



UW
DEPARTMENT
OF SURGERY
PRESENTS

2023 RESEARCH
SYMPOSIUM & 28TH
ANNUAL HELEN & JOHN
SCHILLING LECTURE

GUEST SPEAKER

JULIE ANN SOSA, MD, MA, FACS

FRIDAY, MARCH 31ST, 2023

UW TOWER AUDITORIUM

INTRODUCTION



Douglas E. Wood,
MD, FACS, FRCSEd

Welcome to the 28th Annual Department of Surgery Research Symposium and Schilling Lecture. This symposium allows us the time to celebrate the phenomenal quality, breadth and depth of research in the Department as well as the opportunity to learn from distinguished visiting scholars. Most of all the Schilling Research Symposium is our time to come together as a community of faculty, residents, fellows, students, and friends, and to cultivate the culture of curiosity, innovation and discovery that are part of what makes our Department so strong.

We are fortunate to welcome Dr. Julie Ann Sosa as our Schilling Visiting Professor. Dr. Sosa is the Chair of the Department

of Surgery at the University of California - San Francisco. She holds the Leon Goldman, MD Distinguished Professorship in Surgery and is an esteemed endocrine surgeon and a prolific researcher. Dr. Sosa is a dynamic leader and we look forward to having her with us for the research presentations and for her lecture in the afternoon entitled, "Tackling Controversy and Changing Practice, with Courage and Evidence, as a Resident!"

Today, we will also be honoring this year's Schilling Distinguished Faculty Award recipient, Dr. Raymond Yeung and recognizing his remarkable career as a clinician-scientist. This award is made in appreciation of outstanding University of Washington surgeon-scientists and recognizes the career achievements of those who have distinguished themselves through excellence in scientific contributions, mentorship of colleagues and training the next generation of surgeon-scientists. Past honorees include Dr. Ron Maier (2021) and Dr. Nicole Gibran (2022). A perpetual plaque sits in the Chair's office commemorating the annual award winners.

The Surgery Research Symposium and Schilling Lecture are made possible by a generous gift from the late Helen Schilling in honor of her husband Dr. John Schilling. The Schillings were deeply committed to teaching, scholarship and research, and this event, where residents showcase their research supported by faculty mentors, showcases a great aspect of their legacy. It is with tremendous pride and gratitude that we carry on this tradition and look forward to doing so for years to come.

This is also an important learning opportunity for residents and fellows to refine their scientific presentation skills through presentations, audience Q&A, and feedback from our panel of judges. The Schilling event is a celebration of the passion for research that exists within our Department. Every member of the Department plays a critical role in the success of our research mission and we are grateful for the hard work and dedication of our staff, faculty, and trainees who make events like this possible.

We are pleased that you are joining us and hope that you find the events both informative and inspiring.

A handwritten signature in black ink, appearing to read "Douglas E. Wood".

Douglas E. Wood, MD, FACS, FRCSEd
The Henry N. Harkins Professor and Chair
Department of Surgery
University of Washington

A handwritten signature in black ink, appearing to read "David R. Flum".

David R. Flum, MD, MPH, FACS
Vice Chair for Research
Professor, Surgery, Health Services, and Pharmacy
Department of Surgery
University of Washington

ABOUT HELEN & JOHN SCHILLING

The Helen and John Schilling Endowed Lectureship was established by the late Helen Schilling to bring distinguished scholars to the Department of Surgery at the University of Washington, and to enhance the Department's commitment to the highest standards of patient care, teaching, research and scholarship. It was Mrs. Schilling's wish that the lectureship be named in honor of her husband, John.

Dr. Schilling devoted his life to academic medicine in a career spanning 50 years. He was born and raised just outside Kansas City, Missouri, and at the age of 15 entered Dartmouth College. After graduating from Dartmouth in 1937, he attended Harvard Medical School as a member of the class of 1941, the last class to graduate before World War II. In the six months before the start of his internship and residency at Roosevelt Hospital in New York City, he signed on as a ship's doctor on the schooner Effie M. Morrissey for a scientific expedition to the Arctic sponsored by the U.S. Bureau of Standards. After a number of perilous adventures along the Greenland coast and in the Hudson Straits, he returned to New York and started his training in general surgery. He joined the surgical staff at the University of Rochester in 1945 where he began his lifelong work on wound healing. His career at Rochester was interrupted for several months by a stint in the Central Pacific (Eniwetok) to participate in the study of flash burns as part of the atom bomb tests and the Manhattan Project. Subsequently he joined the Air Force as a volunteer and set up a surgical department at the new School of Aviation Medicine in San Antonio.

In 1956 Dr. Schilling was invited to be the Chief of the first full-time Department of Surgery in the new medical school at the University of Oklahoma. He was successful in recruiting a number of outstanding junior faculty, many of whom went on to become chairs. In addition to his administrative responsibilities, he maintained an extensive research program in wound healing in collaboration with Dr. Betty White. At the end of 18 years, Dr. Schilling and his faculty had trained 75 surgeons from Oklahoma and adjoining states, and had established a department known for its academic accomplishments.

Dr. Schilling came to the University of Washington in 1974 as a senior investigator and, upon the sudden resignation of the chair, was asked to take over the management of the Department of Surgery. Thus



Helen & John Schilling

began his third chairmanship which lasted eight years until his retirement. His first responsibility was to recruit faculty to fill the many vacancies, a task he achieved after several stormy years. Upon his retirement in 1983, he had recruited 41 new faculty members and graduated a total of 40 chief residents.

His career in academic surgery was marked by a devotion to patient care and teaching, as well as research. Despite his commitment to the profession, Dr. Schilling still found time to engage in other activities. From his early childhood he enjoyed the outdoors and had become an expert tennis player, skier, and fly fisherman; he always believed that one's life work should be punctuated by intervals of travel and recreation.

Helen Schilling shared with her husband both the non-academic as well as the academic side of his life. They first worked together in Rochester and continued their professional association through the years in Oklahoma and Washington. They were married in 1979. Mrs. Schilling had a career in newspaper work and administration after graduating from Oberlin College. This dual background enabled her to be his close associate and administrative assistant for 40 years.

SCHILLING GUEST LECTURER

JULIE ANN SOSA, MD, MA, FACS



Julie Ann Sosa, MD, MA, FACS

Professor and Chair
Department of Surgery
University of California -
San Francisco
Leon Goldman, MD Distinguished
Professor of Surgery

Julie Ann Sosa, MD, MA, FACS, is the Leon Goldman, MD Distinguished Professor of Surgery and Chair of the Department of Surgery at the University of California, San Francisco (UCSF), where she is also a Professor in the Department of Medicine and affiliated faculty for the Philip R. Lee Institute for Health Policy Studies. Dr. Sosa came to UCSF in 2018 from Duke. Her clinical interest is in endocrine surgery with a focus in thyroid cancer. She is an NIH- and FDA-funded investigator and author of more than 400 peer-reviewed publications and 80 book chapters and reviews, all largely focused on outcomes research, health care delivery, hyperparathyroidism, and thyroid cancer, with a focus on clinical trials. She has authored or edited seven books. Dr. Sosa is President of the American Thyroid Association (ATA) and serves on the Board of Directors/Executive Council of the ATA and International Thyroid Oncology Group. She is

also chairing the ATA committee responsible for writing the next iteration of differentiated thyroid cancer guidelines. Dr. Sosa is the Editor-in-Chief of the *World Journal of Surgery* and an editor of *Greenfield's Surgery: Scientific Principles and Practice*.

Dr. Sosa has mentored more than 90 students, residents, and fellows, for which she was recognized with induction as a full member to the American College of Surgeons Academy of Master Educators in 2020, and by the ATA with the Lewis E. Braverman Distinguished Lectureship Award in 2017 and its Distinguished Service Award in 2022. She received the Chancellor's Diversity Award in 2022 for the Advancement of Women at UCSF.

Dr. Sosa was born in Montreal and raised in upstate New York. She received her AB at Princeton, MA at Oxford, and MD at Johns Hopkins, where she completed the Halsted residency and a fellowship.

SYMPOSIUM AGENDA

7:30AM **WELCOME / DOUGLAS E. WOOD, MD, FACS, FRCS(ED), THE HENRY N. HARKINS PROFESSOR AND CHAIR**
7:35AM **INTRODUCTION / DAVID R. FLUM, MD, MPH, FACS, VICE CHAIR FOR RESEARCH, PROFESSOR, SURGERY**

– SESSION I –

MODERATOR: TERESA S. KIM, MD, ASSISTANT PROFESSOR, SURGICAL ONCOLOGY

7:45AM **Lindsay K. Dickerson, MD – UW Tumor Immune Microenvironment (TIME) Research Fellow**
“Therapeutic Modulation of Tumor-Infiltrating T Cell Function in Fibrolamellar Carcinoma” Page 10

8:00AM **Lauren L. Agoubi, MD, MA – T32 Pediatric Injury Research Training Fellow**
“Differential Impacts of Firearm Laws by Community Distress and Social Connectedness” Page 11

8:15AM **Kyle S. Bilodeau, MD – T32 NIH-NIGMS Institutional Postdoctoral Research Fellow in Trauma, Injury and Inflammation**
“A Formative Mixed Methods Evaluation of a New Ross Program: Why Context Matters” Page 12

8:30AM **Nallely Saldana-Ruiz, MD, MPH – Vascular Surgery Fellow**
“Impact of Aortoiliac Tortuosity in Outcomes of Fenestrated Endovascular Aortic Repairs” Page 13

8:45AM **Nina M. Clark, MD – T32 National Institute of Diabetes and Digestive and Kidney Diseases Research Fellow**
“Implementation Evaluation of Tiered Tele-Triage Pathways for Burn Center Consultation and Transfer” Page 14

9:00AM **William C. Crannell, MD – Abdominal Transplant Surgery Fellow**
“There is No Difference in Graft Survival for High Versus Low Kidney Donor Profile Index Kidneys Around the High KDPI Cutoff” Page 15

9:15AM **BREAK**

– SESSION II –

MODERATOR: DAVID R. FLUM, MD, MPH, FACS, VICE CHAIR FOR RESEARCH, PROFESSOR

9:30AM **Nikki Thrikutam, MD, MPH – General Surgery R4 (presenting on behalf of Giulia Daneshgaran, MD – Plastic Surgery R3)**
“Are We Late to the Show? A Pilot Needs Assessment of Addressing Gender-Based Microaggressions in Surgical Trainees”..... Page 16

9:45AM **Arjune S. Dhanekula, MD – Cardiothoracic Surgery R4**
“The Fate of the Distal Aorta Following Elective Root Replacement in Marfan Syndrome” Page 17

10:00AM **James M. Dittman, MD – Integrated Vascular Surgery R1**
“Antiplatelet Therapy Associated with Increased Survival Following FEVAR in the Vascular Quality Initiative Database”..... Page 18

10:15AM **Kajal A. Mehta, MD, MPH – General Surgery R4**
“Implementation of an Enterally Based Resuscitation Bundle for Major Burn Injuries in an Austere Setting: Results from a Pilot Hybrid II Effectiveness-Implementation Randomized Trial” Page 19

10:30AM **Blake E. Murphy, MD – Integrated Vascular Surgery R2**
“Long-term Sac Regression is Common Following Fenestrated Endovascular Repair of Juxtarenal Aneurysms” Page 20

10:45AM **Malia A. Brennan, MD – General Surgery R2**
“Impact of Genomic Testing and Chemotherapy on Survival in Women Diagnosed With Breast Cancer Under Age 40” Page 21

11:00AM **SCHILLING DISTINGUISHED FACULTY AWARD—RAYMOND S. YEUNG, MD, FRCS(C), FACS – PRESENTED BY DAVID R. FLUM, MD, MPH, FACS, VICE CHAIR FOR RESEARCH, PROFESSOR, SURGERY**

11:15AM **LUNCH**

– SESSION III –

MODERATOR: SARAH L.M. GREENBERG, MD, MPH, FACS, ASSISTANT PROFESSOR, PEDIATRIC GENERAL AND THORACIC SURGERY

12:30PM **Jamie K. Schnuck, MD – General Surgery R2**
“Surgical and Medical Complications After Mastectomy With or Without Reconstruction in Women Over the Age of 70” Page 22

12:45PM **Michael Weykamp, MD – T32 NIH-NIGMS Institutional Postdoctoral Research Fellow in Trauma, Injury and Inflammation**
“Predicting High-Intensity Resuscitation Needs in Injured Patients Following Hemostasis” Page 23

1:00PM **Frank F. Yang, MD – T32 National Institute of Diabetes and Digestive and Kidney Diseases Research Fellow**
“Multi-Center Use and Outcomes of Dexamethasone for the Management of Malignant Small Bowel Obstruction (mSBO)”..... Page 24

1:15PM **Hannah C. Cockrell, MD – UW PROGRESS Research Fellow**
“Outcomes and Health Equity Impact of Telehealth Use for Pediatric Surgery Preoperative Care” Page 25

1:30PM **Eustina G. Kwon, MD, MPH – Pediatric Surgery Research Fellow**
“The Association Between Childhood Opportunity Index and Pediatric Hospitalization for Firearm Injury or Motor Vehicle Crash” ... Page 26

1:45PM **Hasan Nassereldine, MD – SORCE Postdoctoral Fellow**
“Does the Use of Insulin to Treat Perioperative Hyperglycemia Reduce the Risk of Complications in Non-Diabetic Patients?”..... Page 27

2:00PM **BREAK**

2:15PM **28th ANNUAL SCHILLING LECTURE — GUEST LECTURER: JULIE ANN SOSA, MD, MA, FACS**
“TACKLING CONTROVERSY AND CHANGING PRACTICE, WITH COURAGE AND EVIDENCE, AS A RESIDENT!”

3:15PM **ANNOUNCE SYMPOSIUM WINNERS/CLOSING**

3:30PM **ADJOURN**

MODERATORS



Sarah L.M. Greenberg, MD, MPH, FACS

Assistant Professor

Dr. Sarah Greenberg works as a pediatric general and thoracic surgeon with a primary focus on equity, global surgery, and planetary health. Her clinical practice is based at Seattle Children's Hospital, and she holds the position of Assistant Professor of Surgery at the University of Washington. She also currently works as an At Large Director for the Global Initiative for Children's Surgery, is the lead of Seattle Children's Hospital's Surgical Equity Workgroup to Underscore Population Health (SEW-UP), co-lead of Seattle Children's Hospital's Equity, Diversity, and Inclusion Maintenance of Certification Program (EDI MOC), Generate and Teach Health Equity Routinely (GATHER), and co-lead for the University of Washington's Program in Global and Rural Surgery (PROGRESS).



Teresa S. Kim, MD

Assistant Professor

Dr. Teresa S. Kim is an Assistant Professor of Surgery at the University of Washington and Fred Hutchinson Cancer Center. Dr. Kim is a surgeon-scientist with clinical focus in skin and soft tissue cancers, and a research focus in patient-derived tumor models and tumor immunology. Dr. Kim is currently investigating the mechanisms of immunosuppressive macrophage programming in liver metastases, funded by an NIH/NCI Early-Stage Surgeon Scientist Program award. She is heavily involved in transdisciplinary research to address three major challenges in the field: 1) define and reprogram immunosuppressive myeloid cells

into activators of anti-tumor immunity; 2) more accurately predict patient responses to immunotherapy; 3) enhance patient-derived preclinical models, such as tumor slice culture, to improve the way we study and ultimately treat immune resistance in solid cancer. Dr. Kim has published in multiple high-impact journals including Clinical Cancer Research, Journal of Experimental Medicine, Annals of Surgery, and Gut. Dr. Kim has been recognized nationally as a rising surgeon-scientist and leader in the field through participation in highly competitive programs including the NIH/NCI Early-Stage Surgeon Scientist Program, SITC Sparkathon Accelerator, SITC Women in Cancer Immunotherapy Network (WIN) Leadership Institute, and American College of Surgeons Women in Surgery (WiSC) Mentorship Program. Dr. Kim is grateful for the support of mentors and collaborators and committed to supporting the next generation of surgeon-scientists, particularly from backgrounds underrepresented in academic medicine.

SYMPOSIUM JUDGES

DEPARTMENT OF SURGERY RESEARCH LEADERSHIP



Saman Arbabi,
MD, MPH, FACS
Professor



Giana H. Davidson,
MD, MPH, FACS
Associate Professor



Farhood Farjah,
MD, MPH, FACS
Associate Professor



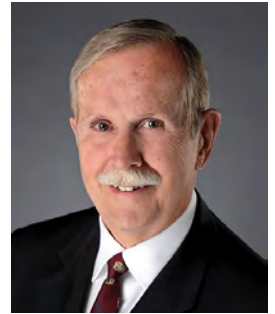
Douglas E. Wood,
MD, FACS, FRCSEd
The Henry N. Harkins
Professor and Chair



Sarah L.M. Greenberg,
MD, MPH, FACS
Assistant Professor



Teresa S. Kim, MD
Assistant Professor



Ron V. Maier,
MD, FACS
Professor



David R. Flum,
MD, MPH, FACS
Vice Chair for Research, Surgery,
Professor, Health Services,
and Pharmacy



Michael S. Mulligan,
MD, FACS
Professor & Chief



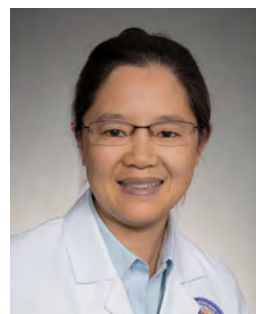
Grant E. O'Keefe,
MD, MPH
Professor



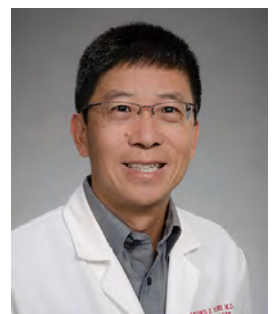
James O. Park,
MD, FACS
Professor



Venu G. Pillarisetty,
MD, FACS
Professor

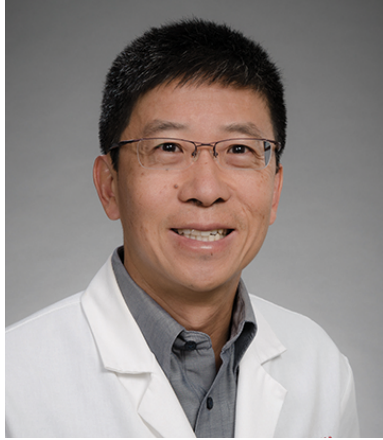


Gale Tang, MD, FACS
Associate Professor



Raymond S. Yeung,
MD, FRCS(C), FACS
Professor

2023 SCHILLING DISTINGUISHED FACULTY AWARD



Raymond S.W. Yeung, MD, FRCS(C), FACS

Professor, Section Chief, Hepatopancreatobiliary Surgery

Raymond Sze Wang Yeung was born in Hong Kong, the second youngest of four siblings. He resided in Hong Kong until his middle childhood when the Cultural Revolution in mainland China forced many to flee and his family immigrated to Toronto, Canada. Settling in North York, Dr. Yeung quickly adapted to his new life and excelled in academics and piano. A voracious learner, he eventually skipped a grade and won a competition as the best pianist for his age group in all of Canada. Eventually, his journey took him to the University of Toronto, where he entered medical school two years into his undergraduate studies. The University of Toronto remained his home for medical school and residency. A last-minute fellowship opportunity at Fox Chase Cancer Center served as the catalyst for his research career.



At Fox Chase, Dr. Yeung met the late Alfred G. Knudson, MD, PhD, who would become his most influential mentor. With his assistance, Dr. Yeung discovered that the gene that caused dominantly inherited renal cell cancer in Eker rats was a mutant of the tuberous sclerosis type 2, or Tsc2 gene. This discovery defined the primary focus of his research for many years, which explored the genetic mechanisms of tumorigenesis with emphasis on tumor suppressor genes and hereditary cancers. Dr. Yeung's laboratory utilized genetic, cell biologic and biochemical approaches to dissect the function of these genes. The quality of his scientific work was evidenced by nearly two decades of continuous NIH R01 funding and numerous publications in high-impact scientific journals.

Despite his ongoing success in defining TSC biology, Dr. Yeung wished to align his research and clinical work more closely. Therefore, nearly a decade ago, he made the courageous decision to transition his research focus towards studying the tumor microenvironment of cancers in the liver using tumor slice cultures (ironically, also abbreviated as TSC). This new direction has ultimately culminated in several large federal research grants and allowed Dr. Yeung to help launch generations of young

surgeon-scientists' research careers at UW. In his characteristically modest way, Dr. Yeung would claim no credit for these successes, but his influence and impact cannot be overstated.

Remarkably, beyond his research prowess, Dr. Yeung is also an expert liver surgeon with strong clinical acumen and superb technical skills. He manages to perform challenging liver resections with minimal drama, thus creating an excellent learning environment for the residents lucky enough to work with him. He founded the UW Medicine Liver Tumor Clinic, the first multidisciplinary clinic of its kind in the Pacific Northwest. He is also the section chief of Hepatopancreatobiliary Surgery, Director of the Center for Advanced Minimally Invasive Liver Oncologic Therapy (CAMILOT), Deputy Director of the Seattle Translational Tumor Liver Cancer Program, a UW Professor of Surgery and an Adjunct Professor of Medicine, Medical Genetics and Pathology. In these leadership positions, Dr. Yeung has consistently displayed vision, empathy, grace, selflessness, inclusiveness and persistence.

Contributed by

Venu Pillarisetty, MD, FACS
Professor of Surgical Oncology
Division of General Surgery
University of Washington

Top: Dr. Yeung with wife Cindy (center) and children (L-R) Amanda, Marcus, and Lindsay.

Center: Drs. Alfred Knudson and Raymond Yeung – 1997

Bottom: Dr. Yeung with another family member–Koa

UW Medicine

DEPARTMENT OF SURGERY

2023 RESEARCH
SYMPOSIUM



LINDSAY K. DICKERSON, MD

UW Tumor Immune Microenvironment (TIME) Research Postdoctoral Fellow

RESEARCH INTERESTS: Cancer immunology, hepatopancreatobiliary (HPB) oncology, surgical oncology palliative care

FACULTY MENTOR: Venu Pillarisetty, MD, FACS

MEDICAL SCHOOL: Johns Hopkins University School of Medicine

HOMETOWN: Los Gatos, CA

DISCUSSANT: Kimberly J. Riehle, MD, FACS, FAAP

THERAPEUTIC MODULATION OF TUMOR-INFILTRATING T CELL FUNCTION IN FIBROLAMELLAR CARCINOMA

Dickerson LK, Daniel SK, Sullivan KM, Carter JA, Jiang X, Hsu C, Labadie KP, Kenerson HL, van den Bijgaart R, Barry KC, Kim TS, Yeung RS, Pillarisetty VG

BACKGROUND: Fibrolamellar carcinoma (FLC), a rare liver cancer primarily affecting young patients without cirrhosis, presents an opportunity for novel immunotherapeutic treatments given high recurrence and metastasis, poor response to chemotherapy, and a unique immune landscape. Current evidence implicates an immunosuppressive tumor microenvironment (TME), including sequestration of tumor infiltrating lymphocytes (TILs) away from the carcinoma compartment and impaired cytotoxic T cell activity, as among the key drivers of aggressive tumor biology in FLC. We hypothesized that precisely targeting the TME could enable immunotherapy for this challenging disease.

METHODS: We created tumor slice cultures (TSCs) from fresh human FLC tumors and treated with drugs aimed at overcoming potential immunosuppressive mechanisms (e.g., C-X-C chemokine receptor type 4 (CXCR4), programmed cell death receptor (PD-1)). We employed live microscopy and single-color immunohistochemistry (IHC) to visualize T cell infiltration and apoptosis after drug treatment, staining for CD8, cleaved caspase-3 (CC3, a marker for apoptosis), and epithelial and stromal markers.

RESULTS: Combination PD-1 and CXCR4 blockade in TSC models significantly increased T cell infiltration and tumor apoptosis compared to IgG1 control. Combination treatment yielded a greater abundance of T cells near apoptotic carcinoma cells (35% vs 9% IgG1, $p=0.04$) on live microscopy, and increased tumor cell death (21% mean absolute difference vs IgG1, $p<0.001$) on CC3 IHC analysis for five FLC specimens (*Figure 1 below*).

CONCLUSIONS: TSC models indicate that modulation of the TME with combination blockade of CXCR4 and PD-1 has the potential to reactivate endogenous antitumor immunity by targeting and overcoming known immunosuppressive features of the FLC TME–TIL sequestration and impaired function, respectively. Future work includes utilizing flow cytometric, RNA, and protein analysis of treated TSCs to further characterize the in vitro effects of combination immunotherapy. These findings may have important clinical and prognostic implications for the development of effective immunotherapies for FLC.

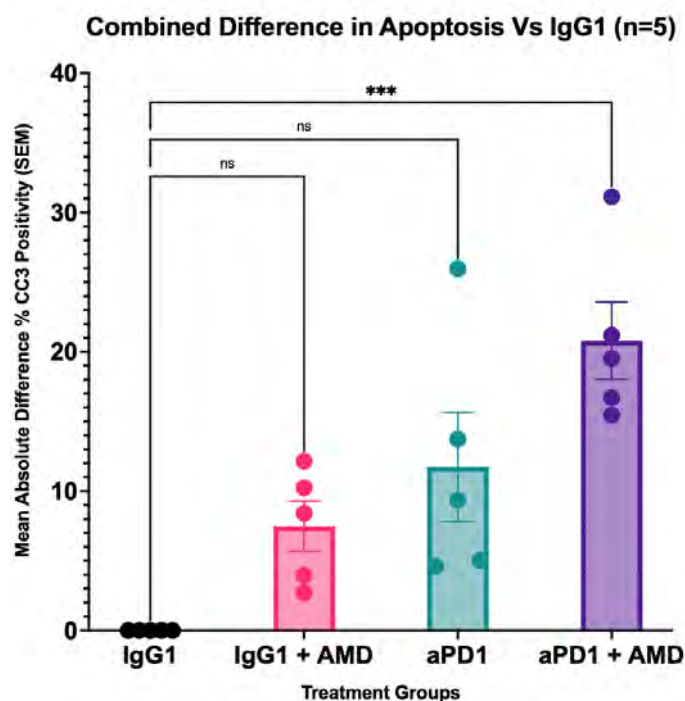
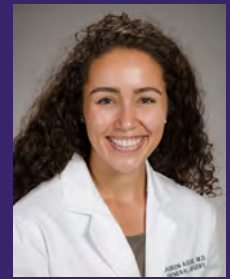


Figure 1. Tumor slice culture treatment with PD-1 blockade and AMD — a small molecule inhibitor of CXCR4 — in combination yielded significantly greater tumor cell death compared to IgG1 control (21% mean absolute difference, $p<0.001$) on cleaved-caspase 3 (CC3) immunohistochemistry (IHC) analysis. AMD and anti-PD-1 treatment alone showed a non-significant trend toward higher apoptosis. The above graph depicts the mean difference in CC3 positivity compared to control for five FLC resections, with three replicates (slices) per treatment group for each resection.



RESEARCH INTERESTS: Systems-based improvement to surgical care access, the effect of social determinants of health on firearm injury pattern, and evidence informed policy-making in global health

FACULTY MENTOR: Frederick P. Rivara, MD, MPH—UW Department of Pediatrics

MEDICAL SCHOOL: University of Michigan Medical School

HOMETOWN: San Antonio, TX

DISCUSSANT: Scott DeRoo, MD

DIFFERENTIAL IMPACTS OF FIREARM LAWS BY COMMUNITY DISTRESS AND SOCIAL CONNECTEDNESS

Agoubi LL, Banks SN, Rivara FP

BACKGROUND: Socioeconomic status (SES) and economic inequality are strongly associated with the incidence of firearm violence. However, few studies have examined SES contextualized by firearm law restrictiveness. The purpose of this study was to analyze the interaction of SES and firearm restrictiveness on firearm violence in the United States.

METHODS: We performed a retrospective national cross-sectional study of firearm incidents (injuries and deaths) between 1/2015 and 12/2021 using the Gun Violence Archive (GVA). Firearm incidents were assigned to a 2020 ZIP Code Tabulation Area. Rural incidents were excluded. Primary predictors were the Distressed Communities Index (DCI), Economic Connectedness (EC) among low/high SES communities, and state-level firearm restrictiveness (Gifford Gun Law Scorecard). Primary outcomes were firearm incidence rates per ZIP across years.

RESULTS: 266,020 urban firearm incidents were recorded in the GVA, two-thirds of which occurred in high distress communities. The mean rate of firearm incidents increased stepwise with each DCI tertile, with a RR of 4.78 (95% CI: 4.68, 4.89) in high vs low distress communities. Low EC was associated with greater risk of firearm violence among both low and high SES communities (IRRs 2.65 (95% CI: 2.59, 2.71) and 1.81 (95% CI: 1.77, 1.84), respectively). Firearm incidence rates increased with decreasing Giffords Score, with Grade F communities experiencing 1.23 times higher rates of firearm violence than Grade A/B communities (95% CI 1.19, 1.26). This pattern persisted among low/medium distress and high EC communities; however, among high distress and low EC communities, there was no association between incidence rates and Gifford Grade (*Figure 1*).

CONCLUSION: Economically distressed and disconnected communities experience disproportionate rates of gun violence. Stricter gun laws are associated with decreased firearm incidents overall; however, their impact is neutralized for those experiencing the greatest economic disadvantages. Policy targeting economic inequality may be essential to reducing firearm violence in low SES communities.

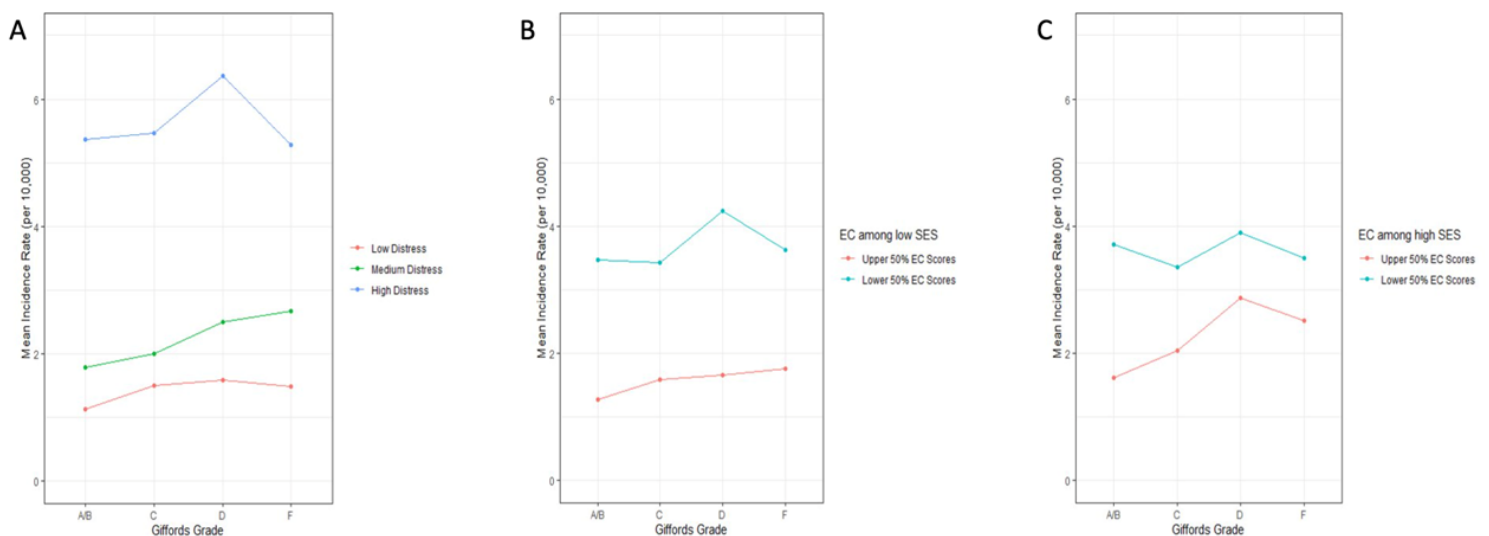


Figure 1. Mean firearm injury and death incidence rates among urban ZIP codes by Gifford Grade and A) DCI Tertile, B) EC among Low SES Individuals, and C) EC among High SES Individuals

**KYLE S. BILODEAU, MD***T32 NIH-NIGMS Institutional Postdoctoral Research Fellow in Trauma, Injury and Inflammation***RESEARCH INTERESTS:** ECMO, cardiothoracic surgery, implementation science**FACULTY MENTOR:** Michael McMullan, MD**MEDICAL SCHOOL:** Frank H. Netter MD School of Medicine**DISCUSSANT:** Christopher Burke, MD

A FORMATIVE MIXED METHODS EVALUATION OF A NEW ROSS PROGRAM: WHY CONTEXT MATTERS

Bilodeau KS, Shang M, Mossman A, Yang F, Mauchley DC, DeRoo S, Burke CR

BACKGROUND: The Ross procedure is a technically complex operation to address pathology of the aortic valve. We report our initial programmatic outcomes using dissemination and implementation (D&I) science frameworks, with an aim to define both programmatic efficacy and effectiveness.

METHODS: Single center, explanatory sequential mixed methods evaluation of a Ross surgery program from June 2020-December 2022. Quantitative measures for baseline patient characteristics and post-operative outcomes were summarized. Qualitative measures were obtained using semi-structured interviews of Ross program leadership and characterized using both an evaluation and determinants framework, RE-AIM (Reach, Efficacy, Adoption, Implementation, and Maintenance) and CFIR (Consolidated Framework for Implementation Research), respectively.

RESULTS: A total of 61 patients underwent the Ross procedure at a single academic center. Mean age was 41 years (± 12). Postoperatively, four (6.5%) patients required permanent pacemaker placement and one (1.6%) required takeback for bleeding. No patients experienced peri-operative stroke or TIA. There were no operative deaths; however, there was one death during the follow-up period (1.6%). Two patients (3.3%) underwent a non-valve related re-intervention involving the autograft-aortic anastomosis during the follow-up period, leading to procedural modification to include a Dacron STJ ring in all patients. Three (4.9%) patients were noted to have early increase in pulmonary homograft gradient, leading to changes in postoperative medical management to include routine steroid pulse and non-steroidal anti-inflammatory use. All patients (100%) have less than 2+ aortic regurgitation on most recent follow-up echocardiogram. Main themes from qualitative measures noted use of an organized evaluation framework and prospective self-audit facilitated measures of effectiveness, as dichotomy within expected vs. observed outcomes led to both procedural and postoperative care modifications. Strong collaboration across hospital systems and sub-specialists promoted adoption and implementation, which led to incorporation of the Ross procedure into accepted organizational practice.

CONCLUSIONS: In this formative evaluation, limited-efficacy outcomes demonstrated similar programmatic success to data from other established centers, thus re-demonstrating efficacy of the Ross procedure in non-elderly adult patients. Prospective and retrospective use of an evaluation and determinants framework promoted adoption and maintenance of the Ross procedure and facilitated system-level modifications to the perioperative care pathway, ultimately leading to sustained effectiveness. Implementation science can thus be used both in real-time and retrospectively, to guide organizational efforts to improve outcomes and to improve the translation of results across centers.

Table 1. Comparison of Quantitative and Qualitative Measures in Program Evaluation: Providing Context to Outcomes

| Dimension | Quantitative Measure | Qualitative Measure | Ross Program Considerations |
|-----------------|--|--|---|
| Reach | Number of patients in target population | What were barriers to patient referral? | Define young/middle aged aortic valve (BAV) population |
| Effectiveness | Postoperative outcomes | What factors led to the observed outcomes? | Need for modification or adaptation (i.e. STJ ring) |
| Adoption | Number of providers participating | What affected provider participation? | Collaboration across systems and specialties (Aortic and congenital cardiac surgeon) |
| Implementation* | Number of Ross procedures performed | How were barriers to implementation addressed? | Address factors along entirety of care pathway (i.e. additional post-operative medical management) |
| Maintenance | Number of program referrals and operations performed | Did Ross become a part of routine organizational practice? | Prospective monitoring and self-audit (Creation and maintenance of multi-institutional Ross database) |

*Contextual factors and processes underlying implementation determinants additionally characterized using the Consolidated Framework for Implementation Research (CFIR)

ICU: Intensive Care Unit; BAV: Bicuspid Aortic Valve



IMPACT OF AORTOILIAC TORTUOSITY IN OUTCOMES OF FENESTRATED ENDOVASCULAR AORTIC REPAIRS

Mossman A, Cure R, Tachida A, Starnes BW, Zettervall SL

BACKGROUND: Anatomy plays a key role in suitability and outcomes for endovascular aortic repair of abdominal aneurysms. Angulation of the proximal aneurysm neck has been associated with adverse events following endovascular repair, including endoleaks, stent migration and secondary interventions. Still, information on the impact of aortoiliac tortuosity in fenestrated repairs of aortic aneurysms remains limited. We aimed to quantify effects of aortoiliac tortuosity on outcomes in complex endovascular aortic repairs.

METHODS: Patients who underwent a physician-modified endovascular repair (PMEG) for treatment of juxtarenal aortic aneurysms at a single center, under a physician-sponsored investigation device exemption study, from 2011-2021 were reviewed. Centerluminal lines and geometric distances were obtained using *TeraRecon software*. A tortuosity index (TI) was calculated. Aortic and iliac tortuosity were assessed independently and stratified into low (<1.15) and high (>1.15) using SVS aortic tortuosity reporting standards. Univariable and multivariable analyses were applied.

RESULTS: 108 patients were identified including 72 with low and 36 with high aortic tortuosity, and 65 with low and 42 with high iliac tortuosity. Patients with high aortic tortuosity were older (76 vs 79 years, $p=0.03$), more commonly female (35 vs 78, $p=0.03$). On univariable analysis, high aortic tortuosity index was associated with increased fluoroscopy time (30 vs 40 min, $p=0.02$), however no differences were noted in outcomes (Table). When iliac tortuosity was assessed, a high tortuosity index was associated with an increased risk of type I or III endoleak (30 vs 23, $p=.0001$), as well as reinterventions (20 vs 16, $p=0.04$) (Table). In multivariable analysis, higher iliac tortuosity was again associated with secondary interventions (OR 2.8, 95% CI 1.1-7.2), including those for type I or type III endoleaks (OR 4.0, 95% CI 1.2-1.6).

CONCLUSION: Among patients treated with PMEG for juxtarenal aneurysms, iliac tortuosity but not aortic, is associated with increased reinterventions and type I or III endoleaks. Long term follow-up is particularly critical for patients with high iliac tortuosity to ensure these high risk endoleaks are identified and treated early to avoid the risk of rupture.

| Variables | Aortic Tortuosity | | | Iliac Tortuosity | | |
|--------------------------------|-------------------|------------------|---------|------------------|------------------|--------------|
| | Low n=72 (%) | High n=36 (%) | P-value | Low n=65 (%) | High n=42 (%) | P-value |
| Adverse Events (any) | 12 (17) | 12 (33) | 0.09 | 18 (28) | 6 (14) | 0.15 |
| Death <30 days | 2 (3) | 3 (8) | 0.33 | 4 (6) | 1 (2) | 0.65 |
| Endoleak (any) | 39 (54) | 15 (42) | 0.31 | 30 (85) | 23 (55) | 0.43 |
| Type I / Type III Endoleak | 3 (4) | 12 (33) | 0.38 | 3 (5) | 12 (29) | 0.001 |
| Type Ia | 3(4) | 2(6) | 1.00 | 3 (5) | 2 (5) | 1.00 |
| Type Ib | 2 (3) | 1 (3) | 1.00 | 1 (2) | 2 (5) | 1.00 |
| Type Ic | 0 (0) | 1 (3) | 1.00 | 1 (2) | 0 (0) | 1.00 |
| Technical Success | 71 (99) | 34 (94) | 0.26 | 63 (97) | 41 (98) | 1.00 |
| Reintervention (any) | 23 (32) | 12 (33) | 1.00 | 20 (48) | 16 (25) | 0.04 |
| Reintervention for Endoleak | 10 (14) | 5 (14) | 1.00 | 5 (8) | 10 (24) | 0.02 |
| Pulmonary Complications | 3 (4) | 0 (0) | 0.55 | 3 (5) | 0(0) | 0.28 |
| Myocardial Infarction | 3 (4) | 2 (6) | 1.00 | 5 (8) | 0(0) | 0.15 |
| Acute Renal Failure | 1 (1) | 3 (8) | 0.11 | 3 (5) | 1 (2) | 1.00 |
| Mesenteric Ischemia | 2 (3) | 0 (0) | 0.55 | 2 (3) | 0 (0) | 0.52 |
| Stroke | 0 (0) | 1 (3) | 0.33 | 1 (2) | 0 (0) | 1.00 |
| Spinal Cord Ischemia | 0 (0) | 2 (6) | 0.11 | 2 (3) | 0 (0) | 0.52 |
| Hospital Length of Stay (days) | 3.9 +/- 5.0 | 2.5 +/- 2.0 | 0.68 | 3.7 +/- 4.8 | 2.9 +/- 3.0 | 0.58 |
| ICU Length of Stay (days) | 1.5 +/- 0.8 | 2.0 +/- 2.7 | 0.06 | 1.3 +/- 0.7 | 2.1 +/- 2.6 | 0.06 |



NINA M. CLARK, MD

T32 National Institute of Diabetes and Digestive and Kidney Diseases Research Fellow

RESEARCH INTERESTS: Emergency general surgery, trauma/critical care, rural surgery, healthcare access

FACULTY MENTOR: Tam Pham, MD, FACS

MEDICAL SCHOOL: University of California, San Francisco

HOMETOWN: Pinckney, MI

DISCUSSANT: Saman Arbabi, MD, FACS

IMPLEMENTATION EVALUATION OF TIERED TELE-TRIAGE PATHWAYS FOR BURN CENTER CONSULTATION AND TRANSFERS

Clark NM, Agoubi LA, Stewart B, Pham TN

BACKGROUND: Early transfer to a burn center improves outcomes in appropriately selected patients. However, potentially avoidable transfers are costly to patients and healthcare systems. We evaluated the implementation of novel burn triage pathways at our institution for trends in resource optimization and pathway reliability.

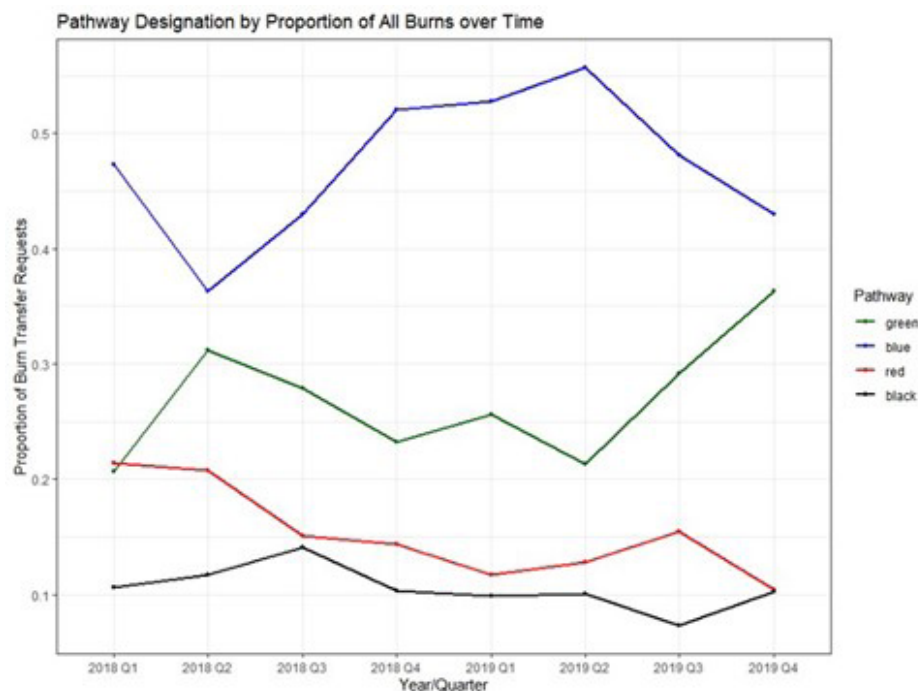
METHODS: Following burn pathway implementation in 2017, transfer nurses triaged calls via review of securely transmitted images: green pathway for outpatient referral, blue for discussion with the on-call burn provider, red for confirmation of transfer through the on-call provider, and black for rapid transfer.

All acute burn referrals from 2017-2019 were evaluated. Outcomes of interest were pathway assignment, burn provider call volume (resource optimization), and the concordance of pathway assignment with final disposition (reliability). Inter-group differences were evaluated using chi-squared tests. Linear regression analyses were performed examining referrals by pathway over time. Concordance between triage pathway assignment and final disposition was evaluated using a kappa statistic. A p-value <0.05 was considered significant.

RESULTS: Transfer nurses triaged 5,257 burn referrals between 2017-2019. By September 2017, pathway adoption increased from 22% to >90%. In 2018-2019, green pathway calls triaged by nurses reduced calls to burn providers by a mean of 40 (SD ± 11) per month. Patients in green/blue pathways were less likely to be transferred, with >84.9% receiving only outpatient follow up (p<0.001). The triage of patients to low-acuity (green/blue) versus high acuity (red/black) pathways reliably predicted ultimate transfer disposition (kappa = 0.744). Both triage to and transfers from the red pathway decreased by approximately 10% from 2018-2019 (**Figure 1**, p<0.001).

CONCLUSION: We demonstrate implementation of reliable triage pathways that optimize existing clinical resources by task-shifting triage of low acuity burns to nursing teams. This model maintains the role of specialized centers as a critical resource, while improving resource allocation, a result which may have implications for other triage systems.

Figure 1. Pathway utilization for acute burn consults over time.





THERE IS NO DIFFERENCE IN GRAFT SURVIVAL FOR HIGH VERSUS LOW KIDNEY DONOR PROFILE INDEX KIDNEYS AROUND THE HIGH KDPI CUTOFF

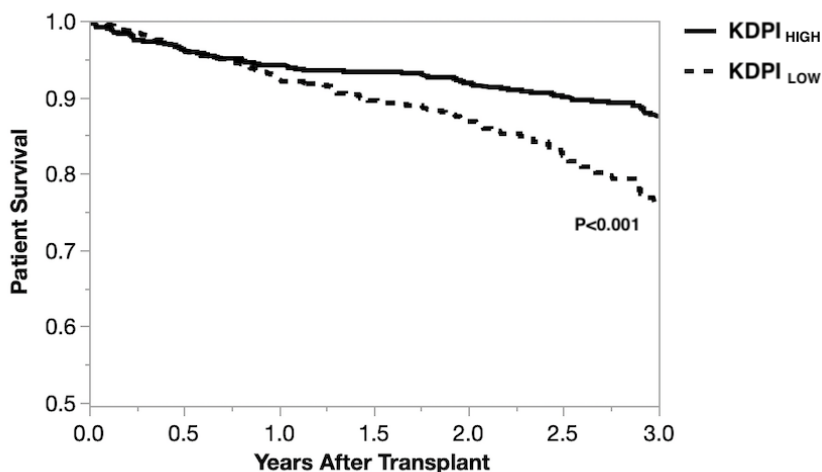
Crannell WC, Perkins JD, Leca N, Kling CE

BACKGROUND: The kidney donor profile index (KDPI) is a factor in deceased donor kidney allocation. The KDPI is a percentile conversion of the kidney donor risk index (KDRI), and $KDPI_{85}$ represents kidneys above the 85th percentile. We have shown that there is decreased utilization for identical KDRI kidneys when labeled “high KDPI.” This study aims to examine the graft and patient outcomes of recipients who received identical KDRI kidneys around $KDRI_{85}$, according to high- versus low-KDPI status.

METHODS: KDRI to KDPI Mapping Tables from 2015 to 2020 were used to determine the $KDPI_{85}$ value. A KDRI of 1.785-1.849 identified kidneys as $KDPI_{HIGH}$ in 2015-2017 and $KDPI_{LOW}$ in 2018-2020. OPTN data was used for donor and recipient information. Kaplan-Meier curves were generated for 1- and 3-year death censored graft and patient survival and a multivariable Cox analysis was performed.

RESULTS: Of 1,518 recipients, 591 received $KDPI_{HIGH}$ and 927 $KDPI_{LOW}$ kidneys. The KDRI did not differ $KDPI_{HIGH}$ versus $KDPI_{LOW}$ cohorts (1.816 vs 1.819, $p = 0.07$). There was no difference in 3-year death censored graft survival for $KDPI_{LOW}$ vs $KDPI_{HIGH}$ [HR 0.86 (CI 0.59-1.25), $p = 0.42$]. There was decreased 3-year recipient survival for $KDPI_{LOW}$ vs $KDPI_{HIGH}$ [HR 1.90 (CI 1.41-2.59), $P < 0.001$]. $KDPI_{LOW}$ recipients had a shorter wait time (542 vs 838 days, $p < 0.001$), fewer dialysis days (1333 vs 1623 days, $p < 0.001$) and were older (63 vs 61 years, $p = 0.03$).

CONCLUSIONS: For recipients of identical KDRI kidneys, but labelled as $KDPI_{HIGH}$ vs $KDPI_{LOW}$, there are comparable 3-year graft outcomes, but decreased patient survival for $KDPI_{LOW}$. In this limited data set, older age is associated with decreased survival. The high-KDPI status should be removed from kidney allocation.





NIKKI THRIKUTAM, MD, MPH

General Surgery R4

RESEARCH INTERESTS: Improving medical student/resident education and improving equity and representation in surgery

FACULTY MENTOR: Erika Bisgaard, MD

MEDICAL SCHOOL: University of Texas Southwestern Medical School

HOMETOWN: Plano, Texas

DISCUSSANT: Kristine Calhoun, MD, FACS

ARE WE LATE TO THE SHOW? A PILOT NEEDS ASSESSMENT OF ADDRESSING GENDER-BASED MICROAGGRESSIONS IN SURGICAL TRAINEES

Daneshgaran G, Dasari M, Bisgaard E

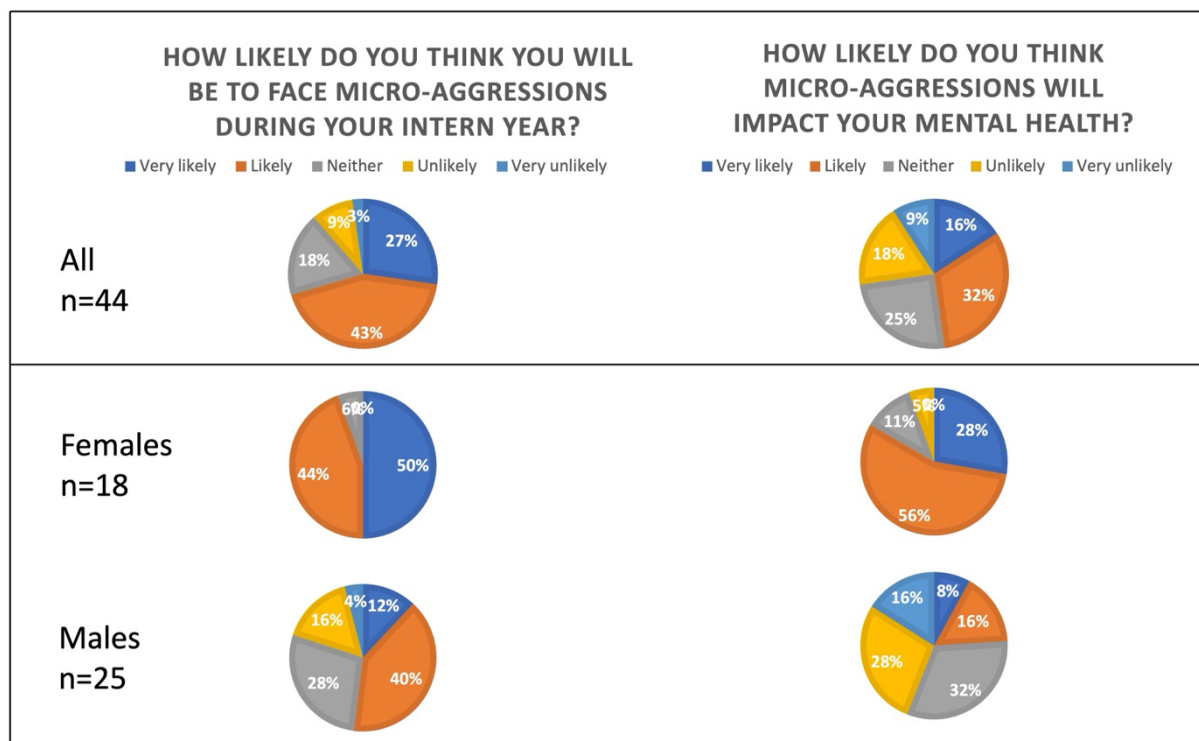
BACKGROUND: Microaggressions result in the unintentional discrimination of marginalized groups. Women and minority groups are underrepresented in surgery, thus, microaggressions are a salient topic for surgical education. This study aims to explore the perceived effect of microaggressions on surgical interns to discuss implementing microaggression training.

METHODS: After IRB approval, an anonymous Likert scaled survey on perceptions of microaggressions was distributed to interns at our institution prior to starting surgical residency. Data was de-identified and analyzed using Likert analysis and paired t-test. Follow-up focus groups were lead and transcriptions analyzed using detailed thematic analysis.

RESULTS: Forty-four of 50 interns responded (88%) to the survey, 18 (40.9%) were female. Overall, respondents believed they were likely to experience microaggressions with a positive response of 4.07. There was a negative trend of whether these would impact patient care with a rate of 2.84. There was a significant difference between male and female respondents on perceived likelihood of experiencing microaggressions (94% vs 52%, $p<0.001$). Female respondents felt these were more likely to impact their mental health (84% vs 20%, $p<0.001$). Respondents without local support were more likely to believe microaggressions would negatively affect their mental health compared to those with local support (67% vs 38%, $p=0.07$). A focus group of female surgical trainees demonstrated themes consistent with previously validated themes on gender-based microaggressions. These included assumption of inferiority, traditional gender roles, and environmental invalidations at all levels of training.

CONCLUSIONS: New trainees experience anxiety and lack preparedness when confronted with the threat of microaggressions. Surgical interns, particularly females and those without local support, demonstrate a preconception that microaggressions may negatively impact their patient care and mental health. Focus group data reveals that microaggressions are experienced by trainees of all levels. Thus, there should be benefit from instituting formal microaggression training prior to starting surgical residency.

Figure:





THE FATE OF THE DISTAL AORTA FOLLOWING ELECTIVE ROOT REPLACEMENT IN MARFAN SYNDROME

DhaneKula AS, Flodin R, Shibale P, Volk J, Benyakorn T, DeRoo SC, Shalhub S, Burke CR

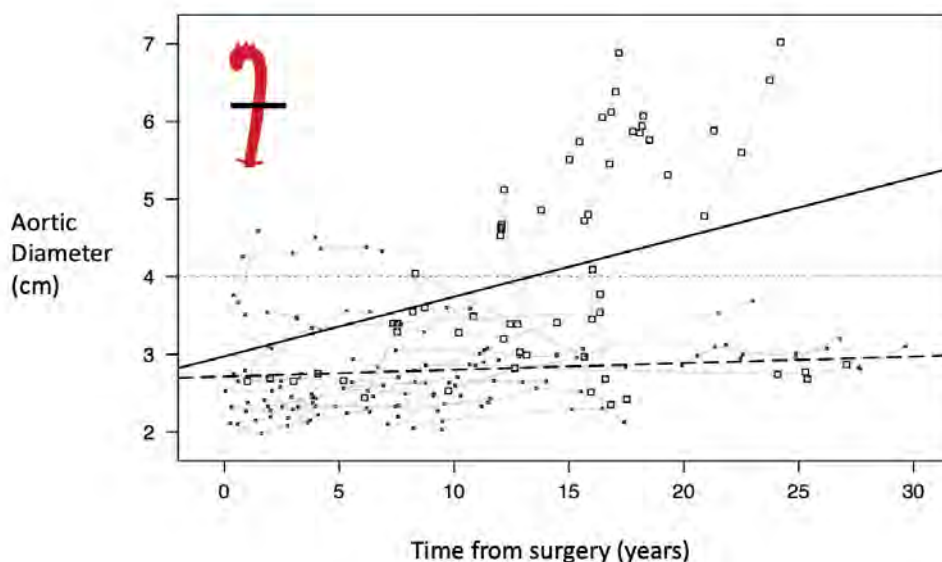
BACKGROUND: Marfan syndrome (MFS) is a genetic aortopathy associated with the development of aortic root aneurysm and dissection. It is unclear if the addition of a prophylactic arch operation is beneficial at the time of root replacement. This project aims to further understand the fate of the distal aorta following elective root replacement in MFS patients.

METHODS: Between 2000 and 2019, 124 patients with a diagnosis of Marfan syndrome underwent elective aortic root replacement. CT scans before and after root replacement were analyzed. The primary outcome of subsequent aortic event was defined as a composite of interval type B aortic dissection (TBAD), aneurysmal degeneration (size >4cm), and subsequent aortic intervention. Secondary outcomes included subsequent TBAD and mortality.

RESULTS: The cohort underwent aortic root replacement at a mean age of 33.3 years. No patients received an arch operation. The composite primary outcome was noted in 30 (24.2%) patients. Patients that experienced the primary outcome were taller and had a history of hypertension ($p < 0.05$). No difference in long-term mortality was observed with the primary outcome (33.3% vs 19.1%, $p = 0.133$). 24 patients (19.5%) suffered subsequent TBAD following root replacement. Presence of TBAD was associated with increased long-term mortality (36.7% vs 18.1%, $p = 0.045$). Rate of change in descending thoracic aortic diameter was higher in the TBAD group (Figure 1, $p < 0.001$). Factors associated with TBAD development included hypertension ($p < 0.05$) and Bentall root replacement (versus valve-sparing) ($p < 0.10$).

CONCLUSIONS: In the absence of TBAD, the distal aorta appears stable in MFS patients following root replacement without arch intervention. Development of TBAD was associated with increased mortality and aortic degeneration. Factors associated with TBAD development included a history of hypertension, underscoring the importance of strict blood pressure control in these patients. In MFS patients undergoing elective root replacement, future morbidity seems to be driven by development of TBAD.

Figure 1. Changes in diameter at mid descending thoracic aorta over time comparing patients with type B dissection (solid line) and without type B dissection (dashed line) (0.077 versus 0.009, $p < 0.001$).



**JAMES M. DITTMAN, MD***Integrated Vascular Surgery R1***RESEARCH INTERESTS:** Aortic aneurysms, vascular quality initiative outcomes, vascular innovation**FACULTY MENTOR:** Kirsten Dansey, MD, MPH**MEDICAL SCHOOL:** Virginia Commonwealth School of Medicine**HOMETOWN:** Yorktown, VA**DISCUSSANT:** Elina Quiroga, MD, MPH, FACS

ANTIPLATELET THERAPY ASSOCIATED WITH INCREASED SURVIVAL FOLLOWING FEVAR IN THE VASCULAR QUALITY INITIATIVE DATABASE

Dittman JM, Zettervall SL, Dansey KD

BACKGROUND: Antiplatelet coverage is often prescribed to maintain the patency of stents placed in the visceral or renal arteries following fenestrated endovascular aortic repair (FEVAR), but there is heterogeneity in practice patterns among institutions. We aim to define antiplatelet and anticoagulation regimens postoperatively nationwide and their impact outcomes using the national Vascular Quality Initiative (VQI) database.

METHODS: All FEVARs recorded in VQI between 2012-2021 were compiled. Three groups were defined by postoperative antiplatelet regimen received: none, single agent (aspirin or P2Y12 inhibitor), and dual antiplatelet therapy. Patient demographics, comorbidities, perioperative factors and medications, primary outcome of 30-day mortality, and secondary outcomes were compared between groups with univariate analysis and multivariate binary logistic regression. Cox regression was utilized to generate hazard ratios for long-term survival.

RESULTS: Of 5,384 FEVAR cases, 7% were not prescribed antiplatelet post operatively (N), 45% were prescribed monotherapy (M), and 48% utilized dual therapy (D). Univariate analysis demonstrated significant differences regarding postoperative anticoagulation use by regimen (N:30% vs M:19% vs D:5%, $p<0.001$) and incidence of 30-day mortality (N:5% vs M:1% vs D:1%, $p<0.001$). After adjustment, both single and dual agent groups demonstrated significantly increased survival at 30 days compared to no regimen (M OR:0.15, 95% CI:0.07-0.32; D OR:0.15, 95% CI:0.06-0.363). Cox regression showed significantly decreased hazard ratios for long-term survival in both groups (M HR:0.65, 95% CI:0.06-0.36, D HR:0.519, 95% CI:0.371-0.725).

CONCLUSION: Antiplatelet therapy is associated with decreased 30-day mortality following FEVAR, with dual antiplatelet therapy associated with the greatest cumulative long-term survival. Compliance with this regimen should be emphasized following FEVAR.

RESEARCH INTERESTS: Burn injury prevention and control, global health, health systems strengthening

FACULTY MENTOR: Barclay Stewart, MD, PhD, MPH

MEDICAL SCHOOL: UT Southwestern Medical Center

HOMETOWN: Lake Jackson, TX

DISCUSSANT: Erika Bisgaard, MD



IMPLEMENTATION OF AN ENTERALLY BASED RESUSCITATION BUNDLE FOR MAJOR BURN INJURIES IN AN AUSTERE SETTING: RESULTS FROM A PILOT HYBRID II EFFECTIVENESS-IMPLEMENTATION RANDOMIZED TRIAL

Mehta KM, Yadav M, Shretha R, Lee J, Phuyal D, Poudel K, Pham T, Rai SM, Nakarmi K, Stewart BT

BACKGROUND: Timely and adequate resuscitation for moderate to severe burn injuries is challenging in many circumstances globally, ranging from low- and middle-income countries (LMICs) to military prolonged field settings, to mass casualty disasters. Burn care experts recommend using enteral-based resuscitation (EResus) in these austere settings, however, there are no clear protocols or guidelines on how to perform enteral resuscitation in real-world scenarios. We aimed to describe the implementation of an EResus bundle in an austere environment.

METHODS: This was a pilot hybrid II effectiveness-implementation randomized trial at a tertiary burn center in Nepal. The Consolidated Framework for Implementation Research helped identify challenges, implement and operationalize EResus and intravenous (IV) protocols via focus group discussions with providers, in-depth patient interviews, and quantitative measures of protocol uptake. Center-wide education, resuscitation supplies and flowsheets, and a communication tool were implemented. The trial enrolled 30 adults with 20-40% burns admitted within 24 hours of injury. Enrolled subjects underwent EResus or IV resuscitation for at least 24 hours. Two-hour interval resuscitation route, volumes, vitals, as well as first 72 hours biomarkers and clinical outcomes are tracked until hospital discharge or death.

RESULTS: Iterative pre-enrollment FGD feedback from stakeholders was used to develop contextually driven EResus and IV resuscitation bundles. Thirty patients were enrolled with 15 patients in the IV arm, and 15 patients in the EResus arm. Results are presented in Table 1.

CONCLUSION: EResus and IV resuscitation protocols were adapted for an austere environment with engagement of local stakeholders. Resuscitation endpoints were similar between arms, which suggests that EResus is a potentially effective method for resuscitation in austere contexts. EResus was viewed favorably by enrolled patients, however, several implementation challenges were identified.

Table 1. Patient demographics and intravenous and enteral-based resuscitation metrics

| | Intravenous Resuscitation (n=15) | | Enteral-based Resuscitation (n=15) | | p value |
|--|--|-----------|--|------------|------------|
| | n | % | n | % | |
| Patient demographics | | | | | |
| Patient age in years, median (IQR) | 50 | (31-57.5) | 48 | (32-61) | 0.53 |
| Patient sex | | | | | |
| Female | 11 | 73.3 | 11 | 73.3 | 1 |
| Male | 4 | 26.7 | 4 | 26.7 | |
| Burn injury characteristics | | | | | |
| Burn injury Total Body Surface Area (TBSA %), median (IQR) | 30 | (26-35.5) | 25 | (21-32.5) | 0.66 |
| Burn injury mechanism | | | | | |
| Flame | 15 | 100 | 13 | 86.7 | 0.143 |
| Scald | 0 | 0 | 2 | 13.3 | |
| Resuscitation parameters | | | | | |
| Hours from injury to resuscitation, median (IQR) | 13.5 | (13-15.5) | 8.5 | (4.3-12.5) | 0.18 |
| 24-hour resuscitation volume (mL/kg/% TBSA), median (IQR) | 4.1 | (3.6-5.7) | 6.7 | (5.4-9.9) | 0.47 |
| 24-hour urine output (mL/kg/hour), median (IQR) | 1.0 | (0.7-1.2) | 0.7 | (0.6-0.9) | 0.47 |
| Acute kidney injury | | | | | |
| On admission | 2 | 13.3 | 4 | 26.7 | 0.36 |
| At 72 hours | 0 | 0 | 4 | 26.7 | 0.03 |
| Renal failure at 72 hours | 0 | 0 | 1 | 6.7 | 0.31 |
| Gastrointestinal (GI) symptoms | | | | | |
| GI discomfort during resuscitation | 5 | 33.3 | 8 | 53.3 | 0.27 |
| Crossover to IV due to GI intolerance | N/A | - | 9 | 9 | - |
| Adverse events during resuscitation period | | | | | |
| Aspiration | 0 | 0 | 0 | 0 | 1 |
| Death | 0 | 0 | 0 | 0 | 1 |
| Outcome | | | | | |
| Discharged home | 5 | 33.3 | 6 | 40 | 0.48 |
| Left against medical advice | 6 | 40 | 3 | 20 | |
| Death | 4 | 26.7 | 6 | 40 | |



BLAKE E. MURPHY, MD

Integrated Vascular Surgery R2

RESEARCH INTERESTS: Complex aortic surgery, FEVAR/bTEVAR, sac behavior

FACULTY MENTOR: Sara L. Zettervall, MD, MPH

MEDICAL SCHOOL: Loyola University Stritch School of Medicine

HOMETOWN: Chicago, IL

DISCUSSANT: Matthew Smith, MD, PhD

LONG-TERM SAC REGRESSION IS COMMON FOLLOWING FENESTRATED ENDOVASCULAR REPAIR OF JUXTARENAL ANEURYSMS

Murphy B, Nkansah R, Dansey K, Kline B, Starnes B, Zettervall SL

BACKGROUND: Aneurysm sac regression after endovascular repair of abdominal aortic aneurysms has been well described, with sac regression failure often associated with increased mortality. This study aims to describe long-term sac behavior following fenestrated endovascular repair (FEVAR) for juxtarenal aneurysms.

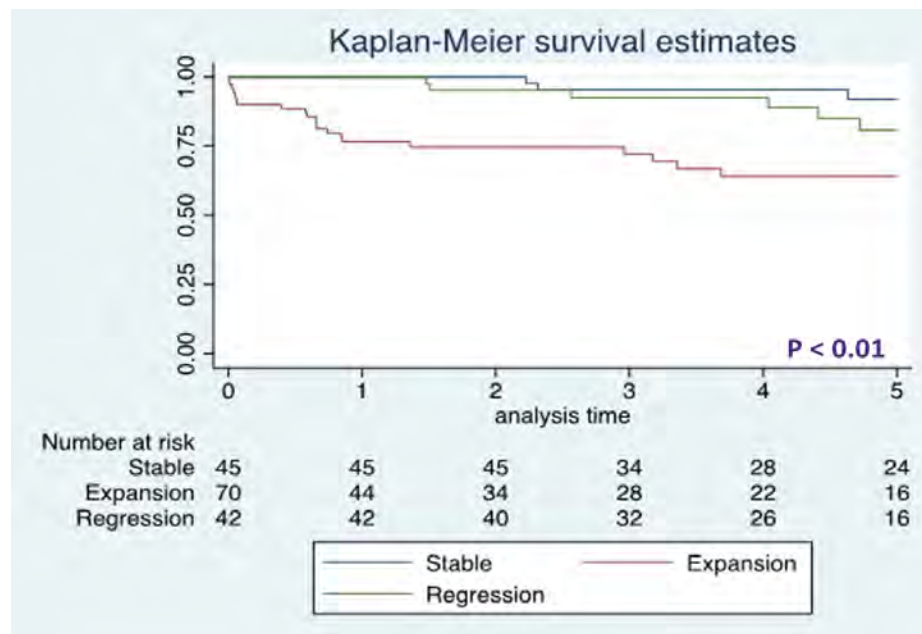
METHODS: 157 consecutive FEVARs performed under an investigational device exemption clinical trial for juxtarenal aneurysms (#NCT01538056) were evaluated. Sac expansion and regression were defined by a change of 5mm or greater. Late changes were defined by sac expansion after previous regression or stability at 1-year follow-up. Sac expansion was assessed at annual follow-up visits and compared to preoperative demographics, anatomic characteristics, and outcomes.

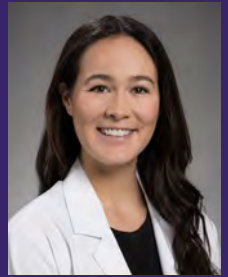
RESULTS: When sac behavior was assessed at 1-year, 49 (46%) patients had regression, 48 (45%) were stable, and 9 (8%) had expansion. At 5-year follow-up, 19 (70%) patients had regression, 3 (11%) were stable, and 5 (18%) had expansion. Late expansion occurred in 9 (18%) patients with stable sac size, and 1 (2%) patient with sac regression at previous 1-year follow-up.

Regarding outcomes, 1-year mortality (regression: 0%; expansion: 22%, $p < 0.001$) and endoleak (regression: 36%, stable: 51%, expansion: 65%, $p = 0.02$) differed by sac behavior. Long-term mortality also differed (Figure 1, $p < 0.01$). Three ruptured aneurysms and one aneurysm-related mortality occurred in long-term follow-up. All patients with a ruptured aneurysm had late expansion after a stable sac size at 1-year follow-up. When predictors of sac expansion were evaluated, only endoleak (OR: 8.9, 95% CI: 1.7-47.4) and increasing age (OR: 1.1, 95% CI: 1.1-1.3) were predictive of expansion.

CONCLUSIONS: There is a high rate of sac regression and stability following FEVAR for juxtarenal aneurysms. However, sac expansion may occur in late follow-up despite initial sac stability or regression. Given the risk of rupture with sac expansion and inability to predict subsequent sac growth, lifelong surveillance for all FEVAR patients remains critical regardless of early sac behavior.

Figure 1. Long-term survival based on sac behavior





IMPACT OF GENOMIC TESTING AND CHEMOTHERAPY ON SURVIVAL IN WOMEN DIAGNOSED WITH BREAST CANCER UNDER AGE 40

Brennan MA, Fan X, Wu Q, Voutsinas J, Schnuck JK, Palmquist E, Lamble N, Flanagan MR

BACKGROUND: Adjuvant chemotherapy reduces the risk of distant recurrence in breast cancer with greater benefit in younger women. Genomic assays predict chemotherapy benefit in node-negative, hormone receptor positive (HR+) / HER2/neu negative (HER2-) breast cancer, but women ≤ 40 years old are under-represented in clinical trials. We hypothesized that despite this, genomic testing in this population has increased over time and explored associations between genomic assays, chemotherapy, and survival.

METHODS: Women ≤ 40 years old diagnosed with T1-2N0 HR+/HER2- breast cancer between 2010-2019 in the National Cancer Database were included. Patient, tumor, treatment, and genomic testing risk scores were evaluated. Adjusted OS was calculated using time-dependent Cox proportional hazards model.

RESULTS: Among 12,835 women, 60.5% underwent genomic testing, increasing over time (46% in 2010 vs. 71% in 2019). Testing was more common among white women, T1c disease, intermediate grade, progesterone receptor (PR+), and lymphovascular invasion. Most patients received chemotherapy (57.3%) with a trend toward decreasing use over time. Chemotherapy use was associated with genomic risk score ($p < 0.001$) and was used in 11.9% of low-risk vs. 86.3% of those with high-risk scores. On multivariable analysis adjusted for age, year of diagnosis, pathologic T stage, Charlson Deyo, grade, histology and PR, the risk of death was 2.7-fold higher (95% CI 1.63-4.45, $p = 0.0001$) for those with high-risk compared to low-risk scores. Overall survival was also higher for low- versus intermediate- scores (HR=1.60, 95% CI 1.01-2.53, $p = 0.0436$)

CONCLUSIONS: There is increasing utilization of genomic assays in young women with early-stage ER+/HER2- invasive breast cancer, and the genomic risk score factors into systemic therapy decision-making despite lack of thorough validation in this age group. Alignment of genomic risk score with overall survival likely supports this practice.



JAMIE K. SCHNUCK, MD

General Surgery R2

RESEARCH INTERESTS: Broad interest in clinical outcomes specifically in pediatric surgery and breast surgical oncology

FACULTY MENTOR: Meghan Flanagan, MD, MPH, FACS

MEDICAL SCHOOL: Medical College of Wisconsin

HOMETOWN: Hartland, WI

DISCUSSANT: Sara Javid, MD, FACS

SURGICAL AND MEDICAL COMPLICATIONS AFTER MASTECTOMY WITH OR WITHOUT RECONSTRUCTION IN WOMEN OVER THE AGE OF 70

Schnuck JK, Fan X, Wu Q, Brennan M, Martin S, Stein IC, Flanagan MR

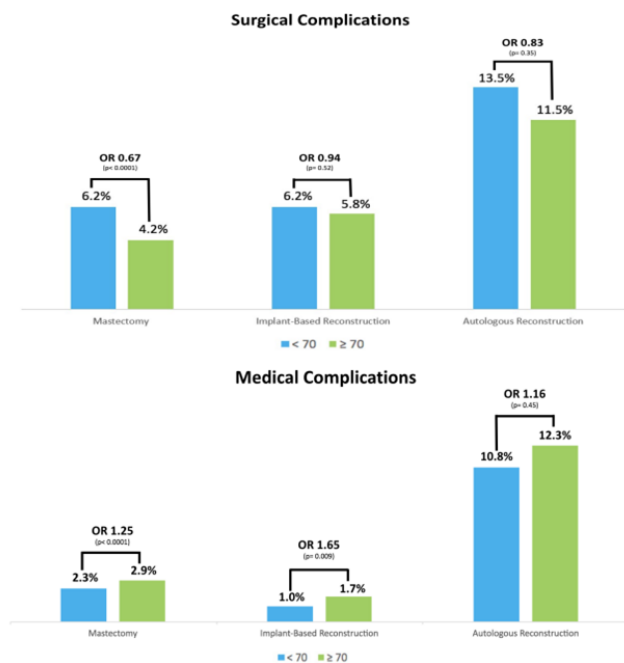
BACKGROUND: Studies demonstrate improved body image and mental health in women ≥ 65 who receive reconstruction when mastectomy is indicated, however, there are concerns regarding safety of these more complicated procedures in older women. We hypothesized that the frequency of complications associated with post-mastectomy breast reconstruction (PMBR) does not preclude PMBR for women ≥ 70 years.

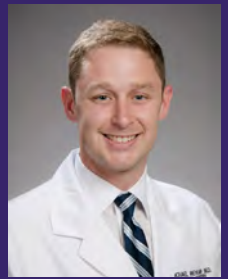
METHODS: Women ≥ 18 years who underwent mastectomy with or without implant-based, or autologous breast reconstruction between 2012 and 2020 and were recorded in the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) Public Use File were included. Post-operative complications were classified as surgical or medical. Univariate and multi-variable analyses were conducted.

RESULTS: Of 164,344 cases, 72.3% were mastectomy, 20.2% implant-based, and 7.5% autologous breast reconstruction. Surgical and medical complications were uncommon (6.4% and 2.7%, respectively). Surgical complications increased with case complexity, but not with age. On multivariable regression adjusting for comorbidities, surgical complications were significantly lower for women ≥ 70 years compared to those < 70 years for mastectomy (OR 0.67, $p < 0.001$), but there were no significant differences for implant-based or autologous reconstruction. Medical complications were higher for autologous reconstruction (10.8%) than mastectomy (2.4%) or implant-based reconstruction (1.1%). The risk of medical complications was higher for those ≥ 70 years compared to those < 70 years for mastectomy (OR 1.25, $p < 0.001$) and implant-based (OR 1.65, $p = 0.009$), but there was no significant difference for autologous reconstruction.

CONCLUSION: The frequency of surgical complications after mastectomy with or without reconstruction is not greater with increased age, but medical complications are increased following mastectomy and implant-based reconstruction. Breast reconstruction in women ≥ 70 years should be routinely discussed and offered if it aligns with patient desires and medical risk profile.

Figure 1. Surgical and medical complications following mastectomy, implant-based, and autologous reconstruction in woman < 70 and ≥ 70 years of age.





PREDICTING HIGH-INTENSITY RESUSCITATION NEEDS IN INJURED PATIENTS FOLLOWING HEMOSTASIS

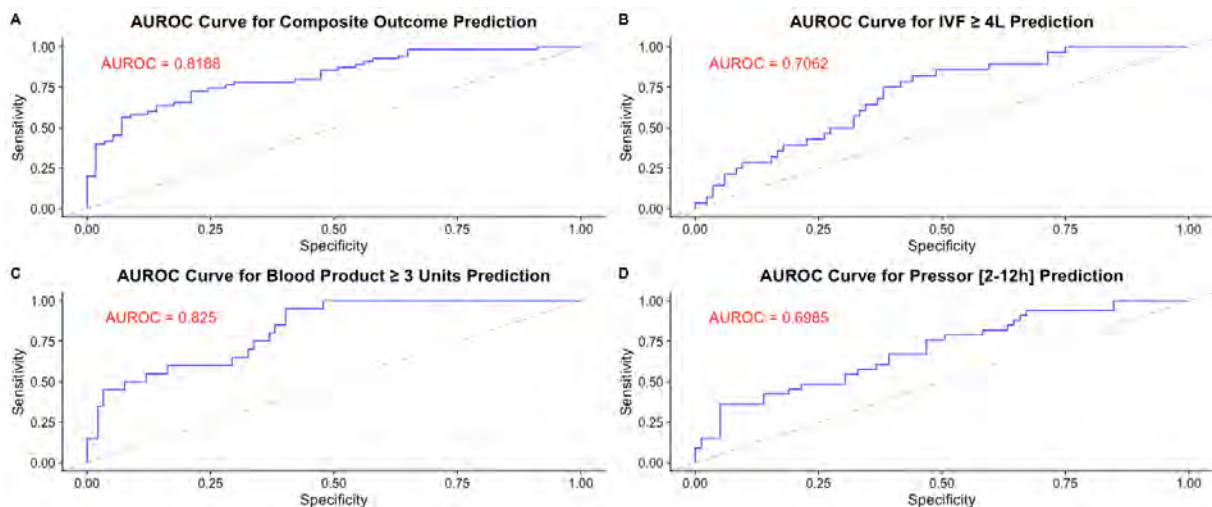
Weykamp M, Beni C, O'Keefe G, Chan G, Robinson B

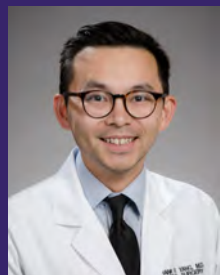
BACKGROUND: Best practice for the resuscitation of injured patients following hemostasis is unknown. The post-hemostasis phase of care is characterized by a variety of physiologic derangements and multiple therapeutic modalities used to address them (e.g., blood, crystalloid, and vasoactive medications). Using a cohort of injured patients from Harborview Medical Center who required an immediate intervention following arrival to the emergency department, we hypothesized that those who would go on to receive high-intensity post-hemostasis resuscitation could be identified in advance, using data available at the time of ICU admission.

METHODS: Hemodynamic, laboratory, and procedure data were extracted for consecutive injured patients admitted to the trauma ICU following an emergent procedure in either the operating room or angiography suite. Significant resuscitation thresholds were defined as the top decile of blood and crystalloid use in the initial twelve hours of ICU care and vasoactive medication use (between ICU hours 2-12). The primary outcome was a composite of *any* of these three modalities. Predictive modeling was performed using logistic regression with predictor variables selected using Least Absolute Shrinkage and Selection Operator (LASSO) regression. Models were trained using 70% of the cohort and tested on the remaining 30%; their predictive ability was evaluated using area under receiver operator curves in the testing cohort. Continuous variables were depicted with medians and interquartile ranges and proportions as percentages.

RESULTS: Six-hundred-and-five (605) subjects were analyzed. A total of two-hundred-and-fifteen (36%) required at least one of the three high-intensity resuscitation criteria. Predictor variables selected by LASSO included: shock index (Heart Rate/Systolic Blood Pressure), lactate, base deficit, hematocrit, and INR. Area under receiver operator curves for prediction models using these variables are depicted in **Figure 1A-D**.

CONCLUSIONS: Data available at ICU admission following hemostasis can identify/potentially predict subsequent high-intensity resuscitation. Use of this model may facilitate triage, nursing ratio determination, and resource allocation.



**FRANK F. YANG, MD***T32 National Institute of Diabetes and Digestive and Kidney Diseases Research Fellow***RESEARCH INTERESTS:** Comparative effectiveness, QoL outcomes**FACULTY MENTOR:** David R. Flum, MD, MPH, FACS**MEDICAL SCHOOL:** Stanford School of Medicine**DISCUSSANT:** Harvesh Mogal, MD, MS, FACS, DABS, FSSO**MULTI-CENTER USE AND OUTCOMES OF DEXAMETHASONE FOR THE MANAGEMENT OF MALIGNANT SMALL BOWEL OBSTRUCTION (MSBO)**

Yang FF, Serrano E, Bilodeau KS, Silvestri CJ, Weykamp M, Gitonga B, Galet C, Bull ACM, Garcia LJ, Turacyzk Kolodziej D, Lin B, Schaefer SL, Olbrich N, Esposito S, Brigham MP, Luhar R, Mamgain A, Brown K, Price TP, Dewdney S, Siparsky N, Park PK, Sanchez S, Skeete DA, Fischkoff KN, Flum DR

BACKGROUND: mSBO is common in patients with advanced abdomino-pelvic cancers. Management includes prioritizing quality of life and avoiding surgical intervention when possible. Use of dexamethasone to restore bowel function was demonstrated in three small, randomized trials and is recommended in National Comprehensive Cancer Network (NCCN) guidelines. It is unknown how often dexamethasone is used for mSBO and whether results from non-research settings support its use.

METHODS: Retrospective review including unique admissions for mSBO at 6 centers (Boston Medical Center, Columbia University, Rush University, University of Iowa, University of Michigan, University of Washington) 1/1/2019-12/31/21. Dexamethasone use and management outcomes were summarized with descriptive statistics and multiple logistic regression.

RESULTS: Among 571 admissions (68% female, mean-age 63y, 85% history of abdominal surgery) that were eligible and initially non-operative, 26% (95%CI:23-30%) received dexamethasone treatment (69% female, mean-age 63y, 88% history of abdominal surgery). Dexamethasone use by site ranged from 13% to 52%. Of these, 13% (95%CI:9-20%) subsequently required non-elective surgery excluding planned gastrostomy during the same admission and 4 dexamethasone-related safety-events were reported. Amongst 421 eligible admissions where dexamethasone was not used, 17% (95%CI:14-21%) required non-elective surgery.

Overall, unadjusted odds ratio (OR) for non-elective surgery with dexamethasone use compared to without is 0.7 (95%CI:0.4-1.3). Using multiple logistic regression, OR after adjusting for site, age, sex, history of abdominal surgery, NGT, and Gastrografin use is 0.6 (95%CI:0.3-1.1).

CONCLUSIONS: Dexamethasone was used in about 1 in 4 eligible mSBO admissions with some evidence of lower rates of operative intervention. Based on these findings, the sample size for a randomized trial to confirm the effect size of dexamethasone on operative management is estimated to be at least n=2800. While a randomized trial of this size may not be feasible, this multicenter retrospective cohort study suggests that more consistent use of dexamethasone for mSBO may represent an opportunity for quality improvement.

Rates of non-elective operative intervention

| | In total admissions – % (95%CI) | In admissions where dex was not used – % (95%CI) | In admissions where dex was used – % (95%CI) | Risk reduction – % (95%CI) | Unadjusted Odds ratio (OR) for non-elective operative intervention with dex (95%CI) |
|--------|------------------------------------|---|--|-------------------------------|---|
| Site 1 | 17% (7-36%) | 22% (9-45%) | 0% (0-50%) | 22% (3-41%) | N/A* |
| Site 2 | 19% (11-30%) | 27% (15-44%) | 11% (4-25%) | 16% (-2%-35%) | 0.3 (0.1-1.2) |
| Site 3 | 14% (9-20%) | 14% (9-22%) | 13% (6-25%) | 2% (-10-13%) | 0.9 (0.3-2.4) |
| Site 4 | 35% (21-53%) | 36% (20-57%) | 33% (12-65%) | 3% (-34-40%) | 0.9 (0.2-4.5) |
| Site 5 | 13% (9-19%) | 13% (9-19%) | 12% (4-30%) | 1% (-12-15%) | 0.9 (0.2-3.2) |
| Site 6 | 17% (11-26%) | 18% (11-28%) | 15% (6-34%) | 3% (-19-14%) | 0.8 (0.2-2.5) |
| Total | 16% (13-19%) | 17% (14-21%) | 13% (9-20%) | 4% (-10-3%) | 0.7 (0.4-1.3) |

Table. Unadjusted odds ratio (OR) of non-operative management with dexamethasone use in admissions for mSBO across 6 sites over 3 years (1/1/2019 to 12/31/2021).

*Not able to calculate OR given that all patients who received dexamethasone continued non-operative management throughout the admission.



OUTCOMES AND HEALTH EQUITY IMPACT OF TELEHEALTH USE FOR PEDIATRIC SURGERY PREOPERATIVE CARE

Cockrell HC, Barry D, Dick A, Greenberg SLM

BACKGROUND: Previous studies conducted at our institution revealed that patients who identify as American Indian or Alaska Native, live in neighborhoods characterized by high levels of socioeconomic disadvantage, and travel farther distances for pediatric surgical care are more likely to use telehealth services. We have not previously evaluated patient outcomes following telehealth for pediatric surgery preoperative care. We compared the incidence of postoperative complications among patients who were evaluated preoperatively via telehealth versus in-person.

METHODS: We performed a retrospective analysis of patients ages 0-21 years who underwent surgery at a quaternary pediatric hospital between 3/1/2020-5/31/2021. Outcome was 30-day postoperative serious adverse events (SAE), defined as cardiac arrest, sepsis, unplanned return to the operating room, or unplanned hospital readmission. Logistic regression assessed the effect of pre-operative appointment type. Patient-level demographic, health status, and geographic access variables were used as covariates.

RESULTS: 1,776 patients were included; 238 (13.4%) telehealth and 1,538 (86.6%) in-person. There were no differences in demographic, health status, or geographic access variables between cohorts. Incidence of SAE was 8.4% for telehealth versus 4.6% for in-person. Telehealth was associated with nearly two-fold odds of SAE on univariable (OR 1.97, 95% CI: 1.15, 3.38) and multivariable regression (OR 1.94, 95% CI 1.04, 3.47). Case duration (OR 1.48, 95% CI 1.27, 1.75), higher ASA classification (OR 3.77, 95% CI 2.28, 6.20), and residence in a disadvantaged neighborhood (OR 2.55, 95% CI 1.32, 4.98) were also associated with increased odds of SAE.

CONCLUSION: We found differential outcomes for preoperative telehealth versus in-person appointments. Additional inquiry is needed to better elucidate the etiology of these differences to improve outcomes and mitigate pediatric surgical inequity.



EUSTINA G. KWON, MD, MPH

Pediatric Surgery Research Fellow

RESEARCH INTERESTS: Pediatric surgery, health outcomes research, trauma, anorectal malformation, social determinants of health

FACULTY MENTOR: Samuel Rice-Townsend, MD, FACS

MEDICAL SCHOOL: Penn State College of Medicine

HOMETOWN: Newport News, VA

DISCUSSANT: Kenneth W. Gow, MD, FACS, FAAP

THE ASSOCIATION BETWEEN CHILDHOOD OPPORTUNITY INDEX AND PEDIATRIC HOSPITALIZATION FOR FIREARM INJURY OR MOTOR VEHICLE CRASH

Kwon EG, Nehra D, Hall M, Herrera-Escobar JP, Rivara FP, Rice-Townsend SE

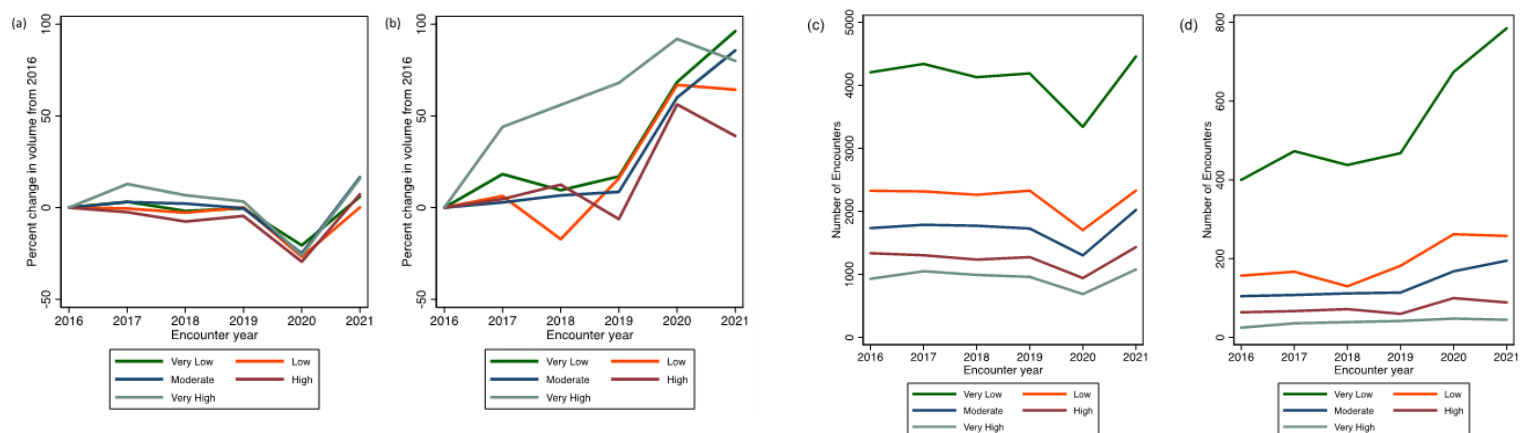
BACKGROUND: Community-level factors can have a profound impact on children's health. We aimed to understand the relationship between community-level determinants and pediatric hospitalizations from firearm injury or motor vehicle crash (MVC).

METHODS: All pediatric patients (<18 years) who presented with an initial encounter for a firearm injury or MVC between 2016-2021 were identified in the Pediatric Health Information System database. Community-level vulnerability was determined by Child Opportunity Index (COI), a composite score of neighborhood opportunity specific to pediatric populations.

RESULTS: We identified 67,407 patients who were treated for injuries due to MVC (n=61,527) or firearm (n=5,880). The overall cohort had an average age of 9.3 (SD 5.4) years with 50.0% being male, 44.0% Non-Hispanic Black, and 60.8% publicly insured. Compared to those with MVC injuries, patients injured by a firearm were older and more likely to be male, Non-Hispanic Black, and to have public insurance (all $p < 0.001$). They were also more likely to be from lower COI communities with 55% residing in communities with very low COI. In multivariable analysis, children living in lower levels of COI were more likely to be admitted for a firearm injury than a MVC injury compared to children living in communities with very high COI; the odds increased as the level of COI decreased (OR 1.33, 1.60, 1.73, 2.00 for high, moderate, low, and very low COI respectively, all $p \leq 0.001$). During the 6-year study period, there was a trend toward increased firearm injuries in all COI groups (Figure 1).

CONCLUSION: In this study, children living in lower COI communities had increased odds of presenting with firearm injury compared with those from high COI communities, and odds increased as COI decreased. These findings highlight the need for focused engagement with low COI communities to decrease the risk of firearm injuries to children and adolescents.

Figure 1. Trend of pediatric trauma injury frequency related COI by percent change for (a) MVC and (b) firearm and number of encounters for (c) MVC and (d) firearm over time



RESEARCH INTERESTS: Factors affecting surgical outcome, race/ethnicity and its impact on cause specific mortality

FACULTY MENTOR: David R. Flum, MD, MPH, FACS

MEDICAL SCHOOL: American University of Beirut Faculty of Medicine

DISCUSSANT: Grant E. O'Keefe, MD, MPH, FACS



DOES THE USE OF INSULIN TO TREAT PERIOPERATIVE HYPERGLYCEMIA REDUCE THE RISK OF COMPLICATIONS IN NON DIABETIC PATIENTS?

Nassereldine H, Flum DR, Chen JY, Dellinger EP

BACKGROUND: Hyperglycemia in the perioperative period in patients without diabetes mellitus (NoDM) increases the risk of adverse surgical outcomes. We aimed to determine the impact of treatment of hyperglycemia with insulin on outcomes among NoDM patients.

METHODS: Retrospective cohort study of patients undergoing surgery (2013-2016) who had perioperative blood glucose testing at UWMC Montlake. Adverse events (AE) were defined using NSQIP criteria and the relationship of insulin and AE assessed using multivariate regression, adjusting for age, baseline comorbidities, American Society of Anesthesiologists physical status class, body mass index, surgical specialty, year of operation and glucose levels for overall model.

RESULTS: 6664 NoDM patients (median age: 54 yrs) underwent general (80.8%), gynecological (16.5%), and vascular (2.7%) surgical procedures. A total of 4899 (73.5%) underwent blood glucose testing. Of these, 2415 (49.3%) had a BG of less than 140, 2484 (50.7%) had hyperglycemia (BG ≥ 140), and 20.7% of those with hyperglycemia received insulin. Among those with hyperglycemia, 1365 (54.9%) had BG 140-179 and of these 334 (24.5%) received insulin; 943 (37.9%) had perioperative BG 180-249 and of these 570 (60.4%) received insulin; and 176 (7.2%) had perioperative BG >250 and of these 110 (62.5%) received insulin.

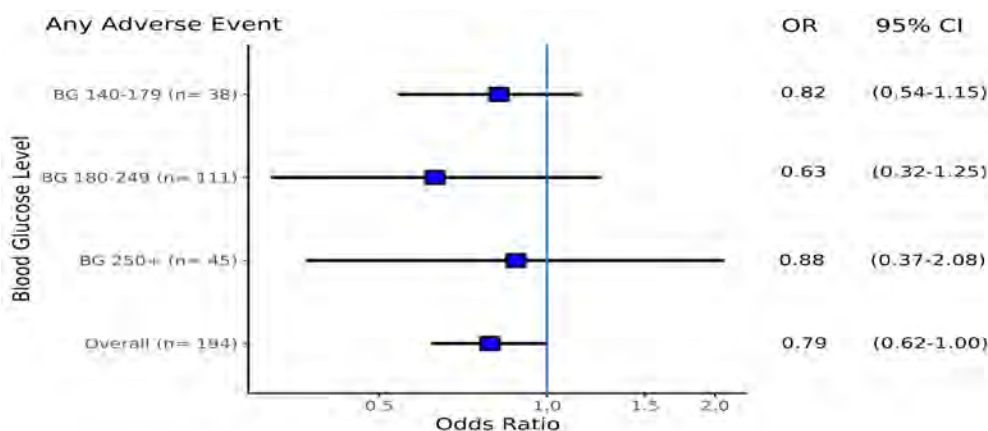
The proportion with AE was higher among all groups who had BG ≥ 140 compared to those with BG <140 and varied based on whether insulin was administered and degree of hyperglycemia. Compared to those with BG ≥ 140 not receiving insulin, the adjusted odds ratio of AE was $\sim 20\%$ lower among those who received insulin (aOR = 0.79 95% CI [0.62-1.00])

CONCLUSION: In NoDM patients with hyperglycemia, insulin reduced but did not normalize the risk of AE. More intensive use of insulin to treat hyperglycemia and perhaps earlier use to prevent hyperglycemia may be a more effective approach to reducing the risk of AEs.

Table/Figure 1.

| BG level among NoDM patients | Rate of AE in insulin+ group [95% CI] | Rate of AE in insulin- group [95% CI] | Adjusted odd ratio | 95% CI |
|------------------------------|---------------------------------------|---------------------------------------|--------------------|-----------|
| <140 | NA | 134 (5.5% [4.7-6.]) | NA | NA |
| 140-179 | 38 (11.4% [8.4-15.2]) | 144 (14.0% [11.9-16.2]) | 0.82 | 0.54-1.23 |
| 180-249 | 111 (19.5% [16.4-22.9]) | 100 (26.8% [22.5-31.5]) | 0.63 | 0.32-1.25 |
| >250 | 45 (40.9% [32.1-50.3]) | 22 (33.3% [23.0-45.4]) | 0.88 | 0.37-2.08 |
| Overall | 194 (19.1% [16.8-21.6]) | 266 (18.1% [16.2-20.1]) | 0.79 | 0.62-1.00 |

NA= not available



2023 RESEARCH SYMPOSIUM POSTER SESSION

WEDNESDAY, MARCH 29TH, 2023

POSTER SESSION AGENDA

WELCOME / DOUGLAS E. WOOD, MD, FACS, FRCSED, THE HENRY N. HARKINS PROFESSOR AND CHAIR

INTRODUCTION / DAVID R. FLUM, MD, MPH, VICE CHAIR FOR RESEARCH, SURGERY, PROFESSOR, SURGERY

- Manal Jmaileh, MD, MPH – TL1 Translational Research Training Program Research Fellow**
(presenting on behalf of Aldina Mesic, MPH, PhD(c) – Research Fellow, UW Department of Global Health)
“Addressing the Road Safety Implementation Gap in Ghana: A Focus on Road User Perspectives” Page 29
- Hannah C. Cockrell, MD – UW PROGRESS Research Fellow**
“Equity in Geographic Access to Optimal Pediatric Surgical Care in The United States” Page 30
- Mary A. Hunter, MD, MA, MS, Burn/Surgical Critical Care Fellow**
“Evaluation of Promis-10 Global Health Survey Implementation at a Regional Burn Center Clinic” Page 31
- Alison S. Bae, MD – Plastic Surgery R6**
“Lymphatic Microsurgical Preventive Healing Approach (Lympha) for the Prevention Of Lymphedema, a Single Institution Retrospective Review” Page 32
- Kyle S. Bilodeau, MD – T32 NIH-NIGMS Institutional Postdoctoral Research Fellow in Trauma, Injury and Inflammation**
“Extracorporeal Cardiopulmonary Resuscitation for Children Who Experience Out-Of-Hospital Cardiac Arrest” Page 33
- Sarah K. Brennan, BS – Medical Student**
“Risk of Lymphedema in a Contemporary Cohort of Breast Cancer Patients After Axillary Dissection: A Single Institution Retrospective Review” Page 34
- Kate E. McNevin, MD – General Surgery R4**
“Validation of the Pcpic Database Using Nsqip-P: A Patient Matched Comparison of Surgical Complications Following Repair of Anorectal Malformations” Page 35
- Arjune S. Dhanekula, MD – Cardiothoracic Surgery R4**
“Cause-Specific Morbidity and Mortality in Young Patients Following Mechanical Aortic Valve Replacement” Page 36

CLOSING REMARKS

ADJOURN

MANAL JMAILEH, MD, MPH

TL1 Translational Research Training Program Research Fellow

RESEARCH INTERESTS: Trauma surgery, injury prevention, global health, and health care capacity

FACULTY MENTORS: Barclay Stewart, MD, PhD, MPH and Charles Mock, MD, PhD, MPH

MEDICAL SCHOOL: University of Washington School of Medicine

HOMETOWN: Tacoma, WA



ADDRESSING THE ROAD SAFETY IMPLEMENTATION GAP IN GHANA: A FOCUS ON ROAD USER PERSPECTIVES

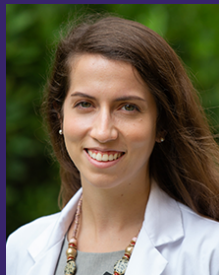
Stewart BT, Wagenaar B, Opoku I, Gyedu A, Mock C, Damsere-Derry J, Mohammed B, Matinu S, Feldacker C

BACKGROUND: The burden of road traffic injuries and deaths is staggering and expected to increase in Ghana and in other low- and middle-income countries. Road users are often neglected in policymaking, leading to widespread dissatisfaction with existing interventions and communities addressing road safety issues themselves (i.e., by building their own unauthorized speed calming measures). The objective of this study is to explore road user perspectives on the causes and solutions to crashes, injuries, and deaths in high-risk areas.

METHODS: We conducted in-depth interviews with road users in areas of high crashes, injuries, and deaths on national roads in Ghana. We purposively selected two types of road users: vulnerable road users, defined as not having external protection (e.g., a pedestrian, motorcyclist) and non-vulnerable users, defined as having external protection (e.g., a motorist, passenger). We used a mixed deductive (direct content analysis) and inductive (interpretive phenomenological analysis) approach to analyze findings.

RESULTS: We conducted a total of 22 in-depth interviews with 12 vulnerable road users and 10 non-vulnerable road users in two urban hot spot locations in Greater Accra Region and two rural hot spot locations in the Northern Region. Factors reported to cause crashes, injuries, and deaths included environmental factors such as a lack of sidewalks and nighttime lights, human factors such as illegal pedestrian crossings and excessive speeding, and vehicle factors such as brake failures and limited safety features (e.g., seat-belts). We found that ambulance services are rarely used due to misconceptions about the arrival time and financial cost. Potential solutions reported included increased enforcement of road safety laws, improved road conditions, and regulation of commercial and public transportation vehicles.

CONCLUSION: This is the first study of its kind to provide evidence on population needs related to road safety in Ghana, which can guide implementation and policymaking.



HANNAH C. COCKRELL, MD

UW PROGRESS Research Fellow

RESEARCH INTERESTS: Health equity, pediatric surgery, environmental sustainability

FACULTY MENTOR: Sarah Greenberg, MD, MPH, FACS

MEDICAL SCHOOL: Virginia Commonwealth School of Medicine

HOMETOWN: Richmond, VA

EQUITY IN GEOGRAPHIC ACCESS TO OPTIMAL PEDIATRIC SURGICAL CARE IN THE UNITED STATES

Cockrell HC, Bowder A, Dick A, Linden A, Greenberg SLM

BACKGROUND: We evaluated equity in geographic access to optimal pediatric surgical care in the United States (US) by comparing the location of children's hospitals to the populations they serve.

METHODS: Geographic access to optimal pediatric surgical care was determined by the percent US population within a 2-hour driving distance from an American College of Surgeons (ACS) Children's Surgery Verification Quality Improvement Program Level I Children's Surgery Center (n = 42). A subgroup analysis was done using ACS National Surgical Quality Improvement Program (NSQIP-Peds) participating hospitals (n =127). Percent population within 2-hours was calculated using haversine modeling in ArcGIS Pro (Version 2.9). County-level population density and rural-urban analyses were performed. Results were stratified by race, ethnicity and language.

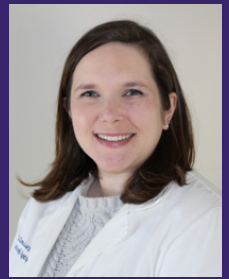
RESULTS: Most ACS Level I Verified Children's Surgery Centers (73.81%) and NSQIP-Peds hospitals (56.69%) are in large metropolitan areas, where only 30.81% of the US population resides. 62% of the US population lives within 2-hours from an ACS Level I Verified Children's Surgery Center and 89% within 2-hours of a NSQIP-Peds hospital. The majority within 2-hours of an ACS Level I Verified Children's Surgery Center are in the Mid-Atlantic (10.91%), East North Central (11.96%) and South Atlantic (21.60%) US Census Divisions. 60.85% of non-Hispanic whites live within 2-hours of an ACS Level I Verified Children's Surgery Center, compared to 58.93% of Hispanics, 45.88% of Native Hawaiians/Other Pacific Islanders, and 34.46% of American Indians/Alaska Natives. Linguistic minority status did not correlate with geographic difference in access to ACS Level I Verified Children's Surgery Centers.

CONCLUSION: The majority of ACS Level I Verified Children's Surgery Centers and NSQIP-Peds hospitals are within urban areas, which may present geographic barriers to children in rural communities. Burden of miles traveled falls disproportionately on minoritized racial and ethnic groups. Efforts to improve equity in geographic access to optimal pediatric surgical care are needed.

RESEARCH INTERESTS: Clinical burn surgery research focused on implementation of interventions to improve burn rehabilitation

FACULTY MENTOR: Barclay Stewart, MD, PhD, MPH

MEDICAL SCHOOL: Wake Forest School of Medicine



EVALUATION OF PROMIS-10 GLOBAL HEALTH SURVEY IMPLEMENTATION AT A REGIONAL BURN CENTER CLINIC

Hunter MA, Gaskins D, Hubbard MM, Wiechman S, Chambers M, Carrougner G, Gibran NS, Stewart BT

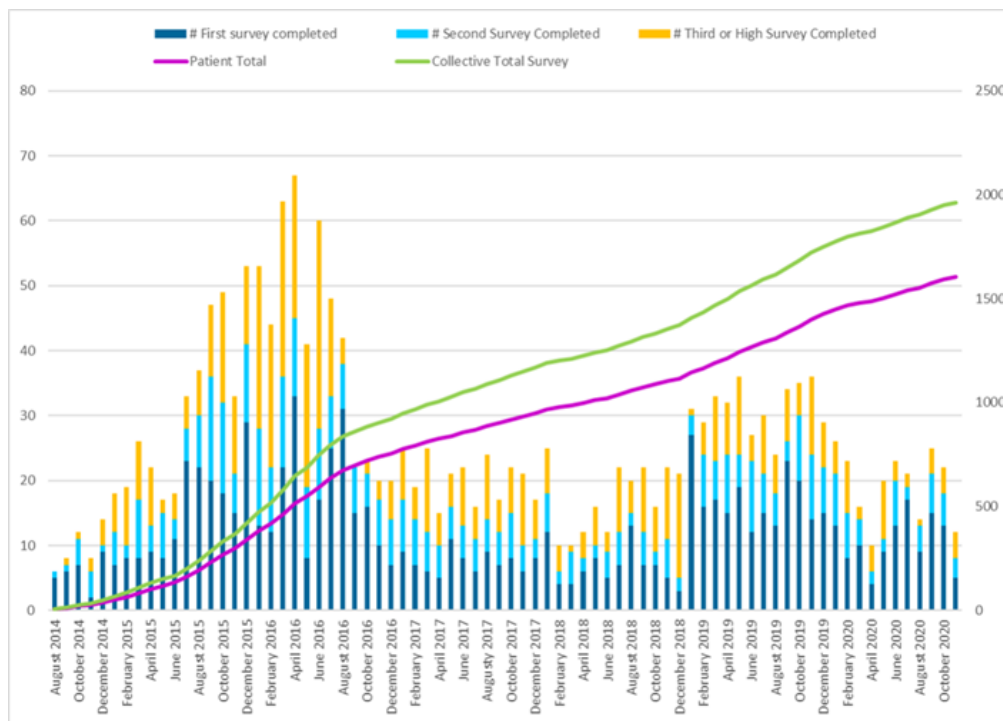
BACKGROUND: Patient-Reported Outcomes Measure System-10 (PROMIS-10) is a survey that evaluates patients' global physical and mental health. PROMIS-10 was introduced into our burn clinic as a screening tool and serial measure of recovery. We aimed to assess the implementation of PROMIS-10 to improve its equitable use in outpatient clinics.

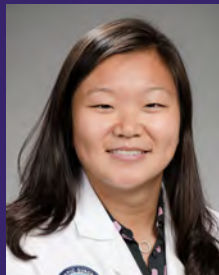
METHODS: The PROMIS-10 was implemented in 2014. The burn clinic staff were trained in its use. Patients were offered English-language surveys at each of their burn clinic appointments. Survey results were reviewed by clinic providers and addressed as part of routine care. Survey answers were entered into REDCap and merged with demographic and burn injury information. Data were collected and analyzed using univariate and bivariable statistics to evaluate equitable implementation.

RESULTS: A total of 1,963 surveys were collected from 1,606 patients from January 2014 to December 2020 (Figure 1). After excluding patients with missing collection of survey and/or demographic data, our analysis included 1,072 patients. The mean number of surveys completed per visit was 0.53 (SEM=0.007) and 88% of patients completed 1 or more surveys. Patients who required intensive care during their index hospitalization or had an operation had higher mean surveys completed per visit (Highest Level of Care ICU=0.611 ± 0.02; Required an operation = 0.608 ± 0.015), whereas patients requiring an interpreter had lower mean surveys completed per visit (Required an Interpreter = 0.468 ± 0.031).

CONCLUSION: Although most patients completed the PROMIS-10 during at least one clinic visit, there is room for improvement to use it as a metric of recovery progress over time. Focus on equity in completion is needed (e.g., coordinating interpreter-assisted completion, availability of translated forms, person-assisted completion for limited English proficiency). Patients with high burn severity had higher rates of survey completion per visit. This is a population in which serial evaluation is helpful in monitoring recovery.

Figure 1: Volume of PROMIS-10 Surveys Completed by Patients at Regional Burn Center Clinic 2014-2020





ALISON S. BAE, MD

Plastic Surgery R6

RESEARCH INTERESTS: Microsurgery, lymphedema

FACULTY MENTOR: Suzanne Inchauste, MD

MEDICAL SCHOOL: Perelman School of Medicine

LYMPHATIC MICROSURGICAL PREVENTIVE HEALING APPROACH (LYMPHA) FOR THE PREVENTION OF LYMPHEDEMA, A SINGLE INSTITUTION RETROSPECTIVE REVIEW

Do M, BA, Song P, MD, Bae AS, MD, Taslakian E, MD, Goldsberry-Long, SR MD, Inchauste SM, MD

BACKGROUND: Secondary lymphedema is estimated in up to 49% of patients after axillary lymph node dissection (ALND) and radiation for breast cancer treatment.¹⁻⁴ Lymphatic microsurgical preventative healing approach (LYMPHA) was first described in 2009⁵ as a method of immediate lymphatic reconstruction to reduce the risk of lymphedema.⁶ Lymphedema incidence following LYMPHA was as low as 2.1% in a recent systematic review.⁸ Our objectives were to identify the rate of lymphedema and potential risk factors in patients who underwent LYMPHA.

METHODS: Retrospective review was performed on patients who underwent LYMPHA from August, 2018 through February, 2022 at a single institution. All patients had node positive breast cancer or recurrence requiring axillary lymph node dissection with a minimum of 3 months follow-up.

RESULTS: A total of 122 limbs successfully underwent LYMPHA over the study period. Rate of lymphedema was 10% (12 of 113) measured by presence of signs and symptoms of lymphedema and L-Dex measurement >10. Patients with ALND alone compared to those with sentinel node biopsy prior to ALND had an odds ratio, 2.93; $p = 0.096$. Patients with one lymphovenous bypass compared to those with 2 or more had an odds ratio, 3.02; $p = 0.168$. The ratio of lymphatic channels to vein per anastomosis (1:1 vs $\geq 2:1$) was evaluated with an odds ratio 0.36, $p = 0.115$. Patients with adjuvant radiation therapy had odds ratio, 3.49; $p = 0.396$.

CONCLUSION: LYMPHA is a safe approach which has demonstrated clear benefits in prevention of secondary lymphedema following ALND with an incidence of 10% at our institution. Our study shows that several factors including number of lymphovenous bypasses, ratio of lymphatic channels to vein per anastomosis, and adjuvant radiation therapy may influence risk of lymphedema development but none were statistically significant. Longer follow up is needed.

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EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION FOR CHILDREN WHO EXPERIENCE OUT-OF-HOSPITAL CARDIAC ARREST

Bilodeau KS, Gray KE, McMullan DM

BACKGROUND: Extracorporeal cardiopulmonary resuscitation (ECPR) improves survival in adult patients with cardiac arrest refractory to conventional cardiopulmonary resuscitation (CPR); however, the impact of ECPR on pediatric patients who are brought into an emergency department (ED) has yet to be elucidated. We sought to evaluate the association of cardiac arrest and ECPR cannulation location on outcomes of pediatric patients with refractory out-of-hospital cardiac arrest (OHCA).

METHODS: A retrospective analysis of the Extracorporeal Life Support Organization (ELSO) registry data was performed. All pediatric patients (age > 28 days to < 18 years) who received ECPR for refractory cardiac arrest in the ED or prior to hospital arrival between 2010 and 2019 were included. We examined associations of location of cardiac arrest and ECPR cannulation (ED vs. non-ED) with outcomes, utilizing unadjusted and multivariate logistic regression for mortality and negative binomial regression for counts of complications across standardized ELSO-defined complication categories.

RESULTS: A total of 140 pediatric patients were identified and included in analyses. Overall survival was 31%. In unadjusted analyses, cardiac arrest prior to index hospital arrival was associated with 2.8 greater odds of mortality (95% CI 1.32, 6.12). Patients who were cannulated outside of the ED experienced 2.4 greater odds of mortality (95% CI 1.12, 4.97). After adjusting for age, race, and diagnoses, these associations were strengthened slightly (prehospital vs. ED cardiac arrest: odds ratio [OR] 3.9, 95% CI 1.61, 9.81; ED vs. non-ED cannulation: OR 2.7, 95% CI 1.19, 6.03). There was no statistically significant association between complications and location of cardiac arrest (incident rate ratio [IRR] 0.93, 95% CI 0.72, 1.18) or ECPR cannulation location (IRR 0.93, 95% CI 0.72, 1.19).

CONCLUSIONS: Location of cardiac arrest and ECPR cannulation influence survival in pediatric patients. Additional studies are needed to identify pre-cannulation predictors of survival.



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RESEARCH INTERESTS: Breast surgery, microsurgery, reconstructive plastic surgery

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MEDICAL SCHOOL: University of Washington School of Medicine

RISK OF LYMPHEDEMA IN A CONTEMPORARY COHORT OF BREAST CANCER PATIENTS AFTER AXILLARY DISSECTION

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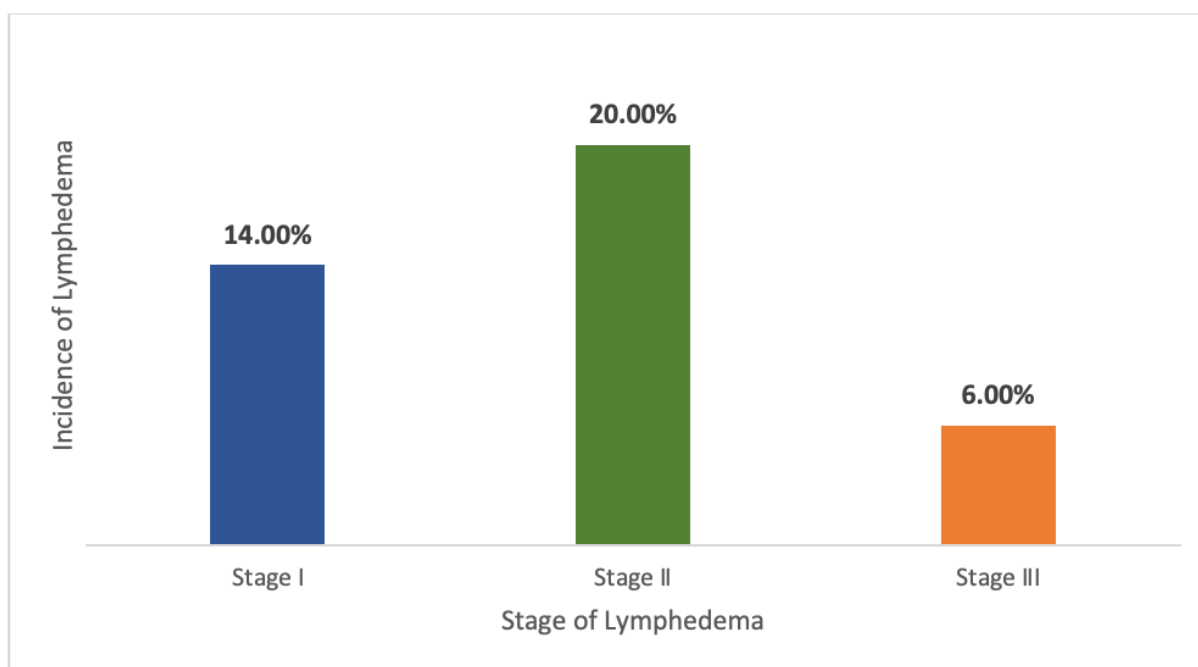
BACKGROUND: Secondary lymphedema has been reported in 16-40% of patients with breast cancer undergoing axillary lymph node dissection (ALND). Increasing use of radiation therapy, preventive surgical procedures, and the implementation of multidisciplinary lymphedema programs aimed at early intervention may impact the longevity of this data. Furthermore, contemporary data regarding the severity of secondary lymphedema is ill-defined.

METHODS: Breast cancer patients who underwent ALND at a single institution between 2018 and 2020 were followed for the development of lymphedema. Lymphedema was defined as an increase of 10 points on noninvasive bioimpedance spectroscopy or 10% increase in arm measurements *and* signs/symptoms of lymphedema. The frequency and stage of lymphedema were calculated, and demographic, tumor and treatment characteristics were evaluated for associations with lymphedema.

RESULTS: ALND was performed in 219 axillae of 217 patients, 178 (82%) of whom were followed for a mean of 30.6 months. The median age at diagnosis was 52 (26 to 87), and the majority were white (78%), postmenopausal (53%) with mean BMI 28.4. Most received chemotherapy (75%) and radiation (86%). Almost 40% (86/217) of patients developed at least stage I lymphedema, with the majority diagnosed at stage II (Figure). On univariate analysis, there were no associations between lymphedema and age of diagnosis, number of nodes removed, year of surgery, race, insurance status, BMI, tobacco use, menopause status, cancer stage, grade, hormone receptors, or receipt of preventive lymphatic surgery or chemotherapy. On multivariable analysis, lymphedema was 2.5-fold greater among those who received radiation compared to those who did not (95% CI 0.99, 6.19 $p = 0.05$).

CONCLUSION: Despite being higher risk than historical controls, the frequency of clinically significant lymphedema (stage II and III) remained comparable, which is likely influenced by early interventions and increased lymphedema awareness.

Figure: Proportion of patients with lymphedema according to stage after ALND for breast cancer.





VALIDATION OF THE PCPLC DATABASE USING NSQIP-P: A PATIENT MATCHED COMPARISON OF SURGICAL COMPLICATIONS FOLLOWING REPAIR OF ANORECTAL MALFORMATIONS

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BACKGROUND: Congenital pediatric colorectal diseases are rare and heterogeneous in nature making this group of patients particularly challenging to study. The Pediatric Colorectal and Pelvic Learning Consortium (PCPLC) aims to improve the health and quality of life of children affected by colorectal conditions. It includes 17 children's hospitals with a registry of more than 3800 patients. PCPLC sites identify patients and upload specific data variables to a national registry. To date, there has been no external validation of the data entered into the PCPLC registry. We sought to validate the data within the PCPLC registry by performing a patient matched analysis of 30-day outcomes with The American College of Surgeons National Surgical Quality Improvement Program-Pediatric (NSQIP-P) database for patients undergoing surgical repair of anorectal malformation (ARM).

METHODS: After approval from the IRB, all patients captured in the PCPLC database at institutions also participating in NSQIP-P who underwent ARM repair younger than 12 months of age were reviewed for 30-day complications. These patients were matched to their NSQIP-P record via retrospective pairing with their hospital identification number. Complications within 30 days of the primary surgical procedure were compared.

RESULTS: There were 591 patients identified in the PCPLC database that met criteria for inclusion. Of these patients, 180 were also included in the NSQIP-P registry. Complications in both the PCPLC database and NSQIP-P database were 7.8% and 10.0% respectively. Complications recorded in both databases demonstrated relative concordance.

CONCLUSION: The 30-day complication rate captured within the PCPLC registry for patients younger than 12 months undergoing surgical repair of ARM appears to have relative concordance with a matched NSQIP-P patient population when accounting for complications not tracked by the PCPLC and normal margin of error. Future studies are needed to externally validate the registry for other patient populations.



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Cardiothoracic Surgery R4

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CAUSE-SPECIFIC MORBIDITY AND MORTALITY IN YOUNG PATIENTS FOLLOWING MECHANICAL AORTIC VALVE REPLACEMENT

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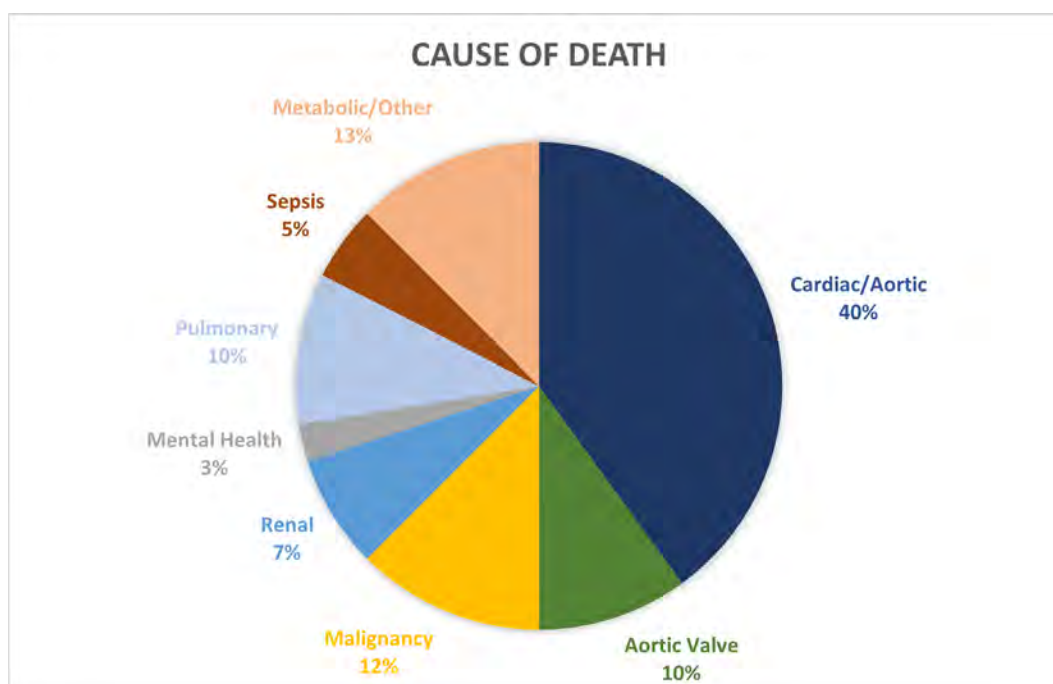
BACKGROUND: Mechanical aortic valve replacement (mAVR) continues to be standard in young patients due to known durability. However, mAVR has been associated with excess mortality when compared to the general population. The goal of this study is to further understand what influences mortality following mAVR placement.

METHODS: Patients less than 65 years of age who underwent mAVR at a single academic health care system from 2000-2022 were queried for inclusion. Exclusion criteria included emergent procedures, root replacement, and loss to follow-up or death within one year of surgery. Final cohort size was 222 patients. Early peri-operative and long-term outcomes were abstracted from the electronic medical record.

RESULTS: Average age was 53.5 years at the time of surgery. Over the study period, 26 (11.8%) of patients suffered major hemorrhage, 7 (3.2%) had an intracranial bleed, 18 (8.2%) suffered a GI/abdominal bleed, 10 (4.5%) had an intracranial embolic event, and 10 (4.5%) required re-intervention on their aortic valve. 40 patients (18.0%) were confirmed dead, of which 50% were related to cardiovascular causes (Figure 1). Overall survival at 5, 10, and 15 years was 92%, 85%, and 71%, respectively. Survival was not influenced by valve size ($p=0.2$) or age of patient at the time of mAVR placement ($p=0.4$). Non-survivors were more likely to be smokers, have a trileaflet aortic valve, carry a diagnosis of heart failure, and have a higher rate of long-term hemorrhagic events ($p<0.05$). Factors associated with long-term mortality after mAVR included heart failure ($p<0.01$), presence of a native trileaflet aortic valve ($p<0.05$), and long-term major hemorrhagic events ($p<0.05$).

CONCLUSION: Nearly half of young patients with an mAVR experience death, reintervention, or a major hemorrhagic event within 15 years following mAVR placement; further, most of these deaths are cardiovascular related. Anticoagulation-related hemorrhagic events seem to be a primary driver for this observed excess mortality, and further research is needed to explore ways to mitigate this impact.

Figure 1. Cause-of-death breakdown amongst patients who received a mechanical AVR under the age of 65. 50% of deaths were due to cardiovascular causes.



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