients with brain tumors using the NCI SEER database. Patients were stratified into groups based on income level, minority status, and rurality. 1:1 tight caliper (0.01) nearest-neighbor propensity-score matching was performed for age, sex, and confounders (income, race, rurality). Statistics included chi-square tests for categorical variables and Student's T for numerical variables. **Results** After matching, the influence of income, race and geographic distribution on tumor progression were evaluated. Suboptimal income was associated with younger age, increased tumor size, reduced incidence of gliomas and H3K27M DIPG, and increased incidence of ependymoma, pilocytic astrocytoma, neuroectodermal tumors, and atypical teratoid/rhabdoid tumors. Regarding treatment, patients with suboptimal income were less likely to have surgery alone but more likely to have radiation and surgery or chemotherapy and surgery. Suboptimal income was associated with lower overall survival. Minority patients had reduced incidence of pilocytic astrocytoma and oligodendroglioma, and increased incidence of germinoma, H3K27M DIPG, glioblastoma, and atypical teratoid/rhabdoid tumors. Minority patients were less likely to be treated with surgery alone but more likely to be treated with radiation alone, radiation and chemotherapy and triple therapy. Minority status was associated lower overall survival. Residing in a non-metropolitan area was associated with older age at presentation, non-female status, and reduced risk of atypical teratoid/rhabdoid tumors. **Conclusions** These data demonstrate that income, race, and geographic distribution influence tumor progression, treatment, and survival in pediatric patients with brain tumors. Future research should investigate strategies for earlier diagnosis and improved clinical management of at-risk patients.

Comparison of the Effectiveness of Intravenous Dexmedetomidine Versus Fentanyl as an Adjuvant to Propofol for Maintenance of Entropy Guided General Anesthesia in Patients Undergoing Elective Brachial Plexus Repair Surgery: A Prospective Randomized Controlled Study

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Dexmedetomidine, Fentanyl, Propofol, Brachial Plexus Repair Surgery

Abstract/Case Study: Introduction: Brachial plexus repair surgery is often performed under general anesthesia without muscle relaxants for nerve stimulation, posing challenges in maintaining hemodynamics and patient immobility. Propofol is commonly used for anesthesia due to its rapid onset and emergence, but it can cause cardiac and respiratory depression. This study examines the effects of dexmedetomidine and fentanyl, which have sedative and analgesic properties, on propofol requirement, perioperative hemodynamics, and recovery in brachial plexus repair surgeries. Methods: After obtaining ethical committee approval from the institution, 50 patients ASA I and II adults undergoing elective brachial plexus repair surgery were divided into two groups of 25 each by chit method of randomization. In Group D and Group F, dexmedetomidine and fentanyl were given intravenously as a loading dose of 1 µg/kg over 10 min before induction followed by maintenance infusion at a dose of 0.5µg/kg/ hr. Dexmedetomidine and fentanyl infusions were kept constant, whereas propofol infusion was titrated to maintain intraoperative entropy value from 40 to 60. Hemodynamic variables (SBP, DBP, MAP, HR) and entropy (RE & SE) were recorded continuously. The intraoperative propofol requirement was noted, and recovery was assessed using extubation quality score and Ramsay sedation score. Results: Group D required significantly less propofol than Group F over 4 hours (719.2 ± 150.30 mg vs 1160.8 ± 214.51 mg, p < 0.001). Intraoperative SBP was more significantly decreased in Group F from its baseline than Group D (p < 0.001). MAP decreased in Group F compared to Group D at few intervals, but it was clinically insignificant. Group D had significantly lower heart rate from the baseline than Group F. Group D had lower entropy levels and comparable extubation quality scores. Postoperative sedation scores were slightly higher in Group D but clinically insignificant. Conclusion: Dexmedetomidine reduces propofol requirement and provides more stable hemodynamics compared to fentanyl in brachial plexus repair surgeries without neuromuscular blockade. Dexmedetomidine also maintains a favorable recovery profile.