2025 RESEARCH SYMPOSIUM

30TH ANNUAL HELEN & JOHN SCHILLING LECTURE

GUEST SPEAKER

GRETCHEN SCHWARZE, MD, MPP, FACS

FRIDAY, MARCH 21ST, 2025
UW TOWER AUDITORIUM

FOREWARD

Welcome to the Department of Surgery's 30th Schilling Research Symposium! Now entering its third decade, the Helen and John Schilling Lecture and Research Symposium is in great hands under the direction of Dr. Meghan Flanagan. We thank her for her commitment to this event and for the great work in organizing it.

Each year, we gather and dedicate three days to the innovative research of our trainees. These days include a presentation of e-posters, a roundtable discussion showcasing the work of our department, and a full day symposium for the innovative research conducted by our trainees that concludes with the keynote lecture by a visiting professor. This year, residents and students submitted a record number of abstracts to the Schilling Research Symposium event, all of which are a remarkable quality. The Schilling Research Symposium is one of many ways the department supports research. The Department of Surgery also hosts the Division of Research, which was created in July 2023 with a vision to advance the research mission within the department. We aim to support faculty, fellows, residents, and staff – in finding greater satisfaction, support, and success in their academic pursuits. In less than two years, the division has grown in size, focus, and impact. Representing over 55 faculty and 60 staff members, the Division of Research has been building infrastructure to support new faculty as they develop their research programs, started over 25 studies, hosts regular grant writing workshops, and provides biostatistical resources and staff support for faculty and residents starting their research. To accelerate this work, the department is investing $1.2 million in research with a focus on revitalizing our clinical research infrastructure (details coming this Spring). This investment recognizes the importance of research in our department's mission and a commitment to "walk the talk" at a time when science funding is particularly challenging. These funds will support faculty who are developing clinical research projects, translation scientists purchasing equipment that will accelerate innovation, and surgeon-scientists pursuing training grants. These and an array of other activities will make it easier for you to pursue research projects.

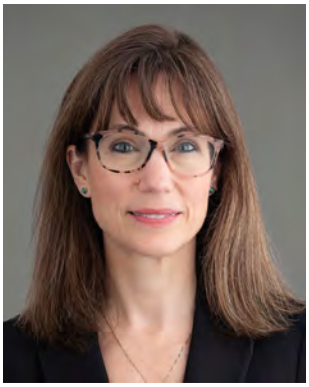
Whether or not research is a part of your day-to-day work in the department, you are a key part of the culture of inquiry that makes our department so strong. We each contribute to that culture daily by asking and encouraging questions, inspiring students and residents to innovate, participating in clinical trials, applying for research fundings, and leading studies. Now more than ever, it is important to maintain this thriving culture of inquiry. Thank you for all you do to reinforce our research culture, and for celebrating research in the department.

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

David R. Flum, MD, MPH, FACS
Professor of Surgery, Adjunct Professor
School of Public Health and Pharmacy
Vice Chair, Division of Research, Department of Surgery
Director, Surgical Outcomes Research Center (SORCE)

30TH ANNUAL HELEN & JOHN SCHILLING LECTURE GUEST SPEAKER

GRETCHEN SCHWARZE MD, MPP, FACS



Gretchen Schwarze MD, MPP, FACS, is the Morgridge Professor of Vascular Surgery and a Professor in the Departments of Surgery and Medical History and Bioethics at the University of Wisconsin. She received her medical degree from Harvard Medical School and master's degree in public policy from the John F. Kennedy School of Government. She completed residency at the Massachusetts General Hospital. Her fellowship training in vascular surgery and clinical ethics was at the University of Chicago Hospital and Clinics. She is a practicing vascular surgeon and health services researcher who also directs the hospital ethics committee. Her research interests focus on informed consent, high-stakes decisions, and end-of-life care for older patients with complex illnesses. She is an alumna of the Greenwall Faculty Scholar and the Cambia Foundation Sojourns Scholar programs. She is currently funded by the National Institute on Aging with two R01s and a K24. She lives in Madison, WI with her husband who is a transplant surgeon and has two daughters, ages 17 and 19.

WELCOME TO THE 30TH ANNUAL DEPARTMENT OF SURGERY RESEARCH SYMPOSIUM AND SCHILLING LECTURE

Meghan R. Flanagan, MD, MPH, FACS

Today, we come together to celebrate the groundbreaking research of our residents and fellows, the dedication of faculty mentors who guide their work, and the opportunity to learn from our esteemed visiting scholar. This symposium is a testament to the dynamic, engaged, and innovative spirit of our research community—including faculty, residents, fellows, staff, and students—who are committed to the pursuit of knowledge and advancing the science that will shape the future of surgery.

As the Director of Training and Engagement for the Division of Research, I am honored to lead this year's Schilling Symposium. With a record number of abstract submissions, it is clear that research is not just an academic pursuit—it is the driving force behind a desire for progress, clinical excellence, and better outcomes. Now, more than ever, we must champion and support the researchers whose work will define the next generation of evidence-based guidelines and transform patient care.

The Division of Research connects and supports our research community across disciplines and methodologies. None of this would be possible without the dedication of over 50 faculty and 60 staff members, and the unwavering commitment of our departmental leadership. Thank you for being part of this vital mission, for supporting the next generation of surgeon scientists whose work will improve care for generations to come.

This year, we are honored to welcome Dr. Gretchen Schwarze as our Schilling Visiting Professor. Dr. Schwarze is the Morgridge Professor of Vascular Surgery and a Professor in the Departments of Surgery and Medical History and Bioethics at the University of Wisconsin. A practicing vascular surgeon and esteemed health services researcher, she also serves as the director of her institution's hospital ethics committee. Dr. Schwarze is widely recognized for her groundbreaking research on informed consent, high-stakes decision-making, and end-of-life care for older patients with complex illnesses. Many may be familiar with her "Best Case, Worst Case" framework, which has significantly influenced patient communication practices. We are privileged to have Dr. Schwarze join us for the research presentations and look forward to her keynote lecture, "Strengths and Limitations: Reflections on Data, Measurement, and Surgeon Communication."

It is also with great enthusiasm that we honor Dr. E. Patchen "Patch" Dellinger as this year's Schilling Distinguished Faculty Award recipient. This prestigious award recognizes the career achievements of exceptional University of Washington surgeon-scientists who over the course of their careers have made significant contributions to scientific advancement, mentorship, and the training of future generations of surgeon-scientists. Dr. Dellinger's work has profoundly influenced and improved the culture of safety in operating rooms worldwide. His contributions have set new standards in surgical practice, ensuring better patient outcomes and fostering a culture of excellence. In recognition of this honor, his name will be added to the perpetual plaque in the Chair's office, joining the esteemed ranks of past award recipients.

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 dedicated to teaching, scholarship, and research, and this event serves as a testament to their enduring legacy. By providing a platform for residents and fellows to present their research, supported by dedicated faculty mentors, we uphold the Schillings' commitment to advancing surgical science and education. With tremendous pride and gratitude, we carry forward this tradition and remain committed to its continuation for years to come. Beyond celebrating research achievements, this symposium offers a valuable learning experience, allowing residents and fellows to refine their scientific presentation skills through formal presentations, audience Q&A, and constructive feedback from our panel of judges.

The Schilling Research Day is a celebration of our shared passion for research and its vital role in improving the care we deliver to our patients every day. Every member of the Department contributes to the success of our research mission – by identifying critical questions that impact patients, mentoring students and residents, engaging patients in clinical trials, securing research funding, incorporating new data into practice and sharing discoveries through publications and presentations. **Your dedication to research is invaluable, and we are deeply grateful for your commitment to making it a priority.** Research is one of the foundations of academic surgery, fueling innovation and shaping the future of patient care. Your hard work and dedication ensure that research continues to thrive at UW, and we sincerely appreciate your contributions.

Meghan R. Flanagan, MD, MPH, FACS
Director of Training and Engagement
Division of Research
Associate Professor
Division of General Surgery

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 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.

Helen & John Schilling

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.

SYMPOSIUM AGENDA

7:15AM WELCOME—DOUGLAS E. WOOD, MD, FACS, FRCSED, THE HENRY N. HARKINS PROFESSOR AND CHAIR
INTRODUCTION—MEGHAN R. FLANAGAN, MD, MPH, FACS, ASSOCIATE PROFESSOR, DIVISION OF GENERAL SURGERY

– SESSION I –

MODERATOR: CHARLES LIU, MD, MS, ASSISTANT PROFESSOR, DIVISION OF GENERAL SURGERY

TIME	EVENT	PRESENTER	PRESENTATION TITLE	PAGE
7:30am		**JASON CARTER, MD, PHD** *Research Resident*	*"Mechanisms of Immune Evasion in Fibrolamellar Carcinoma"*	10
7:45am		**DIVYA RAMAKRISHNAN, MD** *T32 Postdoctoral Research Fellow*	*"Burnout and Attrition: Looking from the Perspective of Psychological Safety in Surgical Education"*	11
8:00am		**NICOLAS STAFFORINI, MD** *Vascular Surgery R4*	*"Management of Moderate Blunt Thoracic Aortic Injuries in Patients with Solid Organ Injury"*	12
8:15am		**EDITT TASLAKIAN, MD, MS** *Plastic Surgery R5*	*"Revisiting Godina's Paradigm: Does Timing Still Influence Complications in Lower Extremity Reconstruction?"*	13
8:30am		**DEWAHAR SENTHOOR, MD** *Abdominal Transplant Fellow*	*"Differential Impact of Severe Obesity And Diabetes On Post-Transplant Survival In Metabolic Dysfunction-Associated Steatohepatitis (MASH) Vs. Non-MASH Etiologies: A 35,406-Patient Analysis from the OPTN Database"*	14
8:45am		**NORMA ELIZAGA, MD** *T32 Postdoctoral Research Fellow*	*"Higher Protein Intake During the First Week is Associated with Worse Outcomes in Critically Ill Trauma Patients: A Secondary Analysis of a Randomized Clinical Trial"*	15
9:00am		**DOUGLAS E. WOOD, MD, FACS, FRCSED** ***THE HENRY N. HARKINS PROFESSOR AND CHAIR***		
9:15am	**BREAK**			

– SESSION 2 –

MODERATOR: EMILY PALMQUIST, MD – ASSISTANT PROFESSOR, DIVISION OF GENERAL SURGERY

9:30am		**NICHOLE CHICOINE, DO** *Pediatric Surgery Research Fellow*	*"Social Determinants of Health Screening and Pediatric Surgical Outcomes"*	16
9:45am		**JAMIE OLAPO, MD** *T32 Postdoctoral Research Fellow*	*"Investigation of Mediterranean Diet to Prevent Episodes of Diverticulitis (IMPEDE) Pilot Trial"*	17
10:00am		**DANIELLE EBLE, MD** *Plastic Surgery Chief*	*"Impact of Age on Long-Term Decisional Regret and Satisfaction After Gender-Affirming Chest Surgery"*	18
10:15am		**ALEX HERNANDEZ, MD, MCR** *T32 Postdoctoral Research Fellow*	*"Financial Concerns Among Injury Survivors: A Thematic Analysis of the Psychosocial Impact of Financial Hardship"*	19
10:30am		**SHEELA DAMLE, MD, PHD** *Hematology/Oncology Fellow*	*"Intratumoral Three-Cell-Type Clusters Represent a Conserved Feature of Effective Endogenous Anti-Tumor Immunity"*	20
10:45am		**ARJUNE DHANEKULA, MD** *Research Resident*	*"Mitochondrial Dysfunction is a Driver of Senescence and Age-Related Disease in the Thoracic Aorta"*	21
11:00am	**SCHILLING DISTINGUISHED FACULTY AWARDEE - E. PATCHEN DELLINGER, PROFESSOR EMERITUS** **PRESENTED BY - DAVID R. FLUM, MD, MPH, FACS, VICE CHAIR FOR RESEARCH, PROFESSOR, SURGERY**			
11:45am	**BREAK**			

– SESSION 3 –

MODERATOR: CHRIS MARFO, MD, MBA – ASSISTANT PROFESSOR, DIVISION OF TRAUMA, BURN & CRITICAL CARE SURGERY

11:30am		**NIKKI THRIKUTAM, MD, MPH** *Plastic Surgery Chief*	*"Hand Burn Injuries and Occupational Impairment: A Study on the Impact of Burn Injuries on Return-to-Work Outcomes from the Burn Model System Research Program"*	22
11:45am		**MALIA BRENNAN, MD** *General Surgery R3*	*"Surgery, Survival, and Disease Progression for HER2+ Metastatic Breast Cancer"*	23
12:00pm		**NZUEKOH NCHINDA, MD** *Pediatric Surgery Research Fellow*	*"Long-term Outcomes of Neonatal Intestinal Atresia and Malrotation Repair"*	24
12:15pm		**BLAKE MURPHY, MD** *T32 Postdoctoral Research Fellow*	*"Descriptive Summary of Genetic Testing Practices for Patients with Aortic Disease at a Tertiary Academic Center"*	25
12:30pm		**SARAH RUDASILL, MD** *F32 Postdoctoral Research Fellow*	*"Factors Associated with Benign Lung Resections"*	26
12:45pm		**VIVIAN HSAIO, MD** *CVES Research Fellow*	*"AI-Assisted Video Analysis For Evaluating Ergonomic Strain In Robotic Surgeons: Pilot Study from the SAGES Ergonomic Task Force"*	27
1:00pm	**LUNCH**			
2:15pm	**30TH ANNUAL SCHILLING LECTURE** **GUEST LECTURER – GRETCHEN SCHWARZE, MD, MPP, FACS**		***"STRENGTHS AND LIMITATIONS: REFLECTIONS ON DATA, MEASUREMENT, AND SURGEON COMMUNICATION"***	
3:15pm	**ANNOUNCE WINNERS AND CLOSING**	**DOUGLAS E. WOOD, MD, FACS, FRCSED** ***THE HENRY N. HARKINS PROFESSOR AND CHAIR***		

MODERATORS

CHARLES LIU, MD, MS – Assistant Professor, Division of General Surgery

Dr. Liu is a colon & rectal surgeon specializing in the treatment of colorectal cancer, inflammatory bowel disease, and benign conditions of the colon, rectum, and anus. His research focuses on out-of-pocket spending and financial hardship experienced by patients, in particular those with inflammatory bowel disease, and the impact of health insurance and public policy on patients' economic and clinical outcomes. He is passionate about improving access to timely, high-quality, and evidence-based surgical care for patients of all backgrounds. Prior to joining the UW Department of Surgery, Dr. Liu completed his general surgery residency at Stanford University and colon & rectal surgery fellowship at the University of Minnesota.

EMILY PALMQUIST, MD – Assistant Professor, Division of General Surgery

Dr. Emily Palmquist is a general surgeon specializing in breast disease. She is an assistant professor in the Department of Surgery at the University of Washington Medical Center and her practice extends to the Fred Hutchinson Cancer Center. Her practice encompasses both benign and malignant breast diseases. Dr. Palmquist completed her undergraduate degree at Boston College. She then earned her medical degree at Tufts University School of Medicine and completed her general surgery residency also at Tufts Medical Center in Boston, Massachusetts. She pursued further specialization through a breast surgical oncology fellowship at Memorial Sloan Kettering Cancer Center, in New York, NY. In addition to her clinical work, Dr. Palmquist is passionate about educating future surgeons and improving patient-reported outcomes in breast cancer care. She understands the essential need to integrate advancements in breast cancer treatment to provided individualized and evidence-based care. Outside of her profession, she enjoys outdoor activities such as hiking, biking, and skiing, as well as cooking.

CHRIS MARFO, MD, MBA – Assistant Professor, Division of Trauma, Burn & Critical Care Surgery

Dr. Marfo is a trauma surgeon and surgical intensivist with expertise in managing critically injured trauma patients at Harborview Medical Center. He graduated from Yale University School of Medicine completing a combined MD/MBA degree. He joined the department in 2018 as a general surgery resident and completed his surgical critical care fellowship in 2024 before joining the faculty as an Assistant Professor. He also serves as the Associate Program Director for the general surgery program at the University of Washington. His research interests are centered on surgical education, including enhancing surgical education in low-resource settings. Dr. Marfo is dedicated to delivering the highest standard of surgical care to improve long-term patient outcomes.

SYMPOSIUM JUDGES

RESEARCH LEADERSHIP

DOUGLAS E. WOOD, MD, FACS, FRCSED
The Henry N. Harkins Professor and Chair

DAVID R. FLUM, MD, MPH, FACS
Professor of Surgery
Vice Chair, Division of Research

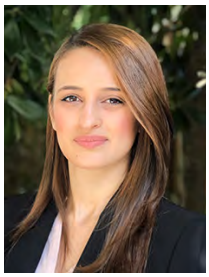
SAMAN ARBABI MD, MPH, FACS
Professor & Chief of Trauma
Division of Trauma, Burn & Critical Care Surgery

SCOTT C. BRAKENRIDGE, MD, FACS
Associate Professor
Division of Trauma, Burn & Critical Care Surgery

EILEEN M. BULGER MD, FACS
Professor & Chief of Trauma, Burn & Critical Care Surgery, Surgeon-in-Chief

CHRISTOPHER CHILDERS, MD, PHD
Assistant Professor
Division of General Surgery

MEGHAN R. FLANAGAN, MD, MPH, FACS
Associate Professor
Division of General Surgery



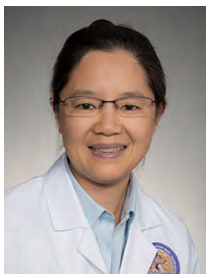
MARIAM HANTOULI, MD
Acting Instructor
Surgical Outcomes Research Center (SORCE)

CATHERINE E. KLING, MD, MPH
Associate Professor
Division of Transplant Surgery

VENU G. PILLARISETTY, MD, FACS
Professor
Division of General Surgery

BRYCE R.H. ROBINSON MD, MS, FACS, FCCM
Professor
Division of Trauma, Burn & Critical Care Surgery

DAVID H. ROTHSTEIN, MD, MS
Associate Professor
Division of Pediatric General Surgery



GALE L. TANG, MD, FACS, RPVI
Chief of Vascular Surgery, Associate Professor
Division of Vascular Surgery, VA Puget Sound Health Care System

RHEA J. UDYAVAR, MD, MPH
Assistant Professor
Division of General Surgery

2025 SCHILLING DISTINGUISHED FACULTY AWARD

E. Patchen Dellinger was born in 1944 in Newark, NJ and lived in rural New Jersey until attending Swarthmore College where he earned a B.A in Mathematics with distinction in 1966. He then attended Harvard Medical School followed by a surgical residency at the Beth Israel Hospital in Boston completed in 1977. During his research years he completed an Infectious Diseases fellowship with Louis Weinstein at Tufts New England Medical Center. The project he most remembers from his fellowship was the importance of multidisciplinary collaboration to examine the question of whether cephalothin increased the nephrotoxicity of gentamicin. The importance of multidisciplinary collaboration continued throughout his career. He was hired as an Assistant Professor of Surgery at the University of Washington at Harborview Medical Center in 1977 and promoted to Associate Professor in 1982. He took a sabbatical year at the Royal Free Hospital in London, U.K. from1988 to 1989, maintaining contact with colleagues at Harborview, where multiple clinical trials that he helped to start were ongoing. He moved from Harborview to the University of Washington Medical Center Montlake in 1990, was promoted to Professor and became Chief of the General Surgery Division at that hospital. He is a former president of the Surgical Infection Society and co-author of guidelines for the prevention of surgical site infections, for the use of prophylactic antibiotics in surgery, for the treatment of intra-abdominal infections, and the management of healthcare workers infected with hepatitis B virus, hepatitis C virus, and/or human immunodeficiency virus published by these societies.

As a faculty member, Patch helped lead pivotal studies related to surgical infectious disease funded by NIH grants and pharmaceutical and device development companies. Some of the studies he is most proud of and had the greatest impact on the field include studies supporting shorter duration of antibiotic prophylaxis for penetrating abdominal injuries and open fractures, a multicenter study demonstrating that prophylactic antibiotics were not helpful for patients with necrotizing pancreatitis, as well as a multicenter study demonstrating the efficacy of shorter duration of antibiotic administration for intra-abdominal infections following source control. He has a career long interest in glycemic control on surgical infection, leading key advances in the field and helping to guide UW to advanced practices in glycemic control. Recognizing his contributions to this field, the UW is currently conducting the Prevention and Treatment of Common Hyperglycemia in Surgery (PATCHS) randomized controlled trial, the first ever test of whether prevention of hyperglycemia is better than treatment alone of hyperglycemia during surgery.

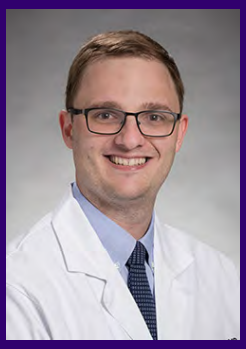
Patch has either led or advised dozens of statewide, national, and global collaboratives aimed at implementing science into surgical practice. This work has reduced complication and saved the lives of thousands of patients. When asked to be an advisor for such research and QI collaboratives, his rule was always to agree to participate on the condition that his own Department be allowed to join in-usually at the expense of the organizers. To that end, extending his advisory roles on the Healthcare Infection Control Practices Advisory Committee (HICPAC) of the CDC, the CMS Surgical Site Infection Prevention group, and the WHO Surgery Technical Working Group, he helped develop and test the WHO Safe Surgery preoperative checklist. He subsequently chaired the Washington State Executive Committee for the Safe Surgery Checklist Coalition as well as the SCOAP checklist collaborative, leading WA State to becoming the first in the nation to have 100% of its hospitals using the checklist. He worked to spread best practices worldwide, serving as a member of the WHO Expert Steering Committee for the Development of Guidelines and Implementation Strategy on the Prevention of Surgical-Associated Infections and a member of the Technical Expert Working Group on Surgical Antibiotic Prophylaxis for the Essential Medicine List for the WHO.

Dr. Dellinger with the general surgery faculty team – 2016

Patch is an author on more than 240 peer reviewed articles (his first “Protective effect of cephalothin against gentamicin-induced nephrotoxicity in rats” in 1976 and his most recent last year “Inactivation of bacteria using histotripsy: A step toward the treatment of abscesses”) as well as 57 book chapters.

He mentored dozens of students, residents and faculty to be excellent surgeons, many of them also successful surgeon-scientists. Patch’s work philosophy resonates now more than ever: “Whether research, clinical care, or administrative issue, collaborate with a multidisciplinary team consisting of young and old, all participating specialties, nurse, faculty, student, infection control agent, patient, and family.”

2025 RESEARCH SYMPOSIUM



JASON CARTER, MD, PHD

Research Resident

RESEARCH INTERESTS: Cancer immunology, computational biology

FACULTY MENTOR: Venu Pillarisetty, MD

MEDICAL SCHOOL: Stony Brook University School of Medicine

HOMETOWN: San Diego, CA

DISCUSSANT: Kimberly J. Riehle, MD

MECHANISMS OF IMMUNE EVASION IN FIBROLAMELLAR CARCINOMA

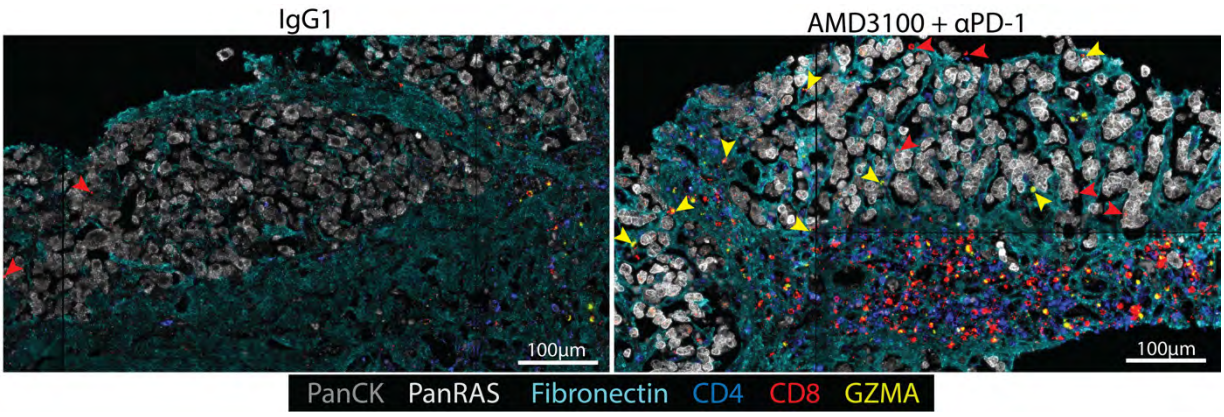
Carter JA*, Dickerson LK*, Daniel SK, Jiang X, Kenerson HL, Damle SR, Goodsell KE, Yeung RS, Crispe IN, Pillarisetty VG

BACKGROUND: Fibrolamellar carcinoma (FLC) is a rare subtype of hepatocellular carcinoma that arises in otherwise healthy adolescents and young adults. Despite nearly all patients sharing an immunogenic DNAJB1-PRKACA fusion oncogene, FLC's immunosuppressive tumor immune microenvironment (TIME) significantly limits immune infiltration and effector function. We hypothesized that T cell exclusion and intratumoral immunosuppression were mediated by distinct mechanisms that could be overcome with rationally designed combination immunotherapy.

METHODS: Multiplex immunohistochemistry (mIHC), flow cytometry, and bulk T cell receptor (TCR) sequencing were used to examine the FLC TIME. The efficacy of combination immunotherapy was experimentally tested using a human tumor slice culture (TSC) model system using live confocal microscopy, single-nuclear and single-cell sequencing, and spatial multi-omics.

RESULTS: Relative to matched non-liver tumor (NTL), the FLC TIME had lower densities of immune effector cells but higher densities of regulatory cells expressing immune checkpoint molecules. The intratumoral TCR repertoire demonstrated increased conservation across individuals despite limited clonal expansion. Single-nuclear RNA sequencing from more than 110,000 individual cells demonstrated significant rewiring of chemokine signaling within the FLC TIME, notably including inferred cell-cell communication between $CXCL12^{+}$ myofibroblasts and $CXCR4^{+}$ lymphocytes that was further supported by co-localization on mIHC. Combination CXCR4 and PD-1 blockade cooperatively increased tumor cell death in TSC, with single-cell sequencing and spatial proteomics from treated tumor slices highlighting activation of cytotoxic T cell, helper T cell, and dendritic cell populations.

CONCLUSIONS: Our findings demonstrate that endogenous antitumor immunity in FLC is limited by both T cell exclusion and local immune checkpoint-mediated immunosuppression. Combination CXCR4 and PD-1 blockade act cooperatively to overcome these independent mechanisms and stimulate an integrated antitumor immune response. These results further lay the pre-clinical groundwork for the development of targeted combination immunotherapy in FLC.



Representative spatial proteomics images of FLC tumor slices demonstrate improved T cell effector function following treatment with combination CXCR4-inhibition (AMD3100) with PD-1 blockade relative to IgG isotype control.

DIVYA RAMAKRISHNAN, MD

T32 Postdoctoral Research Fellow

RESEARCH INTERESTS: Medical and surgical education, communication and decision making with patients

FACULTY MENTOR: Caitlin Smith, MD

MEDICAL SCHOOL: University of California - Irvine

DISCUSSANT: Rhea Udyavar, MD

BURNOUT AND ATTRITION: LOOKING FROM THE PERSPECTIVE OF PSYCHOLOGICAL SAFETY IN SURGICAL EDUCATION

Ramakrishnan D, Hernandez A, Petersen R, Horton M, Chang L, Kim S, Smith C

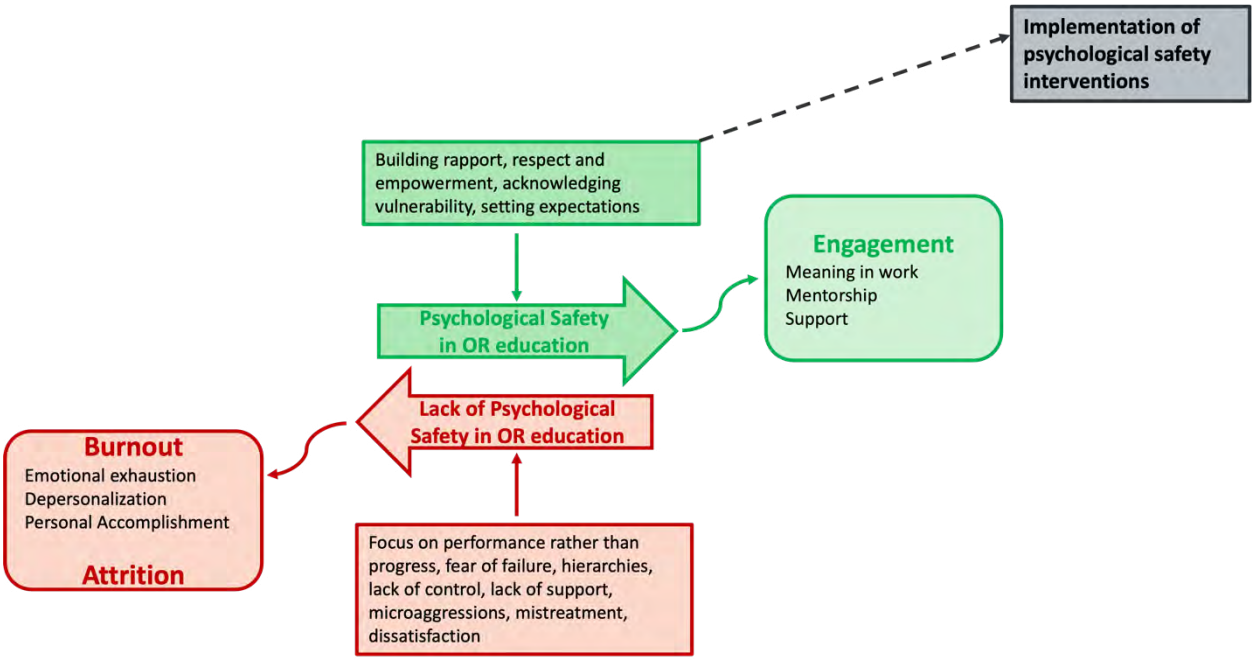
BACKGROUND: Nearly 70% of surgical trainees are suffering from burnout, 24-40% have thoughts of attrition, and 20% drop out of surgery residency. One lens in which to explore the environment in which burnout and attrition is prevalent is through assessment of a person's psychological safety (PS). To verify our conceptual model describing the relationship between PS and burnout and attrition (**Figure 1**), we sought to 1) examine how PS in the OR is related to burnout and attrition among surgical residents and 2) identify positive or negative behaviors in the OR with an impact on PS.

METHODS: We conducted a mixed-methods study targeting categorical general surgery residents at 3 programs in the Seattle area. The survey included validated PS and burnout scales, and assessment of duty hour violations, microaggressions, mentorship, and thoughts of attrition. Inductive coding and thematic analysis were performed on comments collected from open-ended questions about positive or negative OR behaviors promoting or hindering PS.

RESULTS: 35 responses were included for analysis. Increased PS was associated with increased satisfaction with mentorship, decreased duty hour violations, and decreased thoughts of attrition. Increased satisfaction with mentorship was associated with decreased burnout and decreased thoughts of attrition. 71% of residents reported that having positive experiences in the OR have an extremely high impact on how they view the rest of their work. Four behavioral themes were found to be associated with PS: investment in the resident, encouraging a growth mindset, open communication, and creating a collaborative environment.

CONCLUSIONS: PS is associated with satisfaction with mentorship and attrition, supporting our conceptual model describing the relationship between these factors. The behavioral facilitators and barriers to PS in the OR that we identified can help individuals and institutions implement interventions for improving burnout and attrition in surgical education.

Figure 1. Conceptual Model of Psychological Safety, Burnout, and Attrition



NICOLAS A. STAFFORINI, MD

Vascular Surgery R4

RESEARCH INTERESTS: Clinical outcomes in plastic surgery in relation to healthcare disparities, global surgery, pediatric plastic surgery, soft tissue reconstruction

FACULTY MENTOR: Elina Quiroga, MD, MPH

MEDICAL SCHOOL: Instituto Universitario Cemic

HOMETOWN: Buenos Aires, Argentina

DISCUSSANT: Matthew Smith, MD, PhD

MANAGEMENT OF MODERATE BLUNT THORACIC AORTIC INJURIES IN PATIENTS WITH SOLID ORGAN INJURY

Nicolas A. Stafforini MD, Emerald Toth BS, Niten Singh MD, Jake Hemingway MD, Benjamin Starnes MD, Nam Tran MD, Elina Quiroga MD MPH

OBJECTIVE: Blunt Thoracic Aortic Injuries (BTAI) are the second leading cause of trauma-related deaths in the United States. Using the Harborview grading system, BTAI can be classified as minimal, moderate or severe. While moderate BTAI (mBTAI) can undergo semi-elective repair, the optimal management of mBTAI with associated solid organ injury (SOI) is unknown. The aim of this study was to analyze our experience with patients presenting with concomitant mBTAI and SOI.

METHODS: We conducted a single-center retrospective study of patients who underwent TEVAR for treatment of mBTAI between March 2015 and December 2023. SOI's and their grades were identified, and our institutional solid organ injury protocol was followed for each patient. Our endpoints included surgical timing, outcomes and the need for reintervention.

RESULTS: 214 patients presented with BTAI during the study period. 88 patients underwent TEVAR for mBTAI and 46 (52 %) of those presented with concomitant SOI. SOI's included liver (63%), splenic (59%) and renal injuries (37%). Patients with SOI did trend towards longer time from presentation to repair, however, no difference was noted intraoperatively in the dosing of heparin or activated clotting time between the two groups (Table 1). Only one patient, who underwent systemic heparinization during TEVAR, required a return to the operating room for a splenectomy on postoperative day 1. This patient had previously required an exploratory laparotomy with packing and temporary abdominal closure. Patients with SOI did have a longer length of stay (LOS); however, no aortic-related mortalities were noted in either group. Thirty-day all-cause mortality was 4% for patients with SOI and 5% for non-SOI patients.

CONCLUSIONS: Patients with mBTAI and SOI can safely undergo TEVAR with systemic heparinization without an increased risk of complications. Patients with mBTAI and SOI have a longer LOS illustrating the severity of the non-aortic injuries.

TABLE I

Management and outcomes of patients presenting with moderate blunt thoracic aortic injury with and without associated solid organ injury

	SOI *n* = 46	No SOI *n* = 42	P Value
Anti-impulse therapy, *n* (%)	36 (78)	38 (90)	0.12
Time from admission to OR in hours, median (range)	45 (2 - 447)	33 (1 - 141)	0.07
Systemic heparin during index surgery, *n* (%)	44 (96)	41 (98)	0.61
Units/kg, median (range)	85.8 (25.9 - 129.4)	85.7 (26.7 - 125.3)	0.86
Protamine reversal, *n* (%)	34 (74)	36 (86)	0.17
ACT, median (range)	282 (145 - 400)	326 (126 - 400)	0.15
Heparinization time, mean (±SD)	47.4 (±37.8)	42.8 (±21.9)	0.54
OR time in min, mean (±SD)	79.8 (±58.1)	83.0 (±29.1)	0.75
Contrast use in mL, mean (±SD)	65.7 (±28.2)	65.8 (±25.4)	0.98
IVUS, *n* (%)	42 (91)	42 (100)	0.05
Subclavian coverage, *n* (%)	23 (50)	16 (38)	0.26
Subclavian revascularization, *n* (%)	1 (2)	0 (0)	-
Spinal drainage, *n* (%)	0 (0)	0 (0)	-
Spinal cord injury, *n* (%)	0 (0)	0 (0)	-
Lengh of stay (LOS), mean (±SD)	42.6 (±43.8)	18.1 (±19.7)	<0.01
30-day mortality, *n* (%)	2 (4)	2 (5)	0.92
Aortic-related mortality, n (%)	0 (0)	0 (0)	-
Surgical treatment of SOI, *n* (%)	26 (57)	-	-

OR, operating room; SD, standard deviation; IVUS, intravascular ultrasound.
P value > 0.05, not statistically significant.

EDITT N. TASLAKIAN, MD, MS

Plastic Surgery R5

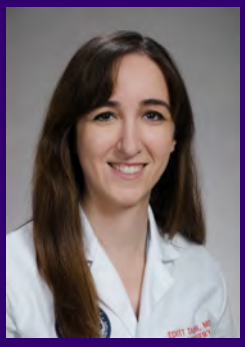
RESEARCH INTERESTS: Clinical outcomes in plastic surgery in relation to healthcare disparities, global surgery, pediatric plastic surgery, soft tissue reconstruction

FACULTY MENTOR: Kari A. Keys, MD

MEDICAL SCHOOL: Mayo Clinic Alix School of Medicine

HOMETOWN: Glendale, CA

DISCUSSANT: Otway Louie, MD



REVISITING GODINA'S PARADIGM: DOES TIMING STILL INFLUENCE COMPLICATIONS IN LOWER EXTREMITY RECONSTRUCTION?

Taslakian EN, Badiee RK, Vu SH, O'Connell G, Taskindoust M, Wang F, Katt S, Roddy E, Crowe CS, Miller EA, Friedrich JB, Liu YK, Keys KA

BACKGROUND: The landmark paper by Godina in 1986 provided evidence for the importance of early soft tissue coverage of lower extremity traumatic injuries within 72 hours to reduce complications. Advancements in wound care and reconstructive techniques since then have allowed for more flexibility on the timing of reconstruction. We sought to review our outcomes as a single institution Level I trauma center to shed a more modern light on the characteristics of injury and management that affect outcomes.

METHODS: A retrospective review identified 269 patients from 1994-2023 who required soft tissue reconstruction following lower extremity injuries at our institution. Demographics, comorbidities, and characteristics and management of traumatic injuries were abstracted. Univariate analysis and multivariable logistic regression models were developed to examine the association of risk factors with complications.

RESULTS: Of the 269 patients in this review, 53.1% were found to have a bony or soft tissue complication within one year of reconstruction. The average time to soft tissue reconstruction from the time of injury was found to be 12 days, and the timing of soft tissue coverage was not shown to significantly affect complication rates. The number of debridements (2.32 vs 2.7, p=0.01), vascular consult (p=0.04), and use of antibiotic spacers (p=0.01) were instead found to be independent predictors of postoperative complications.

CONCLUSION: There are delays to soft tissue reconstruction if a wound is highly contaminated, the patient requires ongoing stabilization, or if there are logistical challenges for operating room availability. In this cohort, timing of reconstruction was not found to significantly impact complications. Instead, complication rates are associated with number of debridements, vascular consult, and antibiotic spacers, all of which serve as proxy markers for the severity of injury. The severity of the defect affecting the outcomes is an informative consideration to help guide shared decision-making with patients.

DEWAHAR SENTHOOR, MD

Abdominal Transplant Surgery Fellow

RESEARCH INTERESTS: Kidney/liver transplant

FACULTY MENTOR: Jim Perkins, MD

MEDICAL SCHOOL: Brown Medical School

HOMETOWN: Bronx, NY

DISCUSSANT: Ryutaro Hirose, MD

DIFFERENTIAL IMPACT OF SEVERE OBESITY AND DIABETES ON POST-TRANSPLANT SURVIVAL IN METABOLIC DYSFUNCTION-ASSOCIATED STEATOHEPATITIS (MASH) VS. NON-MASH ETIOLOGIES: A 35,406-PATIENT ANALYSIS FROM THE OPTN DATABASE

Senthoor D[2], Kling C[2], Sibulesky L[2], Bhattacharya R[1], Pearson M[1], Vutien P[1], Perkins J[2]

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BACKGROUND: Among orthotopic liver transplant (OLT) recipients, severe obesity (SO) and diabetes (DM) have both been associated with poorer outcomes and it remains unclear whether the underlying liver disease etiology modifies their impact on post-OLT outcomes. This study aims to investigate the differential effects of SO and DM on short- and long-term recipient and graft survival in recipients transplanted for MASH vs. non-MASH etiologies.

METHODS: Using the OPTN database, we studied 35,406 first time OLT recipients ≥ 18 years from 2002-2023 (excluding retransplant, multiorgan transplant and cancer). Primary outcomes included graft and patient survival over short- and long-term periods. We performed propensity score matching to match recipient and donor characteristics of MASH vs. non-MASH OLT recipients. Kaplan-Meier survival curves analyses and multivariable cox proportional hazards regression with adjusted hazard ratios (aHR) were used to analyze the associations between DM and SO with recipient and graft survival.

RESULTS: For non-MASH, SO and DM were significantly associated with 1-year mortality (aHR 1.32 p=0.001, 1.18 p=0.049, respectively) and SO (aHR 1.36 p<0.001) was associated with 1-year graft survival. SO and DM were associated with long-term mortality (aHR 1.22 p<0.001, 1.29 p<0.001, respectively) and long-term graft survival (aHR 1.23 p<0.001, 1.23 p<0.001, respectively). For MASH, there was no significant association between SO and DM for 1-year mortality and 1-year graft survival. SO was not associated with long-term mortality and long-term graft survival, whereas DM was (aHR 1.36 p<0.001, 1.30 p<0.001, respectively).

CONCLUSIONS: SO and DM are associated with poorer survival for recipients transplanted for non-MASH indications. In contrast, neither SO nor DM are associated with poorer short-term survival for OLT recipients transplanted for MASH. These findings suggest that the pathophysiological mechanisms contributed to SO may differ according to MASH vs. non-MASH, highlighting nuanced differences in metabolic risk factors among these OLT recipients.

NORMA D. ELIZAGA, MD

T32 Postdoctoral Research Fellow

RESEARCH INTERESTS: Surgical critical care outcomes, vascular surgery outcomes

FACULTY MENTOR: Grant E. O'Keefe , MD, MPH

MEDICAL SCHOOL: University of Hawaii

DISCUSSANT: Saman Arbabi MD, MPH

HIGHER PROTEIN INTAKE DURING THE FIRST WEEK IS ASSOCIATED WITH WORSE OUTCOMES IN CRITICALLY ILL TRAUMA PATIENTS: A SECONDARY ANALYSIS OF A RANDOMIZED CLINICAL TRIAL

Elizaga, Norma MD, Qian Q., MBA, Brakenridge, S., MD., O'Keefe, G., MD

BACKGROUND: Optimal protein intake for critically ill trauma patients is a topic of ongoing debate. Guidelines recommend greater than 2g/kg/day, however recent data suggest that this may be harmful. Further, relatively few trauma patients were included in protein supplementation studies. This study aimed to analyze outcomes in critically ill trauma patients in relation to protein intake.

METHODS: Trauma ICU patients enrolled in a single-center, randomized trial of protein supplementation from 2016 to 2021 were included. The primary outcome was ventilator-free days (VFDs). Adjusted competing risks regression was used to assess the relationship between mean total protein intake in the first week of ICU admission and VFDs, with death as a competing risk. Mediation analysis was done to detect whether serum BUN was a mediator in the relationship between protein intake and VFDs.

RESULTS: 430 patients were analyzed. The median age of subjects was 44 [IQR:30-59] years, with 77% male. Median ISS and APACHE II scores were 34 [IQR:24-43], and 27 [IQR:22-32], respectively. The median average total protein intake in the first ICU week was 0.86 [IQR:0.4-1.3]g/kg/day. Higher mean protein intake in the first week was associated with lower VFDs (SHR 0.64 [95%CI: 0.5–0.8]). Increased protein was associated with an increased risk of death (SHR 1.37 [95%CI: 1.0-1.8]). On mediation analysis, protein intake had a negative direct effect on VFDs (–3.4 [95%CI: -5.0-(-1.8)]). The total effect of protein on VFDs was –3.8 (95%CI: -5.2-[-2.2]). The proportion mediated by BUN on VFDs through protein intake was 10% (95%CI: 2%-24%).

CONCLUSION: Higher protein intake early during ICU stay was associated with reduced VFDs and increased risk of mortality in trauma patients. BUN mediated a small but significant portion of the association between protein and VFDs. A lower range of target protein may be needed to prevent worse outcomes in these patients.

NICHOLE H. CHICOINE, DO

Pediatric Surgery Research Fellow

RESEARCH INTERESTS: Pediatric surgery, health equity, gender equity, health outcomes

FACULTY MENTOR: Sarah Greenberg, MD, MPH

MEDICAL SCHOOL: Marian University College of Osteopathic Medicine

HOMETOWN: Santa Rosa, CA

DISCUSSANT: Emily Palmquist, MD

SOCIAL DETERMINANTS OF HEALTH SCREENING AND PEDIATRIC SURGICAL OUTCOMES

Chicoine, N.H.; Barry, D.; Greenberg, S.L.M

BACKGROUND: Differential outcomes have been identified across racial groups, language preference, and socioeconomic standing within the pediatric surgical literature. These studies utilize various SDOH indices (COI, ADI, SVI) to estimate the impact SDOH has on surgical outcomes. However, the impact of a positive screen on the now required SDOH screening tools developed by hospital systems to receive Medicaid and Medicare services has not been well studied. We sought to assess what the association between a positive screen from SDOH responses was and its impact on pediatric surgical outcomes (30 day post-operative mortality and serious adverse events).

METHODS: A retrospective analysis of pediatric surgical patients ages 0–21 years was performed at a quaternary pediatric hospital from 11/9/2019-7/9/2024. Logistic regression was used to assess the relationship between a positive screen on the SDOH screening tool at our institution, and 30-day postoperative mortality and serious adverse events (SAE).

RESULTS: Among 28,130 patients, the incidence of 30-day mortality and SAE were 0.1% and 10%. On univariable regression, patients who had a positive SDOH screen had 1.44 increased odds of 30-day postoperative mortality (95% CI 0.65-3.11) and 1.34 statistically increased odds of SAE (95% CI: 1.20-1.49). Given the limited event size of mortality (n=35) it was not possible to model mortality outcomes based on each of the SDOH screening domains; however of the domains (Housing, Food Insecurity, Transportation, Stable Housing, and Cost) Housing and Cost had statistically significant increased odds of SAE (Housing 1.38, CI 1.05-1.83 and Cost 1.32, CI 1.14-1.52).

CONCLUSION: Pediatric surgical patients who screen positive for SDOH screening may experience worse postoperative outcomes in terms of mortality and are noted to have statistically worse outcomes for SAE compared to those patients who do not screen positive.

TABLE 1: Analysis of 30-day post-operative mortality and serious adverse events

Characteristic	Mortality OR	95% CI	SAE OR	95% CI
Positive SDOH Screen	1.44	0.65, 3.11	**1.34**	**1.20, 1.49**
SDOH Screen Categories				
Housing				
Stable Housing Today			1.11	0.86, 1.41
Stable Housing for the next 2 months			**1.38**	**1.05, 1.83**
Food				
Food (Last 12 months worried about running out of food)			1.01	0.78, 1.29
Food (Last 12 months run out of food			0.98	0.79, 1.21
Cost				
Pay for Necessities (housing, food, heating)			**1.32**	**1.14, 1.52**
Pay for Nutritious Foods over last 12 months (vegetables & fruit)			0.82	0.66, 1.01
Transportation				
Lack of Transport for medical needs			1.21	0.89, 1.66
Lack of Transport over past 12 months			1.18	0.87, 1.57

Bolded Text= p≤0.05

JAMIE OLAPO, MD

T32 Postdoctoral Research Fellow

RESEARCH INTERESTS: Nutrition as preventative medicine for surgical diseases, integrative medicine, breast cancer and DCIS treatment

FACULTY MENTOR: David R. Flum, MD, MPH

MEDICAL SCHOOL: Medical College of Wisconsin

HOMETOWN: Hartland, WI

DISCUSSANT: Rhea Udyavar, MD

INVESTIGATION OF MEDITERRANEAN DIET TO PREVENT EPISODES OF DIVERTICULITIS (IMPEDE) PILOT TRIAL

Olapo JK, Strate LL, Comstock BA, Agrawal N, Liao JM, Mata-Diaz S, Mallon Andrews K, Morrow K, Fannon E, Lawrence S, Pullar KM, Schmicker R, Tveleneva A, Morenz A, Drewnowski A, Neuhouser M, Flum DR

BACKGROUND: Diverticulitis is one of the most common gastrointestinal causes of healthcare utilization and up to twenty percent of patients with diverticulitis will experience recurrence. There are no evidence-based, non-surgical interventions to prevent recurrence, but a Mediterranean diet (MD) has been proposed for secondary prevention given its anti-inflammatory benefits. We conducted a feasibility-focused pilot trial of a MD for recurrent diverticulitis.

METHODS: People with uncomplicated diverticulitis were randomized (2:1) to a Mediterranean-style diet intervention vs control (high-fiber diet 25-38 g/day). The intervention, MediForAll, was a free education program that provided meal planning support. Participants completed bi-weekly MD adherence surveys, received email/text "nudges", and dietitian counseling. Diet quality was assessed using a validated food frequency questionnaire and scored using the Alternative Healthy Eating Index (AHEI). Diverticulitis events and symptoms were self-reported and measured with the gastrointestinal quality of life index (GIQLI).

RESULTS: Of 110 patients approached, 61% (n=66) agreed to randomization (mean age 58 years, 62% female). There were 44 in the intervention and 22 in the control arm, with 97% completing 6–12-month surveys. MediForAll resulted in an increase in MEDAS score from 7 to 9 and in the AHEI from 68 to 73 at 6 months (score difference 7.1; 95% CI: –1.6 to 15.7). The cumulative risk of diverticulitis recurrence at one year in the MediForAll group was 32% vs 40% in the control arm (Figure 1). In a subset of patients with fecal calprotectin measured at baseline and at 6 months, there was a trend towards decreasing values among patients in the intervention arm and no change or increase in control patients.

CONCLUSIONS: Most patients were willing to be randomized, and the intervention increased adherence to a Mediterranean pattern diet over one year. Although not powered to evaluate clinical endpoints, there was signal the intervention reduced the risk of recurrent diverticulitis and improved symptoms compared to control This pilot trial supports a larger randomized trial designed to investigate clinical endpoints.

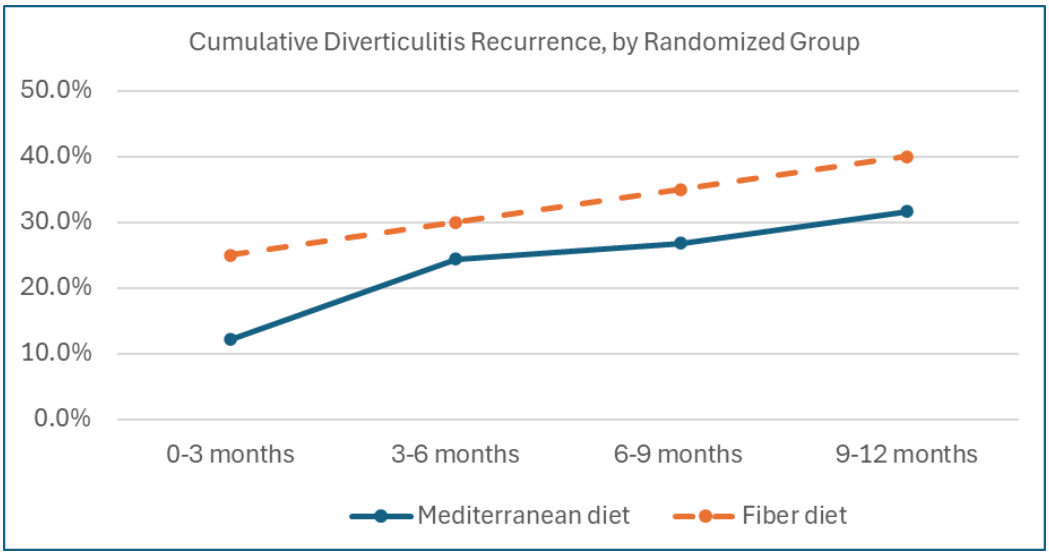

FIGURE 1. Cumulative diverticulitis recurrence between randomization groups over 12-months

DANIELLE J. EBLE, MD

Plastic Surgery Chief

RESEARCH INTERESTS: Gender-affirming surgery, medical ethics

FACULTY MENTOR: Shane D. Morrison, MD, MS

MEDICAL SCHOOL: Boston University School of Medicine

HOMETOWN: Saranac Lake, NY

DISCUSSANT: Giana H. Davidson, MD, MPH

IMPACT OF AGE ON LONG-TERM DECISIONAL REGRET AND SATISFACTION AFTER GENDER-AFFIRMING CHEST SURGERY

Eble DJ[1,2], Younoszai M[2], Nguyen AL[3], Tople T[4], Gopalan M[2], Wang X[5], Ettinger RE[1,2], Morrison SD[1,2,6]

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2 Division of Plastic Surgery, Department of Surgery, Seattle Children's Hospital, Seattle, WA
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*These authors contributed equally to this work

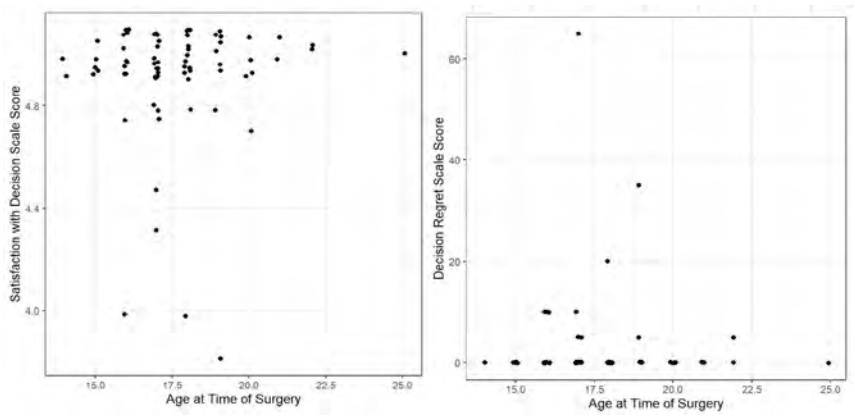
BACKGROUND: Many states have enacted legislative bans on gender-affirming surgery for transgender and gender-diverse (TGD) youth on the basis of procedural irreversibility and the potential for decisional regret or dissatisfaction.[1] While data demonstrate high satisfaction and low regret amongst TGD *adults* (≥ 18 years) undergoing gender-affirming chest surgery (GACS),[2] prior studies of TGD *youth* in this context have only evaluated medical interventions (e.g. puberty blockers, hormone therapy).[3] This study examines decisional satisfaction and regret amongst TGD persons undergoing GACS at <18 versus 18-26 years old.

METHODS: Assigned female at birth individuals who underwent GACS at Seattle Children's Hospital ≥1 year prior to survey were eligible. Patient-reported outcomes were collected using the Holmes-Rovner Satisfaction with Decision (SWD) Scale and the Decision Regret Scale (DRS). Higher SWD scores (1-5) represented increased satisfaction, whereas higher DRS scores (0-100) represented increased regret. Data analysis included descriptive statistics and Fisher's exact and Wilcoxon rank sum tests to compare participants aged <18 vs. 18-26 years. Three participants with highly discordant SWD and DRS scores (i.e. high regret and satisfaction *or* low regret and satisfaction) were excluded due to presumed reporting error.

RESULTS: 77 of 180 (42.8%) eligible patients completed the survey, 41 of which were <18 years old at time of surgery (53.2%). The majority of participants were white (n=50, 68.5%), male-identifying (n=56, 72.7%), and on testosterone at time of surgery (n=66, 91.7%). Median age at surgery amongst the adolescent cohort was 17 years [IQR 16.0-17.0] compared to 19 years [IQR 18.0-20.0] in the young adult cohort (p<0.001). There were no differences in median DRS scores (<18 years 0.0 [0.0-0.0] *vs* 18-26 years 0.0 [0.0-0.0], p=0.44) or SWD scores (<18 years 5.0 [5.0-5.0] *vs* 18-26 years 5.0 [5.0-5.0], p=0.66) (Figure 1).

CONCLUSIONS: TGD adolescents and young adults both demonstrate high satisfaction and low regret following GACS.

FIGURE 1: Distribution of Satisfaction with Decision and Decision Regret Scale Scores by Participant Age.



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ALEXANDRA H. HERNANDEZ, MD, MCR

T32 Postdoctoral Research Fellow

RESEARCH INTERESTS: Trauma outcomes, social determinants of health, limited English proficiency

FACULTY MENTOR: John W. Scott, MD

MEDICAL SCHOOL: Oregon Health and Science University

HOMETOWN: Los Angeles CA

DISCUSSANT: Deepika Nehra, MD

FINANCIAL CONCERNS AMONG INJURY SURVIVORS: A THEMATIC ANALYSIS OF THE PSYCHOSOCIAL IMPACT OF FINANCIAL HARDSHIP

Alexandra Hernandez MD MCR, Wen Ting Yang MD, Nina M. Clark MD MS, Elizabeth Buhler BS, Deepika Nehra MD, Barclay Stewart MD PhD, Saman Arbabi MD, Eileen Bulger MD, Doug Zatzick MD, and John W Scott MD MPH

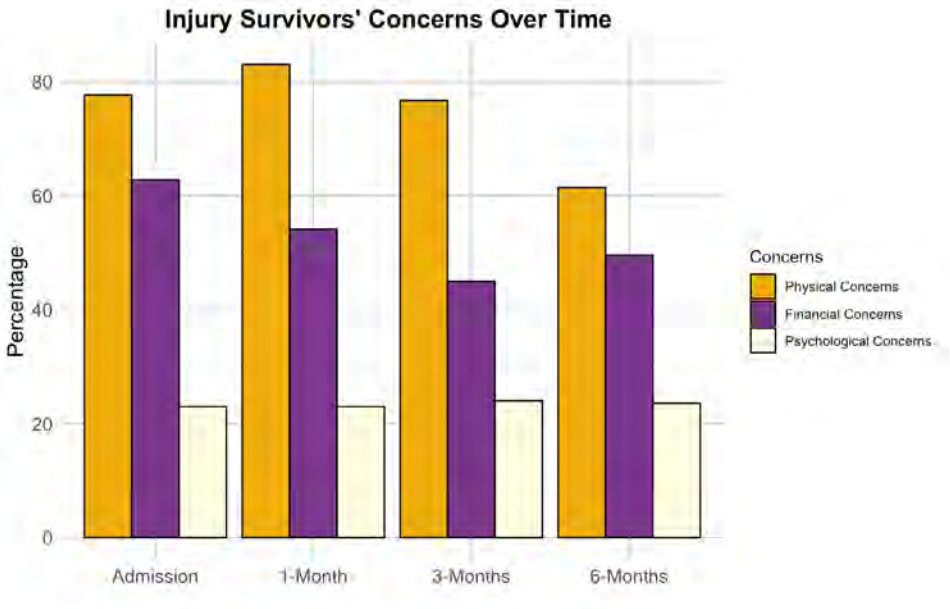
BACKGROUND: Financial hardship is common and contributes to poor outcomes among injured patients. However, development of patient-centered interventions to mitigate financial hardship is limited by a poor understanding of patients' subjective experience.

METHODS: We performed a secondary analysis of the Trauma Survivors Outcomes and Support Trial (2014-2016) which used open-ended interviews to elicit concerns from patients at risk for posttraumatic stress disorder at the time of admission. Patients were asked "Of all the things that have happened to you since you were injured, what concerns you the most?" Those initially reporting ≥3 concerns were included in a longitudinal cohort and were asked the same question at 1-, 3- and 6-months post-injury. Interview transcripts were coded for financial concerns with a deductive thematic analysis approach. Financial concerns included medical or nonmedical bills, income or work loss, future financial worries, and cost-related care delays. Descriptive statistics were used to evaluate financial concerns and representative quotes were identified for each type of financial concern.

RESULTS: A total of 243 patients were interviewed at admission, and 58% reported at least one financial concern (most commonly medical bills and income loss). Among the 151 patients in the longitudinal cohort, 82% experienced at least one financial concern during the full 6-month study period. At every timepoint, concerns about financial health were similar in magnitude to physical health and more common than mental health (Figure). Income concerns were disproportionately elevated among adults <65 compared to ≥65 (43% v. 14%, p=0.002).

CONCLUSION: In open-ended interviews the majority of injury survivors expressed financial concerns which began as early as the time of admission. Income loss and medical debt are common concerns after injury, with income loss concerns having greatest impact among working-age adults. Interventions targeting financial concerns form a critical part of patient-centered care of injury survivors.

FIGURE. Physical, Financial, and Psychological Concerns After Injury in the Longitudinal Cohort



Author's Interpretation: Financial concerns were the second most common concern category at every timepoint after injury, nearly reaching physical recovery concerns and above psychological concerns.

Financial concerns were different from both physical recovery and psychological concerns at every time point, p<0.05.

SHEELA R. DAMLE, MD, PHD

Hematology/Oncology Fellow

RESEARCH INTERESTS: Pancreatic cancer, tumor immunology, dendritic cells

FACULTY MENTOR: Venu Pillarisetty, MD

MEDICAL SCHOOL: Virginia Commonwealth University

HOMETOWN: Grand Forks, ND

DISCUSSANT: Jeremy Sharib, MD

INTRATUMORAL THREE-CELL-TYPE CLUSTERS REPRESENT A CONSERVED FEATURE OF EFFECTIVE ENDOGENOUS ANTI-TUMOR IMMUNITY

Damle SR[1,2,#], Carter JA[3,#], Pineda JMB[4], Goodsell KE[3], Jiang X[3], Dickerson LK[3], Mudd JL[5], Walsh T[5], Vij KR[6], Ruzinova MB[7], Akilesh S[8], Fields RC[5,9], Crispe IN[3,8,10], Pillarisetty VG[3]

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[6] Department of Medicine, Division of Oncology, Washington University School of Medicine, St. Louis, MO, USA
[7] Department of Pathology and Immunology, Washington University School of Medicine, St. Louis, MO, USA
[8] Department of Laboratory Medicine and Pathology, University of Washington, Seattle, WA, USA
[9] Siteman Cancer Center, Washington University School of Medicine, St. Louis, MO, USA
[10] Department of Immunology, University of Washington, Seattle, WA, USA

[#] Equal contribution

BACKGROUND: Effective anti-tumor immunity hinges on the priming and activation of tumor-specific cytotoxic $CD8^+$ T cells; however, these intratumoral cell-cell interactions are not well understood. The temporospatial co-localization of dendritic cells (DCs), $CD4^+$ T cells (Th), and $CD8^+$ T cells (CTL) within the tumor immune microenvironment have recently been shown to influence response to immune checkpoint blockade.

METHODS: We applied a novel technique for spatial co-localization on published spatial transcriptomics and proteomics datasets to identify three-cell-type clusters. We also utilized a large tissue microarray of pancreatic cancer with associated clinical data to determine the clinical significance of three-cell-type clusters on patient outcomes.

RESULTS: We demonstrated that these three-cell-type clusters, or immune triads, are commonly found in multi-omic spatial datasets from several immunotherapy-naïve solid tumor types, including pancreatic ductal adenocarcinoma (PDAC). These intratumoral triads are enriched in mregDC, $CXCL13^+$ Th, and $GZMK^+PD\text{-}1^+$ CTL signatures, suggesting functional consequences of cluster participation. Using multiplex immunohistochemistry with a large tissue microarray, we identified three-cell-type clusters in 499 of 553 (90%) primary PDAC tumors that did not receive neoadjuvant immunotherapy. Intriguingly, increased density of DC:Th:CTL and DC:Th clusters were correlated with significantly improved overall survival, while DC:CTL and DC:Th dyads, as well as individual cell type densities, were not.

CONCLUSIONS: Overall, these findings provide strong evidence for the presence of three-cell-type clusters across tumor types independent of immunotherapy and highlight their incompletely understood role in driving endogenous anti-tumor immunity.

ARJUNE DHANEKULA, MD

Research Resident

RESEARCH INTERESTS: Aging biology and aortic disease

FACULTY MENTOR: David Marcinek, PhD - Deptartments of Radiology and Lab Medicine and Pathology

MEDICAL SCHOOL: Wayne State University

HOMETOWN: Detroit MI

DISCUSSANT: John Dimarakis, MD, PhD

MITOCHONDRIAL DYSFUNCTION IS A DRIVER OF SENESCENCE AND AGE-RELATED DISEASE IN THE THORACIC AORTA

Dhanekula AS, Harrison B, Stuppard R, Matson-Hughes A, DeRoo SC, Burke CR, Hwang B, Mulligan MS, Pal JD, Marcinek DJ

BACKGROUND: Aging results in both increased stiffness and weakness in the thoracic aorta, increasing the risk of heart failure, hypertension, aortic aneurysm, and aortic dissection. Mitochondrial dysfunction and senescence are classic hallmarks of aging and have been shown to contribute to age-related disease in multiple organs. However, their respective roles in aortic aging are not well understood. We hypothesize that mitochondrial dysfunction and senescence work synergistically to drive age-related aortic dysfunction, and intervening upon this interaction can improve aortic biology in an age-dependent manner.

METHODS: Young (6-8 month) and aged (25-27 month) C57Bl/6NIA mice received either no treatment (NT) or the mitochondrial-targeted therapeutic Elamipretide (ELAM; SS-31) at 3mg/kg via subcutaneous pump for 8 weeks. Mice underwent pre- and post-treatment echos and blood pressure readings. Aortas were harvested for analysis at 8 weeks and taken for either histology, live respirometry via the Oxygraph 2k respirometer, or RNA analysis.

RESULTS: The aged aorta has a significant increase in elastin breaks, increased expression of senescent markers, and decreased complex II-linked cellular respiration ($p<0.05$) (Figure 1A). Treatment with ELAM restores complex II-linked respiration to values seen in young mice, while also improving maximal respiration and respiratory efficiency ($p<0.05$) (Figure 1A). Bulk RNAseq analysis revealed that ELAM treatment significantly affects the aortic transcriptome in an age-dependent manner, altering mitochondrial-related transcription, improving inflammatory expression, and greatly reducing senescent expression ($p<0.0001$) (Figure 1B-C). Histologically, this corresponds to a significant reduction in elastin breaks, suggesting an improvement in aortic compliance with ELAM treatment ($p<0.05$) (Figure 1D).

CONCLUSIONS: Mitochondrial dysfunction drives senescent and age-related changes in the thoracic aorta. Targeting mitochondrial bioenergetics results in an age-specific improvement in aortic biology, corresponding to reduced senescence, tempered inflammation, and improved histologic architecture. Mitochondrial therapeutics are thus a promising avenue for translational research in age-related aortic disease.

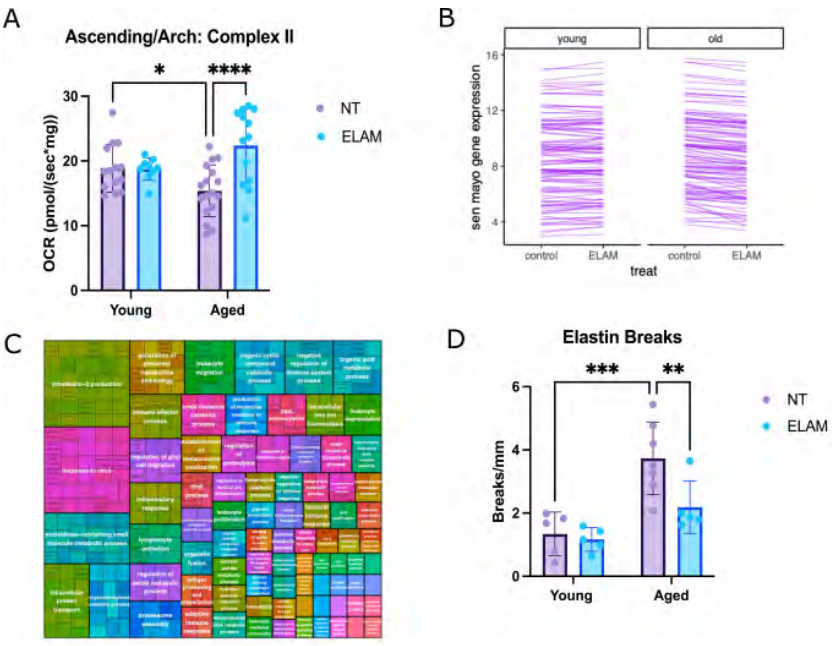

FIGURE 1: ELAM treatment of the aged aorta results in improved complex II function (A), reduced senescent burden (B), altered metabolic and inflammatory pathways (C), and reduced elastin breaks (D).

NIKKI P. THRIKUTAM, MD, MPH

Plastic Surgery Chief

RESEARCH INTERESTS: Burn and trauma reconstruction, limb salvage

FACULTY MENTOR: Barclay Stewart, MD, PhD, MPH

MEDICAL SCHOOL: University of Texas Southwestern Medical School

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DISCUSSANT: Dylan Jason, MD

HAND BURN INJURIES AND OCCUPATIONAL IMPAIRMENT: A STUDY ON THE IMPACT OF BURN INJURIES ON RETURN-TO-WORK OUTCOMES FROM THE BURN MODEL SYSTEM RESEARCH PROGRAM

Thrikutam NP [a,b], Kopp CM[c], Orton C[a], Bamer AM[d], Schneider JC[e,f], Solis-Beach K[g], Kazis LE[e,f], Yenikomshian HA[h], Kowalske K[g], Stewart BT[a,c]

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BACKGROUND: Return to work (RTW) after burn injury is dependent on many variables including type and location of burn injury, access to care, and pre-injury mental and physical health. As prior studies were limited by small sample sizes, we aimed to use a large database to explore the associations between hand burn severity, functional hand outcomes, and RTW post-injury.

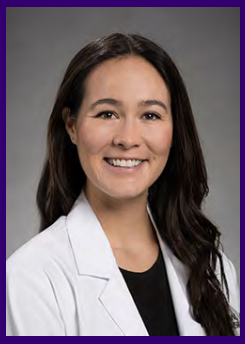
METHODS: Data from a multicenter prospective longitudinal study were analyzed. Adults with burn injuries were classified into 5 groups ranking in severity of hand injury: (0) no hand burns, (1) single hand burn no grafting, (2) bilateral hand burn no grafting, (3) single hand burn requiring grafting, (4) bilateral hand burn requiring unilateral graft, (5) bilateral hand burn requiring bilateral grafts. Grafting was used as a proxy for burn severity. Self-reported employment status, Patient-Reported Outcomes Measurement Information System (PROMIS) Upper Extremity (UE) scores, and requests for work accommodations were collected at discharge, 6-, 12-, and 24-months post-injury. Descriptive statistics and analysis of variance (ANOVA) were completed to examine outcomes.

RESULTS: A total of 4,621 participants met inclusion criteria. Group 5, those with most severe burns, had significantly longer RTW times than Groups 0-3 ($p < 0.005$). At 6 months, the mean PROMIS UE scores for grafted groups (Group 3, 40.6; Group 5, 35.4) were significantly worse than non-grafted groups (Group 1, 46.8; Group 2, 45.0; ($p < 0.0001$). At every time point, the majority of respondents did not request accommodations for their injuries from their employers, regardless of severity.

CONCLUSION: Hand burn severity plays a significant role in both RTW function. The lack of correlation between burn severity and request for work accommodations hints at the baseline vulnerability of these populations. These findings suggest a need for systematic improvements in the way these patients are cared for and re-integrated into the workforce.

MALIA A. BRENNAN, MD
General Surgery R4

RESEARCH INTERESTS: Rural health disparities, indigenous health, women's health
FACULTY MENTOR: Sara H. Javid, MD
MEDICAL SCHOOL: University of Hawaii
HOMETOWN: Honolulu, HI
DISCUSSANT: Claire Buchanan, MD



SURGERY, SURVIVAL, AND DISEASE PROGRESSION FOR HER2+ METASTATIC BREAST CANCER

Brennan MA; Palmquist E; Fleuret S; Gwin WR; Schmicker RH; Javid SH

BACKGROUND: Randomized controlled trials have shown locoregional therapy in de novo metastatic breast cancer (MBC) does not appear to improve survival but may improve local control. The objective of this study was to examine if surgery was associated with survival or disease progression advantage for patients with de novo HER2+ MBC.

METHODS: We performed an institutional retrospective review of de novo stage IV HER2+ breast cancer patients (2011-2023). The data collected included patient demographics, clinical staging, histologic subtype, number of metastases, systemic therapy regimens, breast and axillary surgery, survival and progression outcomes. Unadjusted logistic regression was used to determine associations between surgery and disease progression. Survival analyses (Kaplan-Meier and Cox regression) were used to examine the association between surgery and survival.

RESULTS: 99 patients were identified. The median age was 51 years. Sites of metastatic disease included bone 48.5%, lymph nodes 35.4%, liver 32.3%, lung 22.2%, and brain 6.1%. 44.4% of patients underwent surgery. Of these, 72.7% underwent mastectomy and 27.3% lumpectomy. Indications for surgery included curative intent (45.5%) and local control (36.4%). Prior to surgery, there were similar rates of local disease progression in "no surgery" vs "surgery" groups (25.6% vs. 36.6%, p=0.28). Patients undergoing surgery had reduced distant disease progression as compared to no surgery (40.0% vs 60.0%, p=0.06), but there was no significant difference in local disease control (15.0% local progression after surgery vs 25.6%, p=0.24). Those undergoing surgery appeared to have improved median survival vs those without surgery, (>150mo vs 47.9mo (HR: 0.19, 95% CI, 0.09-0.40)), although this was not statistically significant.

CONCLUSION: Surgery was not associated with significant improvement in survival or local disease control compared systemic therapy alone in HER2+ MBC. The observed improved distant disease control in those undergoing surgery likely reflect a selection bias to offer surgery in patients with more favorable response to systemic therapy.

NZUEKOH N. NCHINDA, MD

Pediatric Surgery Research Fellow

RESEARCH INTERESTS: Health outcomes, quality and improvement, health policy

FACULTY MENTOR: David H Rothstein, MD, MS

MEDICAL SCHOOL: The University of Chicago Pritzker School of Medicine

HOMETOWN: Oak Creek, WI

DISCUSSANT: Patrick J. Javid, MD

LONG-TERM OUTCOMES OF NEONATAL INTESTINAL ATRESIA AND MALROTATION REPAIR

Nchinda NN, Kamineni DP, Rothstein DH

BACKGROUND: Intestinal atresia and malrotation are congenital anomalies that increase morbidity and mortality in newborns. There is a lack of literature on post-surgical complications beyond the first few months of life. The purpose of this study is to assess long-term complications of surgical repair for neonatal intestinal atresia and malrotation.

METHODS: This is an IRB-approved retrospective review of electronic medical records of neonates diagnosed with intestinal atresia and/or malrotation, who received surgical management at a tertiary, free-standing children's hospital from 1999-2019. Demographic factors and clinical factors were assessed with descriptive statistics. Age is represented as median [range]. Statistical significance is defined as $p<0.05$.

RESULTS: There were 124 neonates included. Median gestation age was 37 [22, 42] weeks, median age at diagnosis was 2.0 [0, 28] days, and most recent median age was 8.0 [1.0, 16] years. There were 86 neonates (69%) with malrotation only, 24 (19%) with intestinal atresia only and 14 (11%) with both malrotation and intestinal atresia. Comorbid congenital conditions included congenital heart disease (30, 24%), heterotaxy/situs inversus (23, 19%), gastroschisis (6, 4.8%), and omphalocele (3, 2.4%). Eighteen neonates (15%) had stoma creation; nearly all had stoma reversal (17, 94%). Eleven neonates (8.9%) developed intestinal failure. Eighteen patients (15%) developed small bowel obstructions (SBOs), triple the incidence of the general pediatric population. Most SBOs occurred within the 15-month post-operative period and none in adolescence (Figure). Most SBOs had surgical management (11, 61%), the majority of which were enterolysis (7, 64%) or anastomotic revision (2, 18%). Bowel resection, intestinal failure and SBO were each significantly associated with increased hospitalizations following index admission ($p<0.05$).

CONCLUSIONS: Neonates who underwent surgical repair of intestinal atresia or malrotation had increased incidence of intestinal failure and small bowel obstruction, with most occurrences in early childhood. The majority of bowel obstructions required further surgical intervention.

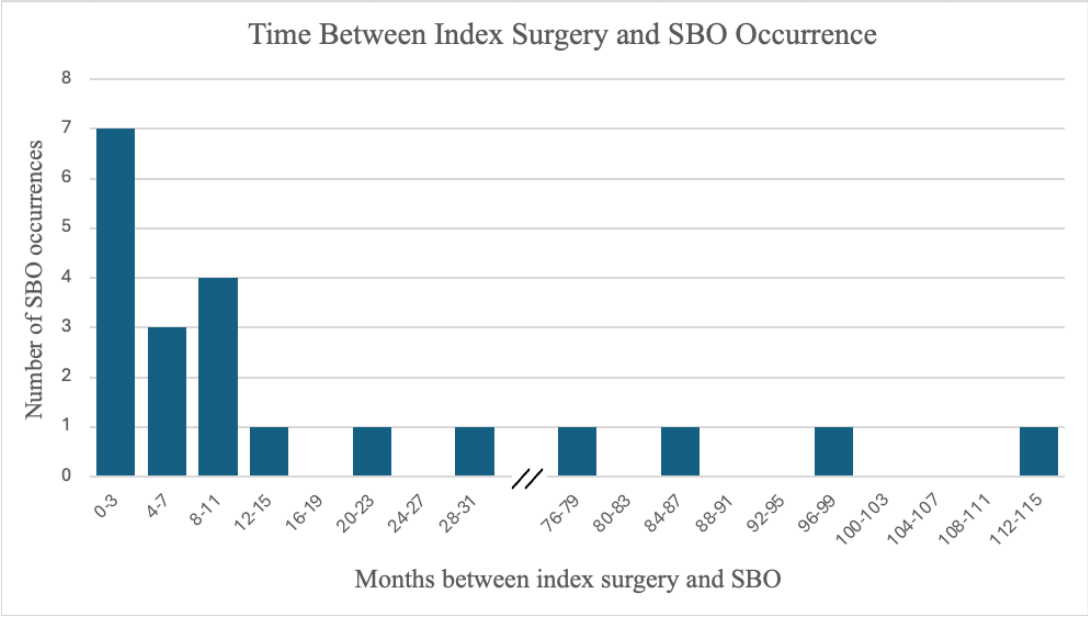


FIGURE | Duration of time (months) between index surgery for intestinal atresia or malrotation and occurrence of small bowel obstruction (SBO). Of the total 124 patients, 18 patients had later SBO. One patient had two SBO occurrences, another had three SBO occurrences. The majority of SBO occurrences were in early childhood and extended into late childhood.

BLAKE E. MURPHY, MD

T32 Postdoctoral Research Fellow

RESEARCH INTERESTS: Complex aortic disease, limb salvage, health outcomes, quality improvement

FACULTY MENTOR: Sara Zettervall, MD, MPH

MEDICAL SCHOOL: Loyola University Stritch School of Medicine

HOMETOWN: Chicago, IL

DISCUSSANT: Elina Quiroga, MD, MPH

DESCRIPTIVE SUMMARY OF GENETIC TESTING PRACTICES FOR PATIENTS WITH AORTIC DISEASE AT A TERTIARY ACADEMIC CENTER

Murphy BE, Sorber R, DeRoo S, Burke C, Beyers P, Otto C, Buber Y, Smith MC, Dansey KD, Sweet MP, Zettervall SL.

BACKGROUND: Despite important implications for the medical and surgical management of aortic aneurysm and dissection, the rate of genetic aortopathy and mutation type remains poorly described. This study aims to describe the frequency and type of genetic mutations, and differences in aortic pathology following implementation of standardized testing protocols within a multidisciplinary thoracic aortic program.

METHODS: Routine genetic testing was standardized in January 2023, offered to patients less than 70 years old at index presentation, or those with a first-degree relative with a history of aortic aneurysm, dissection, or sudden unexplained death. The rate of positive testing and specific genetic mutations were described. Demographics, operative indication, index aortic pathology, diseased aortic segment, and type of aneurysm or dissection were assessed.

RESULTS: 247 patients underwent genetic testing from January 2023 to November 2024; 52 (21%) had a mutation identified. 33 (65.4%) patients had TGF-beta signaling mutations, followed by smooth muscle mutations (19.2%), collagen mutations (9.7%), and dual or BGN mutations (5.7%). Fibrillin mutations were most common (27%), followed by Loeys Dietz syndrome (17.2%), MYLK mutations (11.5%), vascular EDS (9.6%), and ACTA2 mutations (9.6%). Patients with positive testing were younger (49.8 vs. 58.2 years, $p < 0.01$) and more likely to undergo surgery (80.8% vs. 62.6%, $p = 0.01$). Women accounted for 42.3% of patients with positive testing, and 28.4% without. There were no differences in operative indication although dissection accounted for 42.3% of index pathology for patients with positive testing and 33% for those without. There were no differences in diseased aortic segment, or type of aneurysm or type of dissection.

CONCLUSIONS: Positive genetic testing occurs in 20% of patients with aortic pathology referred for surgical evaluation. Given the impact of genetic aortopathy on medication management, threshold for repair, and operative approach, genetic testing should be offered uniformly to all patients.

TABLE 1. Mutations documented in modern cohort genetic aortopathy patients (n = 52)	
TGF-beta signaling mutations (65.4%)	
Fibrillin mutations (FBN1, FBN2)	14 (26.9%)
Loeys-Dietz (TGFBR1, TGFBR2, TGFB2, SMAD3, SMAD6)	9 (17.2%)
LOX	1 (1.9%)
LTBP3	2 (3.8%)
MYLK	6 (11.5%)
SKI	2 (3.8%)
Collagen Mutations (9.7%)	
Vascular Ehlers Danlos Syndrome (COL1A1, COL3A1, COL4A2, COL4A4, COL5A2)	5 (9.6%)
Smooth Muscle Mutations (19.2%)	
ACTA2	5 (9.6%)
MYH11	4 (7.8%)
MED12	1 (1.9 %)
Dual Mutations (3.8%)	
ADAMTS/PRKG1	1 (1.9 %)
MYH11/NOTCH1	1 (1.9 %)
Other Mutations (1.9%)	
BGN VUS	1 (1.9%)

SARAH E. RUDASILL, MD

F32 Postdoctoral Research Fellow

RESEARCH INTERESTS: Lung cancer diagnostics, treatment selection, and patient-centered outcomes

FACULTY MENTOR: Farhood Farjah, MD, MPH

MEDICAL SCHOOL: UCLA David Geffen School of Medicine

HOMETOWN: New Oxford, PA

DISCUSSANT: Meghan R. Flanagan, MD, MPH, FACS

FACTORS ASSOCIATED WITH BENIGN LUNG RESECTIONS

Rudasill SE, Wood DE, Farjah F

BACKGROUND: The rate of benign nodule resection in lung cancer screening trials averages 20%. At the national level, rates outside the trial setting are insufficiently characterized. We hypothesized that rates are lower over time and with specialist care but are higher in patients at lower risk of lung cancer (e.g., younger age without current tobacco use or without chronic obstructive pulmonary disease [COPD]).

METHODS: Using the American College of Surgeons National Surgical Quality Improvement database, we conducted a cohort study (2016-2022) of adults who underwent elective lung resection, excluding those with pulmonary metastases or interstitial lung disease. The primary outcome was diagnosis of lung cancer (or not). We used multivariable regression to evaluate for associations between pre-specified factors and the rate of benign nodule resection.

RESULTS: Among 37,874 patients—median age 67 years, 58% women—15% underwent benign nodule resection. From 2016 to 2022, benign resection rates decreased from 18% (95%CI 17–19%) to 15% (95%CI 14–16%). Rates were highest for those ≤50 years (37% [95% CI 35–39%]) and lower with increasing age: 51-60 years: 21% (95%CI 20–22%); 61-70 years: 14% (95%CI 14–15%); 71-80 years: 11% (95%CI 11–12%); and >80 years: 10% (95%CI 9–11%). Benign resections occurred more frequently in patients without current tobacco use (17% [95%CI 16–17%] versus 12% [95%CI 12–13%]) and without severe COPD (17% [95%CI 16–17%] versus 11% [95%CI 11–12%]). In multivariable analysis, younger age, absence of current tobacco use or severe COPD, and earlier operative year were associated with a higher risk of benign nodule resection, whereas surgeon specialty was not (Table 1).

CONCLUSIONS: Rates of benign nodule resection outside the trial setting varied in expected and unexpected ways, informing the development of a selective approach to utilizing existing interventions that can mitigate unnecessary surgery.

TABLE 1. Multivariable Logistic Regression for Factors Associated with Benign Nodule Resection

	Odds ratio	95% confidence interval	
Age (years)			
≤50	5.86	4.97	6.90
51-60	2.83	2.43	3.29
61-70	1.79	1.55	2.07
71-80	1.28	1.10	1.48
>80	Reference		
Gender			
Female	Reference		
Male	1.15	1.09	1.22
Smoking status			
Current tobacco use	Reference		
Former/never tobacco use	1.56	1.46	1.67
Severe COPD			
Yes	Reference		
No	1.27	1.17	1.37
Surgeon specialty			
Thoracic	Reference		
Cardiothoracic	1.06	0.82	1.37
General Surgery	1.02	0.90	1.16
Operative year	0.97	0.95	0.98

VIVIAN HSAIO, MD

CVES Research Fellow

RESEARCH INTERESTS: AI, surgical technology, foregut pathophysiology, quality of life
FACULTY MENTOR: Andrew S. Wright, MD
MEDICAL SCHOOL: Brown University
HOMETOWN: Saratoga, CA
DISCUSSANT: Saurabh Khandelwal, MD

AI-ASSISTED VIDEO ANALYSIS FOR EVALUATING ERGONOMIC STRAIN IN ROBOTIC SURGEONS: PILOT STUDY FROM THE SAGES ERGONOMIC TASK FORCE

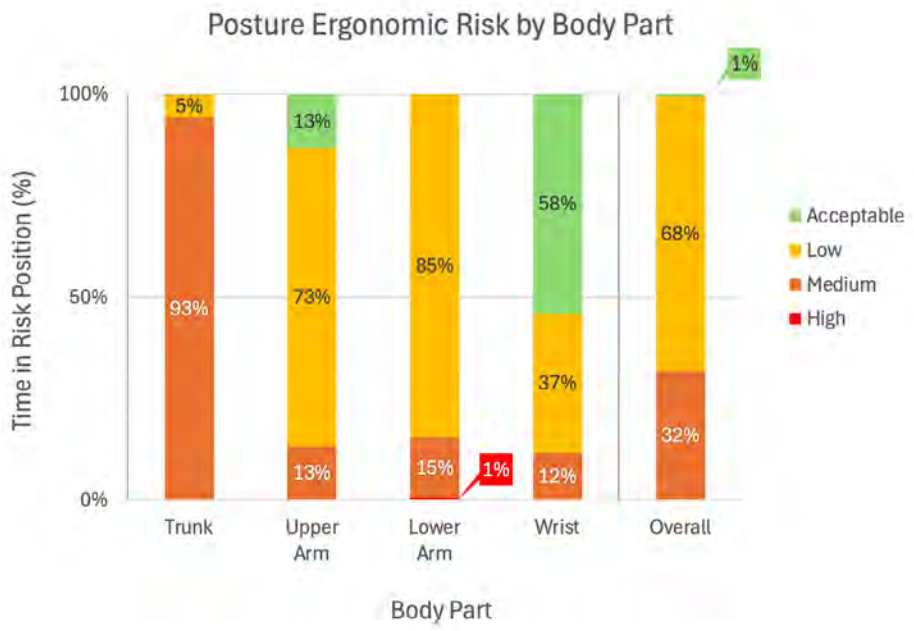
Hsiao V, Keller DS, Zhang IY, Parmar A, Narula N, Wright AS

BACKGROUND: Most surgeons experience work-related pain and musculoskeletal injuries (WRMSI). Though robotic surgery has been speculated to reduce risk of WRMSI compared to open and laparoscopic approaches, the vast majority of robotic surgeons still experience neck, back, and upper extremity discomfort. Despite growing use of robot-assisted surgery (RAS), there is limited research on the ergonomic risks faced by robotic surgeons. This study aims to evaluate ergonomic strain during RAS.

METHODS: Artificial intelligence (AI)-assisted video analysis was used on a convenience sample of experienced faculty-level robotic surgeons to assess their positioning, practice, and pain. Participants completed 3 repetitions of a standardized simulated surgical task on the daVinci Xi robotic surgery console. Video recordings were analyzed using AI-assisted kinematic assessment software (TuMeKe Ergonomics, San Mateo CA). Validated subjective assessment tools and a general ergonomic practices questionnaire were calculated. Spearman's correlation coefficient evaluated the relationship between the time spent in medium-to-high-risk ergonomic positions and the corresponding reported discomfort.

RESULTS: The 5 participants were a mean 50.7 years old, 60% female, and performed mean 3.5 robotic cases weekly. The average RULA score was 5.2 (SD 0.84), exceeding the "acceptable" threshold of 2. The trunk had the worst objective posture score (3/6), and participants spent 32% of the operative time in overall medium- to high-risk positions. There was high correlation between reported low back discomfort and the time the trunk spent in medium-to high-risk positions (r=0.90, p=0.04).

CONCLUSIONS: Using AI-guidance and validated ergonomic scales demonstrated that ergonomic strain is high even in experienced robotic surgeons. Pain was reported after only 30 minutes of simulated surgical tasks. The degree of pain correlated directly with time spent in high-risk positions. This proof-of-concept pilot study highlights the potential of AI-assisted video analysis to identify high-risk ergonomic postures, providing valuable insights for planning future studies and effective interventions.



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The Helen and John Schilling Lecture is an annual lecture 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 in honor of her husband, John.

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