ANNUAL RESEARCH DAY 2022

Thursday, May 5 2022

Tufts University | School of Medicine

BOSTON UNIVERSITY

St. Elizabeth's Medical Center
A STEWARD FAMILY HOSPITAL
Steward

Welcome Message

Dear Friends and Colleagues,

On behalf of the Research Day Planning Committee, welcome to the Annual Research Day of St. Elizabeth's Medical Center, a celebration of scientific and scholarly work conducted on campus and at Carney Hospital by interns, residents, and fellows enrolled in our Graduate Medical Education training programs and carried out in collaboration with faculty members.

A full schedule of events and all abstracts submitted can be found in the following pages. We are once again impressed by our trainees' interest in this event in 2022. A total of 70 abstracts were received: 32 original investigations, 14 quality improvement reports, and 24 clinical vignettes/case reports. We are so appreciative of the time and effort that our judges from St. Elizabeth's Medical Center and Tufts Medical Center have put into scoring these abstracts. During the course of the morning, you will have the opportunity to listen to oral presentations of the top scoring efforts.

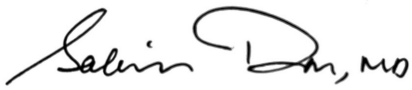
We are especially excited to be able once again hold parts of our Research Day in person as we transition to a hybrid format. With the cautious optimism that the worst of the COVID pandemic is in our rearview mirror, we can more fully appreciate the exploration of new frontiers in all fields of Medicine.

In many ways, the study of Psychiatry represents a kind of "final frontier" given the unique and exquisite complexity of the brain, and there has never been a more exciting time to pursue a career in psychiatric research. We are so fortunate to have our colleague and neighbor from Beth Israel Deaconess Medical Center, Dr. Daniel Press speak with us about his research career and particularly his work studying the effects of Transcranial Magnetic Stimulation in depression and other psychiatric conditions.

It is our hope that this day will not only give us the opportunity to celebrate the ongoing scientific and scholarly work but also promote research collaborations among trainees and faculty within and across departments. Thank you very much for being with us today. Enjoy the day!

Sincerely,

Jason Strauss, MD
Chair, Research Day Planning Committee



Sabrina Dar, MD
Co-Chair, Research Day Planning Committee

Program

May 05, 2022

7:30 – 7:45 a.m.

Welcome & Introduction – Hybrid *Zoom* and select in-person guests
Jason Strauss, MD
Chair, Research Day Planning Committee

7:45 – 8:30 a.m.

Keynote Speaker – Hybrid *Zoom* and select in-person guests
Daniel Z. Press, MD
Chief, Division of Cognitive Neurology
Associate Professor of Neurology, Harvard Medical School

8:30 – 10:05 a.m.

Oral Presentations – Hybrid *Zoom* and select in-person guests

1st Place Original Investigation
Daniel Smoot, DO
"Evaluating Propofol Induced Hypertriglyceridemia as a Risk Factor for Pancreatitis in Critically Ill Patients with COVID-19 Pneumonia: A Retrospective Multi-Centre Observational Study"

2nd Place Original Investigation
Grace Lassiter, MD
"Long-term rejection free renal allograft survival with Fc-modified anti-CD154 antibody monotherapy in nonhuman primates"

3rd Place Original Investigation
Roop Dutta, MD
"Left Atrial Appendage Velocities Associates with Increased Risk of Development of Atrial Fibrillation"

1st Place Quality Improvement Report
Mohamed Abdelazeem, MD
"Improving Cardiac Rehabilitation Referral Rates – A Quality Improvement Project at a Tertiary Cardiac Center"

2nd Place Quality Improvement Report
Michael Malkowski, MD
"Improving Care to Hospitalized Patients with Alcohol Use Disorder Managed on the Medical Service"

1st Place Clinical Vignette
Thomas Pomposelli, MD
"A case of pathologically confirmed streptococcal infection causing an IgA vasculitis with associated glomerulonephritis and leukocytoclastic dermal vasculitis"

10:05 – 10:15 a.m. **History of Psychiatry – Hybrid *Zoom* and select in-person guests**
Sabrina Dar, MD
Co-chair, Research Day Planning Committee
Chief Psychiatry Resident
PGY-4 Resident

10:15 – 10:25 a.m. **Presentation of Awards & Closing Remarks – Seton Auditorium**
Presented by Jason Strauss, MD
Chair, Research Day Planning Committee

10:25 – 11:15 a.m. **Poster Presentations – Seton Auditorium**

Judges Panel

Helen Kyomen, MD

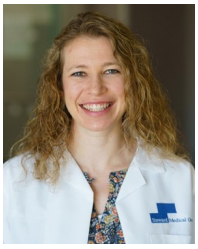
Helen H. Kyomen, MD, MS is a board-certified fellowship trained geriatric psychiatrist and clinical researcher. She graduated from the University of Southern California School of Medicine and completed her residency at the University of Hawaii. She completed geropsychiatry clinical and research fellowships at McLean Hospital, the Harvard Medical School Division on Aging, and the Harvard School of Public Health. She trained in epidemiology with a concentration in research design and biostatistics at the Harvard School of Public Health. She has made substantial contributions through teaching, research, clinical/administrative service and other professional activities. Dr. Kyomen's main clinical and research interests include affective and behavioral disturbances and geropsychiatric syndromes in elderly patients, and geriatric psychopharmacology.

Stephen Pinals, MD

Stephen Pinals MD is board certified from the American Board of Psychiatry and Neurology. Dr. Pinals graduated from the Robert Wood Johnson School of Medicine and subsequently completed his residency in Psychiatry at the Massachusetts Mental Health Center.

Michael Schoor, MD

Michael Schoor is a board-certified Anesthesiologist and Critical Care Physician. Dr. Schoor graduated medical school from the University of Miami and proceeded to complete residency in anesthesiology at University of Massachusetts. Dr. Schoor stayed at UMass for fellowship in ICU and critical care medicine. Dr. Schoor has research interests in medication errors, traumatic hip fracture, and the patients experience of the perioperative period. He enjoys teaching and mentoring and is currently developing a multidisciplinary simulation curriculum.



Ruth Schulman, MD

Dr. Schulman is board certified by the American Board of Internal Medicine in Nephrology and Internal Medicine. Dr. Schulman earned her medical degree from Tufts University School of Medicine in Boston, Mass. She completed her residency training in internal medicine at the University of Maryland Medical Center in Baltimore, MD, followed by fellowship training in nephrology at the Beth Israel Deaconess Medical Center in Boston, Mass.

Judges Panel (cont.)

Mark Conrad, MD

Dr. Conrad is board certified by the American Board of Vascular Surgery. Dr. Conrad graduated from the University of Michigan School of Medicine before completing his general surgery residency at Henry Ford Hospital in Detroit. Dr. Conrad stayed on as a research fellow studying critical care, trauma, and vascular surgery before perusing fellowship in vascular surgery at the Massachusetts General Hospital.

Lindsay Arnold, Pharm.D, BCPS

Dr. Arnold is the Director of Pharmacy Services and the PGY1 Residency Program Director at St. Elizabeth's Medical Center in Boston, Massachusetts. Dr. Arnold received her Doctor of Pharmacy degree from Northeastern University in Boston, Massachusetts. She then completed her Pharmacy Practice Residency at the University of Nebraska Medical Center followed by an additional residency in Adult Internal Medicine with an emphasis in Cardiology at Virginia Commonwealth University. Dr. Arnold has also served as a clinical specialist in internal medicine, cardiology and anticoagulation. Her research and quality improvement interests include the impact of patient education on hospital readmission, specifically in heart failure and myocardial infarction, venous thromboembolism prevention and management and transitions of care. She serves a reviewer for Pharmacotherapy, Annals of Pharmacotherapy, Endocrine Practice and Cardiovascular Therapeutics.

Ahmed Mohamed, MD

Dr. Ahmed Mohamed was born in Bryan, Texas and graduated from the school of medicine at Cairo University. He completed his residency at Brown University Program/ Kent Hospital where he was also chief resident during his final year of training. Dr Mohamed was the recipient of the early career investigator award from the AHA for his research on the association between lower heart rate variability and all-cause cardiac mortality. Dr. Mohamed has been at Saint Elizabeth's Medical Center for 2 years, serving as one of the core faculty and clinical assistant professor of Internal Medicine.

Yoav Golan, MD, MS, FIDSA

Associate Director, Clinical and Translational Research Center
Tufts CTSI
Associate Professor of Medicine, Tufts University School of Medicine

Dr. Golan is an infectious disease specialist whose research focuses on hospital-acquired infections, antibiotic resistance, MRSA, C. difficile infections, invasive fungal infections, and hospital epidemiology. He is a graduate of the Hadassah School of Medicine at the Hebrew University in Jerusalem, Israel. He completed a medicine residency and Infectious Diseases fellowship at the Tel Aviv Sourasky Medical Center, followed by a transplant ID fellowship and Masters in statistics and modelling at Tufts University School of Medicine.

Judges Panel (cont.)

David J. Greenblatt, MD

Louis Lasagna, MD, Endowed Professor, Department of Immunology
Professor of Psychiatry, Medicine, and Anesthesia
Tufts University School of Medicine
Special and Scientific Staff (Research), Tufts Medical Center

David J. Greenblatt, MD is the Louis Lasagna, MD, Endowed Professor at Tufts University School of Medicine, in the Department of Immunology (formerly the Department of Pharmacology and Experimental Therapeutics), and is a senior faculty member in the Graduate Program in Pharmacology & Experimental Therapeutics in the Graduate School of Biomedical Sciences at Tufts University. He also holds appointments as Professor of Psychiatry, Medicine, and Anesthesia, at Tufts University School of Medicine. He has previously served as Chair of the Department of Pharmacology and Experimental Therapeutics at Tufts University School of Medicine, Program Director and Associate Program Director of the institution's Clinical/Translational Research Center (formerly the General Clinical Research Center), and Chair of the Institutional Review Board. He is Editor-in-Chief of Clinical Pharmacology in Drug Development, operated by the American College of Clinical Pharmacology. He also is Co-Editor-in-Chief of the Journal of Clinical Psychopharmacology. Dr. Greenblatt is a Magna Cum Laude graduate of Amherst College. He obtained his medical degree from Harvard Medical School, and trained in internal medicine and clinical pharmacology at Massachusetts General Hospital. Dr. Greenblatt has been an active investigator in the area of molecular and clinical pharmacology. His PubMed listing includes more than 1000 publications; more than 780 of these represent original research reports. His work has been supported by the National Institutes of Health for more than 35 years.

Guest Speaker

Daniel Z. Press, MD

Chief, Division of Cognitive Neurology

Associate Professor of Neurology, Harvard Medical School

Dr. Daniel Press received his undergraduate degree in Biological Basis of Behavior from the University of Pennsylvania in 1987 and his medical degree from the University Of Connecticut School Of Medicine in 1993. Upon completion, He trained in Neurology at the Harvard Longwood Neurology Training Program and did fellowship training in both Behavioral Neurology (1997-1999) and Movement Disorders (1999-2000). With his board certification and his appointed title of Associate Professor in Neurology with Harvard Medical School – In 1999, Dr. Press was recruited to join the Cognitive Neurology Unit (CNU) at Beth Israel Deaconess Medical Center in which he serves as current Chief of the Division for the unit and is a member of the Parkinson's disease and Movement Disorders Center. Dr. Press's professional interest focuses on his clinical and researches that are in neurodegenerative conditions such as Alzheimer's disease, Parkinson's disease and Lewy Body diseases.

In addition, his projects include publications in these subjects and currently conducting research projects funded by the National Institutes of Health (NIH), the Harvard Center for Neurodiscovery, along with other supported foundations.

List of Winners and Honorable Mentions of Research Day 2022

Original Investigations

Winners:

1. Daniel Smoot, DO
   Department of Medicine
2. Grace Lassiter, MD
   Department of Surgery
3. Roop Dutta, MD
   Department of Cardiology

Honorable Mentions:

1. Eran Brauner, MD
   Department of Surgery
2. James Tasch, MD
   Department of Pulmonology
3. Asegul Bulut, MD
   Department of Medicine
4. Thomas Pomposelli, MD
   Department of Surgery
5. Nikolay Korchemay, MD
   Department of Medicine

Quality Improvement

Winners:

1. Mohamed Abdelazeem, MD
   Department of Medicine
2. Michael Malkowski, MD
   Department of Medicine
3. Matthias Bergmann, MD
   Department of Medicine

Honorable Mentions:

1. Tishena Lloyd, MD
   Department of Medicine
2. Danielle Levin, MD
   Department of Anesthesiology
3. Natalya Asipenko, Pharm. D, BCPS, BCCCP
   Department of Pharmacy
4. Kamil Dar, MD
   Department of Psychiatry
5. Thy Dang, MD
   Department of Medicine

Clinical Vignettes

Winners:

1. Thomas Pomposelli, MD
   Department of Surgery
2. Matthias Bergmann, MD
   Department of Medicine
3. Mayssam El Najjar, MD
   Department of Medicine

Honorable Mentions:

1. Christopher El Mouhayyar, MD
   Department of Medicine
2. Nur Ay, MD
   Department of Medicine
3. Huseyin Degirmenci, MD
   Department of Medicine
4. Sabrina Dar, MD
   Department of Psychiatry
5. Shree Ghanta, MD
   Department of Medicine

Original Investigation

1st Place

Evaluating Propofol Induced Hypertriglyceridemia as a Risk Factor for Pancreatitis in Critically Ill Patients with COVID-19 Pneumonia: A Retrospective Multi-Centre Observational Study

Daniel Smoot, DO; Nikolay Korchemny, MD; Aju Jose, MD; Allison Jones, PharmD, BCPS; Lori Lyn Price, MAS; Andrew Moraco, MD

Background: Patients with severe COVID-19 pneumonia are often hospitalized in the ICU requiring prolonged mechanical ventilatory support. Propofol is one of the most commonly used sedatives in the critical care setting. Hypertriglyceridemia, arbitrarily defined as triglyceride levels greater than 400 mg/dl, is a known complication of propofol infusion, and higher levels of triglycerides are known to be associated with pancreatitis. In our study we looked to identify a safe cut off for triglyceride levels as well as cumulative dosing of propofol in this patient population to minimize the risk of developing pancreatitis.

Methods: Utilizing our COVID-19 database from hospitals in the Steward Health Care Network we conducted a retrospective multi-center review to evaluate the instances of pancreatitis in critically ill patients with COVID-19 pneumonia who received propofol for sedation while intubated. We chart reviewed each patient and collected the following data: the number of days over which propofol was administered, cumulative dosage of propofol received, peak triglyceride levels, lipase levels, symptoms of pancreatitis and abdominal CT imaging consistent with pancreatitis. For the data analysis we used ROC analysis in conjunction with Youden's index to identify the optimal thresholds for propofol administration parameters and triglyceride levels that would offer maximal sensitivity and specificity for predicting pancreatitis.

Results: We reviewed 499 cases of COVID-19 pneumonia and found 154 patients that were on propofol for sedation for a sufficient period of time and also met other inclusion criteria. Among these we identified 6 cases of suspected pancreatitis based on elevated lipase levels of greater than 3 times the upper limit of normal. Using the ROC analysis and Youden's index we identified optimal cut-offs for peak triglyceride levels (688 mg/dl), number of days on propofol (4.5 days), Average daily propofol dose (3007 mg/day), cumulative propofol dose (24,113 mg) to indicate low risk of pancreatitis. The NPV for suspected pancreatitis for these cut-offs were found to be from 0.98 to 1.

Limitations: Few patients had abdominal CT imaging present, or documentation of abdominal discomfort so we based our cases of suspected pancreatitis on elevated lipase levels. We isolated very few cases of suspected pancreatitis which suggests a reassuring safety profile for propofol, however this also decreases the accuracy of the statistical tests used.

Conclusions: Our study suggests that patients who are found to have triglyceride levels less than 688 mg/dl, or that have been on propofol for less than 4.5 days, received less than 3007 mg of propofol per day or have received less than 24113 mg in total of propofol have a low risk of developing pancreatitis. While these results are encouraging, larger prospective studies with more confirmed cases of pancreatitis are still necessary to establish peak triglyceride and propofol infusion cutoffs for risk of developing pancreatitis.

Evaluating Propofol Induced Hypertriglyceridemia as a Risk Factor for Pancreatitis in Critically Ill Patients with COVID-19 Pneumonia: A Retrospective Multi-Centre Observational Study (cont.)

	Threshold	Sensitivity	Specificity	NPV	PPV
Peak Triglyceride Level (mg/dl)	688	0.67	0.82	0.98	0.13
Days on Propofol (up to peak triglyceride)	4.5	1.00	0.46	1.00	0.07
Average Propofol Dose (mg/day)	3007	1.00	0.35	1.00	0.06
Cumulative Propofol Dose (mg)	24113	0.83	0.67	0.99	0.09

Table 1. Shown are the optimal thresholds for peak triglyceride levels and propofol infusion parameters for predicting propofol induced pancreatitis in COVID-19 patients. These are calculated based on ROC curves using Youden's Index. The table also shows corresponding pre- and post-test probabilities.

Evaluating Propofol Induced Hypertriglyceridemia as a Risk Factor for Pancreatitis in Critically Ill Patients with COVID-19 Pneumonia: A Retrospective Multi-Centre Observational Study (cont.)

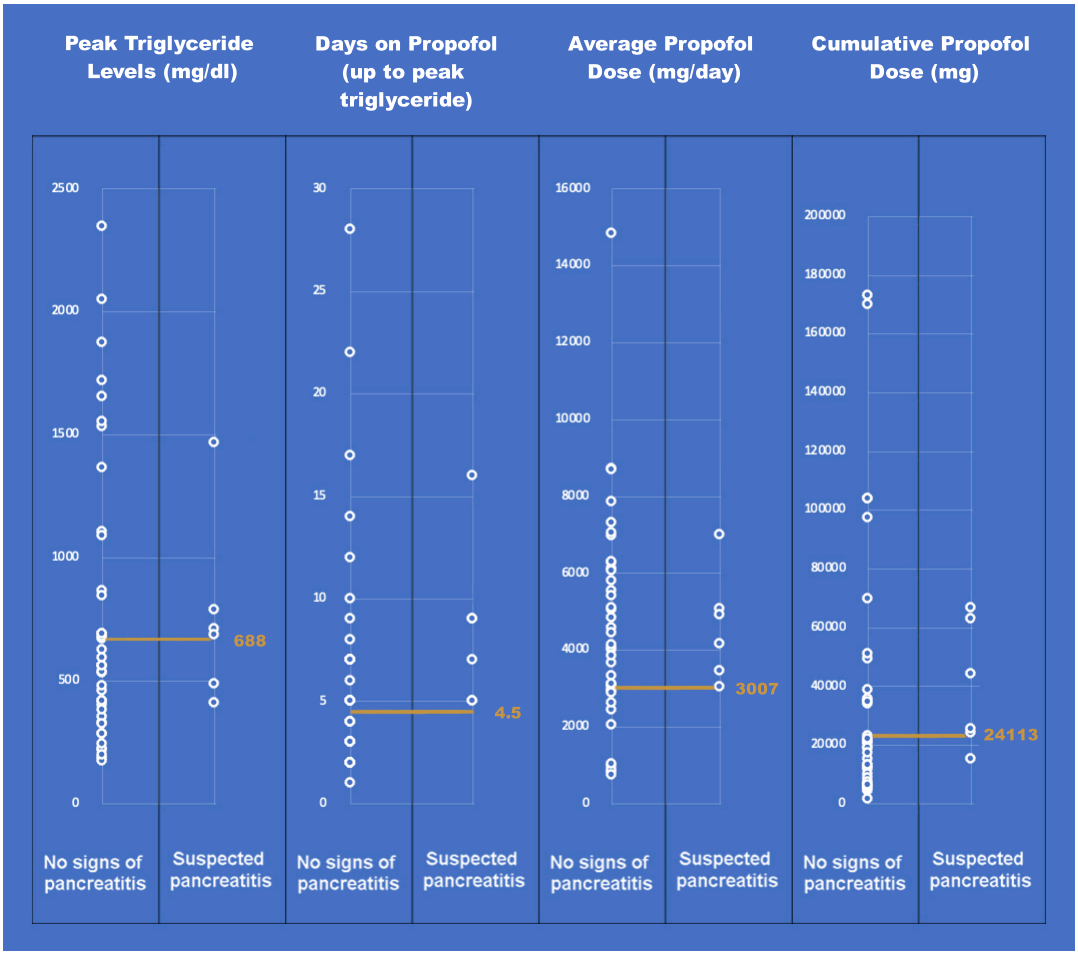


Table 2. Shown are dot plots in which the values for peak triglyceride levels and propofol infusion parameters are represented for each patient reviewed. For each parameter patients are divided into those with or without suspected pancreatitis. Optimal thresholds for predicting pancreatitis are marked and labelled in orange.

Original Investigation

2nd Place

Long-term rejection free renal allograft survival with Fc-modified anti-CD154 antibody monotherapy in nonhuman primates.

Grace Lassiter, Takayuki Hirose, Ashley D'Attilio, Ryo Otsuka, Ahmad Karadagi, Toshihide Tomosugi, Tatsuo Kawai

Background: Belatacept is currently an only FDA approved costimulatory blockade (CB) used as an alternative to calcineurin inhibitors in kidney transplantation. However, it has been associated with higher rates of acute cellular rejection (ACR) and more effective CB has been sought. Blockade of the CD154/CD40 pathway with anti-CD154 antibody (aCD154) has been shown to be more effective in inhibiting alloimmune responses than CTLA4Ig. Unfortunately, clinical application of aCD154 has been abandoned due to its thrombophilic property which appears to be mediated by FcγRIIA receptor–dependent platelet activation. To address this problem, an Fc-modified aCD154 (TNX-1500), in which Fc was engineered to decrease binding to Fcγ RII, has been developed. In the current study, we have evaluated TNX-1500 for its efficacy to prevent kidney allograft rejection in NHPs.

Methods: Twelve cynomolgus macaques received MHC mismatched kidney allografts with either TNX-1500 monotherapy (20mg/kg weekly) (Group A) or combined with daily mycophenolate mofetil (MMF) (TNX-1500 weekly for 6 weeks followed by every 2 weeks) (Group B). The results were compared with our historic results of no immunosuppression (No IS, n=5) or conventional immunosuppression (I.S.) with tacrolimus (Tac), MMF and methylprednisolone (Pred). (Conventional IS, n=20).

Results: Without any prophylaxis, no thromboembolic complication was observed in all nine recipients of TNX-1500. Renal allograft survival at 6 month was 80% in Group A (n=6). Histopathology at 6 months of 5/6 recipients showed no evidence of rejection (g0,i0,t0,v0,ptc0,cg0,ci0, ct0,cv0, C4d0). One recipient lost on day 28 with ACR2b. Six recipients have so far have been tested in Group B. Two recipients developed rejection on day 36 and 48 while they were still treated with weekly TNX-1500. Another recipient had to be euthanized on day 111 post-transplant due to complications from MMF. The three other recipients in this group are currently in progress with normal kidney function at days >180, >84 and >42. Renal allograft survival at four months in Conventional I.S. was 52% (p=0.33 vs. Group A) and all five recipients without I.S. rejected their kidney allografts by day 11 (p=0.0018 vs. Group A).

Limitations: Twelve cynomolgus macaques received MHC mismatched kidney allografts with either TNX-1500 monotherapy (20mg/kg weekly) (Group A) or combined with daily mycophenolate mofetil (MMF) (TNX-1500 weekly for 6 weeks followed by every 2 weeks) (Group B). The results were compared with our historic results of no immunosuppression (No IS, n=5) or conventional immunosuppression (I.S.) with tacrolimus (Tac), MMF and methylprednisolone (Pred). (Conventional IS, n=20).

Conclusions: Excellent renal allograft survival was achieved with TNX-1500 monotherapy without thromboembolic complications. Combination with MMF resulted in inferior allograft survival.

Original Investigation

Long-term rejection free renal allograft survival with Fc-modified anti-CD154 antibody monotherapy in nonhuman primates (cont.)

Table 1

Group	TNX-1500	MMF	Tac	Pred	Renal allograft survival (days)
A	weekly	-	-	-	>180,>180, >180, >180, >77, 28
B	weekly for 6 weeks, followed by every 2 weeks	daily	-	-	>180, >84, >42, 111, 36, 48
Conventional I.S.	-	daily	daily	daily	>120, >120, >120, >120, >120, >120, >120, >120, >120, >120, 114, 106, 84, 69, 68, 65, 55, 43, 27
No I.S.	-	-	-	-	11,10, 9, 9, 8

Table 1.

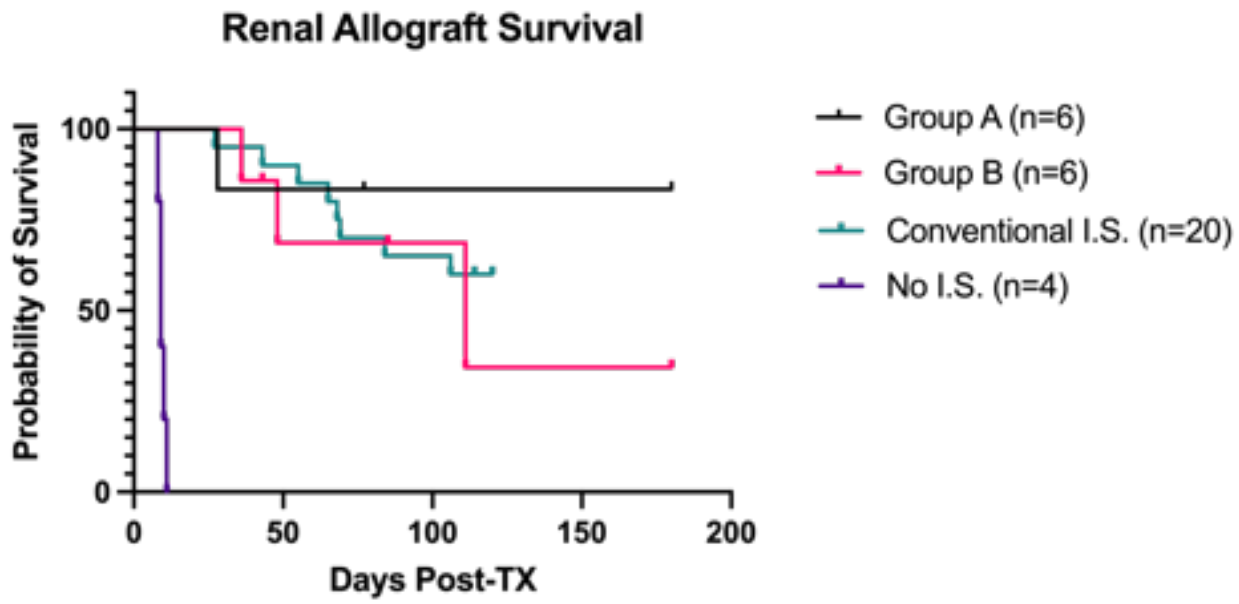
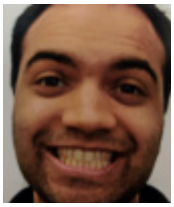


Figure 1.

Original Investigation

3rd Place



Left Atrial Appendage Velocities Associates with Increased Risk of Development of Atrial Fibrillation

Roop Dutta, Michael Johnstone

St Elizabeth's Medical Center Boston, MA

Background: Atrial Fibrillation is the most common arrhythmia in the United States affecting 3 to 6 million individuals and, due to an aging population, projected to reach 6 to 19 million by 2050. Atrial fibrillation is associated with substantial co-morbidities, most notably stroke and heart failure, arterial embolism and dementia. It is therefore important to assess predictive characteristics for the development of atrial fibrillation to prevent or reduce these clinical sequelae. One possible mechanism for the development of atrial fibrillation is decreased systolic function of the left atrium, though very difficult to measure echocardiographically. A surrogate for systolic left atrial function is left atrial appendage flow velocity. This can be obtained from transesophageal echocardiograms and is approximately 40 cm/s or greater in healthy patients who are in sinus rhythm. Low left atrial appendage peak velocity (less than 40 cm/s) in atrial fibrillation are associated with thrombus formation in the left atrial appendage and higher rate of thrombotic events. We investigated the association between the development of atrial fibrillation and left atrial appendage peak velocity in patients who are in sinus rhythm to determine if the presence of low atrial velocities predict the development of atrial fibrillation.

Methods: We identified 63 patients who had transesophageal echocardiograms with left atrial appendage peak velocity measurements done between 2016 and 2020 and did a retrospective cohort analysis, dividing patients into low Low left atrial appendage peak velocity (less than 40 cm/sec) and high Low left atrial appendage peak velocity (higher than 40 cm/s) and assessed for subsequent development of atrial fibrillation based on chart documentation. An IRB was submitted and accepted by STEMC. Two-tailed and one-tailed Z score testing was used to assess for statistical significance between groups. We excluded those with severe mitral stenosis, presence of infective endocarditis, presence of non-bacterial endocarditis, presence of cardiac fibroelastoma, and presence of cardiac lipoma.

Results: A total of 63 patients who had transesophageal echocardiograms were analyzed with 31 having Low left atrial appendage peak velocity of less than 40 cm/s and 32 having Low left atrial appendage peak velocity of greater than 40 cm/s. The proportion of those with Low left atrial appendage peak velocity less than 40 cm/s who developed atrial fibrillation was 77.4%; The proportion of those with Low left atrial appendage peak velocity more than 40 cm/s who developed atrial fibrillation was 28.1% ($p < 0.001$). The odds ratio was 8.77.

Limitations: Limitations of this study include small sample size, some differences in baseline characteristics (e.g. lower left atrial velocity patients are more likely to have systolic heart failure), and lack of analysis assessing for a temporal relationship between lower left atrial appendage velocities and development of atrial fibrillation. Finally, this study was limited by chart review and the study was not prospective in nature.

Conclusions: We conclude that lower left atrial appendage velocities are associated with a greater risk of developing atrial fibrillation in patients with normal sinus rhythm. Future directions include enrolling more patients, to stratify based on specific Low left atrial appendage peak velocity LAAV (e.g. distinguishing between Low left atrial appendage peak velocity less than 20, 20-40, 40-60, etc), to stratify by type and duration of atrial fibrillation, and to assess development of atrial fibrillation by implantable loop recorder data.

Left Atrial Appendage Velocities Associates with Increased Risk of Development of Atrial Fibrillation (cont.)

	Low Left Atrial Appendage Velocity (< 40 cm/s)	High Left Atrial Appendage Velocity (> 40 cm/s)	P-Value Between Groups
Age	75.3	69	0.08
Percent Female	38.70%	43.80%	0.68
Percent Male	61.30%	56.20%	0.66
Hypertension	83.90%	71.90%	0.25
Diabetes Mellitus	22.60%	31.30%	0.44
CVA	16.10%	18.80%	0.78
Diastolic Heart Failure	58.10%	43.80%	0.25
Systolic Heart Failure	29.00%	15.60%	0.2
History of smoking	41.90%	43.80%	0.88
Coronary Artery Disease	51.60%	28.10%	0.06
Hyperlipidemia	67.70%	59.40%	0.497

Table 1. Baseline Characteristics of transesophageal echocardiograms patients divided by low and high left atrial appendage velocities

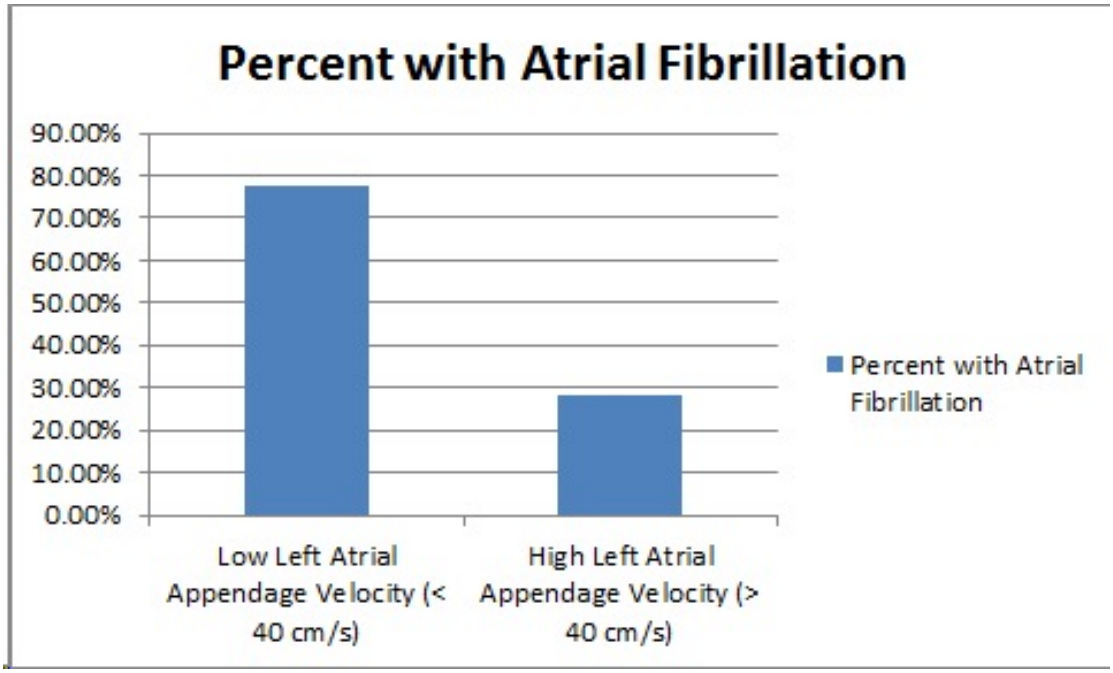
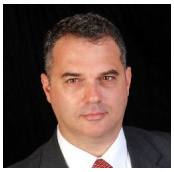


Figure 1. Low Left Atrial Velocities Are Significantly Associated with a Higher Risk of Development of Atrial Fibrillation ($p < 0.001$)

Original Investigation

Honorable Mention



The added value of Radiotherapy in delayed adjuvant treatment for R1 resection in patient with pancreatic adeno carcinoma

Eran Brauner, M.D.; Onur Kutlu, M.D.; Eduardo Vega, M.D.; Omid Salehi, M.D.; Richard Freeman, M.D.; Conrad Claudius, M.D., PhD

Background: Adjuvant chemotherapy (AC) following resection of pancreatic adenocarcinoma (PAC) has been shown to improve survival. However, controversy exists regarding the role of adjuvant therapy when a delay in delivery cannot be avoided due to postoperative complication or prolonged recovery, and to whether AC or chemoradiotherapy (ACRT) represents the superior adjuvant treatment strategy following a margin-positive vs. margin-negative resection.

Methods: The national cancer database (NCDB) was queried for patients with PAC who underwent PD between 2010-2018. Only patients with complete data for, age, sex, grade, comorbidity, surgical approach, T-stage, N-stage, grade, tumor size, margin status, radiotherapy and chemotherapy sequencing, time to adjuvant chemotherapy, time to discharge, M0 disease, complete survival data, and 30-day mortality were included. Patients who received neoadjuvant, as well as those who never received any adjuvant therapy, were excluded. The cohort was divided into 4 groups (1) <60 days to AC (No Delay AC), (2) ≥60 days to AC (Delay AC), (3) <60 days to ACRT (No Delay ACRT), (4) ≥60 days to ACRT (Delay ACRT). Survival analyses were performed for the subgroups in the context of R1 and R0. Cox multivariable regression analyses were performed, adjusting for the following confounding factors: age, sex, grade, comorbidities, margin status, hospital stay, T-Stage, N-stage, surgical approach, adjuvant radiotherapy.

Results: 13740 patients met inclusion criteria. Median follow-up was 20.5 months; median overall survival (OS) was 23.7 months. R1 resection was documented in 23%. Delay of ≥60 days to AC/ACRT was seen in 41.9% of the patients. Early vs. delayed initiation of AC afforded no survival benefit to the margin-negative cohort (p=0.263). AC <60 days suggested a survival benefit among margin-positive patients (No Delay AC vs. Delay AC, 19.91 vs 15.24 months), and when corrected for confounders the effect of delay to AC was significant (p=0.041, HR 1.206, 95% CI 1.002-1.420). In R1 patients, ACRT with and without delay was associated with statistically identical outcome (No Delay vs. Delay, 19.9 vs 19 months, log rank p=0.054), In R1 group, addition of RT to patients with delay adjuvant treatment resulted in statistically similar outcomes to the group who received timely administration of AC (No delay AC vs Delay ACRT, p=0.74, HR 1.031, 95%CI 0.861-1.234).

Limitations: Retrospective study using national data base. 50% of the patient were treated in an academic centers which may not represent the general population.

Conclusions: Margin-negative and margin positive PAC patients appear to receive differential benefit from AC vs. ACRT following PD. Delay of AC ≥60 days may be associated with worse survival in patients with positive margins following PD for PAC. This negative effect was not observed among margin-positive patients with a delay of ACRT ≥60 days. These findings suggest that consideration should be given to delivery of ACRT rather than AC in patients with positive margins when delay of adjuvant therapy ≥60 days cannot be avoided.

Original Investigation

Honorable Mention

Is it Time to Use Bronchodilator Response in the Evaluation of the Non-Specific Pattern on Pulmonary Function Testing?

James Tasch, D.O.; Samer Abujaber, M.D.; Laith Hattar, M.D.; Aju Jose, M.D.; Lori Lyn Price, MAS; Peter LaCamera, M.D.; Hernan Avella, M.D.

Background: Pulmonary function tests (PFT) are interpreted by comparing an individual's pulmonary measurements to accepted reference values. A normal forced exhalation volume in one second (FEV1)/forced vital capacity (FVC) ratio with a reduced FEV1 and/or FVC has been referred to as preserved ratio impaired spirometry (PRISm) [1]. Non-specific pattern (NSP) is a subgroup that additionally has normal total lung capacity (TLC) [2]. These terms have been commonly interchanged in much of the research in this field despite being representative of distinct populations. Clinical symptoms in patients with PRISm have been linked to the future development of chronic obstructive pulmonary disease [3]. The same has not yet been investigated in NSP, but this pattern has been shown to remain stable or evolve to both obstructed or restricted patterns over time [4]. The aim is to understand what clinical characteristics or spirometric differences are associated with a diagnosis of obstructive lung disease in a NSP population.

Methods: Methods: We retrospectively reviewed the charts of subjects who demonstrated NSP on at least one PFT between 2014-2020 at a single academic center and grouped them based on the treating physician's primary pulmonary clinical diagnosis at the last known clinic visit that addressed pulmonary symptoms. NSP was defined using either pre-BD (n=111) or post-BD values (n=79). Diagnoses were then clustered into 'obstructive' and 'non-obstructive' groups for both definitions of NSP. The chi-square test or Fisher Exact tests were used to test for associations between groups.

Results: Results: In those who met NSP criteria using either pre-BD or post-BD spirometry, having a significant BD effect, using the current widely accepted guideline defined by a ≥12% change from baseline and ≥200 mL increase in FEV1 and/or FVC, was associated with a clinical diagnosis of obstructive lung disease (p=0.03 and p= 0.0004, respectively). Using a previously published alternative definition of BD response, defined by an increase of >8% change from the predicted reference in FEV1 and/or FVC [5], the association between a clinical obstructive diagnosis and BD response was only significant when using the post-BD NSP definition (p=0.03).

Limitations: Limitations: The retrospective nature of this project and narrow sample size were limitations of this study.

Conclusions: Conclusion: This study provides evidence that in those with NSP, whether identified using pre or post BD spirometry values, the presence of a positive BD response using current guidelines is associated with a clinical diagnosis of obstructive lung disease. This observation suggests that BD testing should be incorporated into standard PFT interpretation algorithms for those with NSP.

Original Investigation

Honorable Mention

The Feasibility and Accuracy of Continuous Glucose Monitoring System in Hospitalized Non-critically ill Patients with Diabetes after Cardiac Surgery and during their Transition of Care from the Intensive Care Unit during the Covid-19 Pandemic

Aysegul Bulut, M.D.; Padmavathi Srivoleti, M.D.; Mohamed Abdelazeem, M.D.; Karen Feghali, M.D.; Moaz Abdelrehim, M.D.; Bryan Hernandez, RN; Ye Chen, MS; Janis L. Breeze, MPH; Catalina Norman, M.D., PhD; Samara Pena, M.D.; Jeena Sandeep, M.D.; Linda Salvucci, RN, CDE; Susan Berry Cann, DNP; Ann T. Sweeney, M.D.

Background: The use of continuous glucose monitoring (CGM) has demonstrated benefits over traditional point-of-care (POC) capillary blood glucose testing in managing hospitalized patients with dysglycemia. A limited number of studies have assessed the use of CGM in non-intensive care unit (ICU) patients and none have focused solely on non-ICU cardiac surgery patients with diabetes during their transition of care from the ICU. We initiated this single-arm pilot feasibility study during the COVID-19 pandemic in 11 patients to determine the feasibility and accuracy of real-time CGM in cardiac surgery patients with diabetes after their transition of care from the ICU.

Methods: We recruited 11 consecutive patients (ages 18-80 years old) with diabetes on insulin who were hospitalized for cardiac surgery, primarily coronary artery bypass grafting, with a planned hospital stay of at least three days. The study was approved by our Institutional Review Board. The primary outcomes were to assess the accuracy of CGM as well as the percent time in range (%TIR) defined as the proportion of glucose levels between 70-180 mg/dL. After patients were transferred to the cardiac transition unit, a G6 CGM sensor and transmitter were placed on patients' upper outer arms. A smart phone in patients' rooms functioned as a receiver and relayed the glucose concentration estimates and trending information to a tablet at the nurses' station thereby creating a glucose telemetry system. The data was also stored in a cloud-based platform to allow remote monitoring via smartphones by study investigators. Patients were also on a standard POC capillary blood glucose testing protocol. Insulin doses were adjusted daily per a standard insulin protocol. Clarke Error Grid (CEG) analysis was used to compare CGM and POC measurements. Mean absolute relative difference (MARD) of the paired measurements was calculated to assess the accuracy of the CGM for glucose measurements during the first 24 hours on CGM, the remainder of time on the CGM as well as for different chronic kidney disease (CKD) strata.

Results: Overall, MARD between POC and CGM measurements was 14.80% (Table1a). MARD for patients without CKD IV and V with eGFR > 20 ml/min/1.73m2 was 12.13%. Overall, 97% of the CGM values were within the no-risk zone of the CEG analysis (Figure1). For the first 24 hours, a sensitivity analysis (Table1b) of the overall MARD for all subjects and for those with eGFR > 20 ml/min/1.73m2 was 15.42% (+/- 14.44) and 12.80% (+/- 7.85) respectively. Beyond the first 24 hours, overall MARD for all subjects and for those with eGFR > 20 ml/min/1.73m2 was 14.54% (+/- 13.21) and 11.86% (+/- 7.64) respectively. The mean CGM glucose was 179 mg/dl and TIR (% time in range 70-180 mg/dL) was 59.8%.

Limitations: Small sample size limits the statistical power of this study.

Conclusions: CGM has great promise to optimize inpatient diabetes management in the noncritical care setting and after the transition of care from the ICU with high clinical reliability and accuracy. More studies are needed to further assess CGM in patients with advanced CKD.

Original Investigation

The Feasibility and Accuracy of Continuous Glucose Monitoring System in Hospitalized Non-critically ill Patients with Diabetes after Cardiac Surgery and during their Transition of Care from the Intensive Care Unit during the Covid-19 Pandemic (cont.)

Table 1.a

MARD between POC and CGM:

	Overall (n=137)
ARD	
mean (SD)	14.80 (13.53)
median [IQR]	13.20 [5.22, 18.52]
[min, max]	[0, 91.00]

	eGFR >= 20ml/min/1.73m^2 (n=97)	eGFR < 20ml/min/1.73m^2 (n=40)
ARD		
mean (SD)	12.13 (7.67)	21.27 (20.81)
median [IQR]	12.71 [5.35, 17.16]	16.37 [5.09, 25.08]
[min, max]	[0, 34.95]	[0, 91.00]

Table 1b.

Within 1st 24 hours:

	Overall (n=40)
ARD	
mean (SD)	15.42 (14.44)
median [IQR]	14.78 [7.38, 20.18]
[min, max]	[0.30, 91.00]

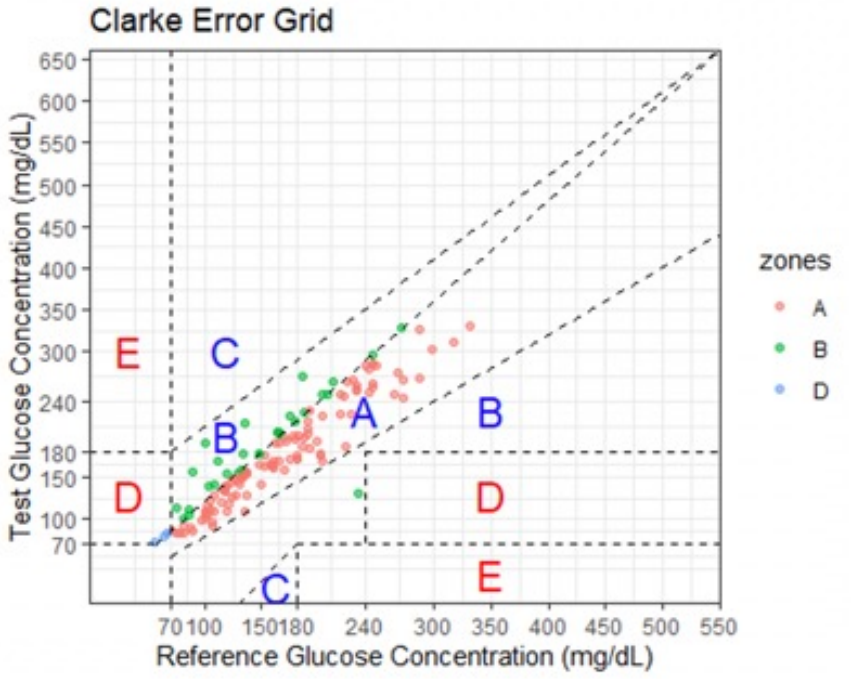
	eGFR > 20ml/min/1.73m^2 (n=28)	eGFR < 20ml/min/1.73m^2 (n=12)
ARD		
mean (SD)	12.80 (7.85)	21.55 (23.02)
median [IQR]	12.65 [6.37, 17.63]	18.32 [12.94, 20.96]
[min, max]	[0.30, 30.28]	[1.03, 91.00]

1. After 1st 24 hours

	Overall (n=97)
ARD	
mean (SD)	14.54 (13.21)
median [IQR]	13.14 [5.10, 18.06]
[min, max]	[0, 73.33]

Table 1. 1a. MARD was calculated based on 137 matched glucose pairs of 11 patients. MARD is also shown for patients in different CKD strata. 1b. Sensitivity analysis: MARD for glucose measurement during the 1st 24 hour during hospital stay and rest of hospital stay, also calculate MARD in different CKD strata.

The Feasibility and Accuracy of Continuous Glucose Monitoring System in Hospitalized Non-critically ill Patients with Diabetes after Cardiac Surgery and during their Transition of Care from the Intensive Care Unit during the Covid-19 Pandemic (cont.)



Zone A: no effect on clinical action (CGM within 20% of POC)

Zone B: altered clinical action with little to no effect on clinical outcome (>20% difference, no incorrect treatment)

Zone C: altered clinical action, likely to affect clinical outcome (hyperglycemia or hypoglycemia leading to inappropriate treatment)

Zone D: altered clinical action, could have significant medical risk (undetected hypoglycemia or hyperglycemia needing treatment)

Zone E: altered clinical action, could have dangerous consequences (hypoglycemia mistaken for hyperglycemia, and vice versa)

N	A (%)	B (%)	D (%)
131	76.6	21.2	2.2

Figure 1. Clarke Grid Analysis is used to compare the glucose measurement from point-of-care (POC) and continuous glucose measurement (CGM) A table is also provided with percentage of values of CGM fallen within different zones.

Original Investigation

Honorable Mention

Expression of human CD47 in pig glomeruli prevents proteinuria and prolongs grafts survival following pig-to-baboon xenotransplantation

Thomas Pomposelli, M.D.; Kazuhiro Takeuchi, M.D., PhD; Yuichi Ariyoshi, M.D., PhD; Akira Shimizu, M.D., PhD; Yuichiro Okumura, M.D., PhD; Hironosuke Watanabe, M.D., PhD; Lennan Boyd, BS; Megan Sykes, M.D., PhD; David Sachs, M.D.; Kazuhiko Yamada, M.D., PhD

Background: Xenotransplantation (XTx) could provide a limitless supply of organs that would address the current worldwide shortage. Induction of tolerance could reduce the need for the extensive immunosuppression required to prevent rejection of pig-to-primate xenografts. By utilizing our group's current pre-sensitization strategy including simultaneous donor thymus transplant and intra-bone bone marrow transplant, we have extended xenograft survival from 29 to 83 days in baboons. While our regimen has succeeded in preventing sensitization of recipient baboons to the xenograft, we have observed that all baboon recipients go on to develop proteinuria and severe nephrotic syndrome as early as postoperative day (POD) 2.

CD47 is an important ligand that binds SIRPα on macrophages and other immune cells where it helps maintain the macrophages in a nonactivated state. Recently we found that induced expression of human CD47 (hCD47) on endothelial cells and podocytes isolated from hCD47 transgenic (Tg) swine markedly reduced phagocytosis by baboon and human macrophages. This observation led us to hypothesize that an incompatibility between pig CD47 and baboon SIRPα could play a role in initiating the nephrotic syndrome in this xeno-graft model, and that by transplanting hCD47 Tg porcine kidneys we could potentially overcome the incompatibility of the porcine CD47-baboon SIRPα interspecies ligand-receptor interaction and prevent the development of proteinuria following KXTx.

Methods: Ten baboons received simultaneous pig kidney transplant with vascularized thymic grafts (n = 8) or intra-bone bone marrow transplants (n = 2). Baboons were divided into three groups (A, B, and C) based on the transgenic expression of hCD47 in Galactosyltransferase gene knockout (GalT-KO) pigs. Baboons in Group A received kidney grafts with expression of hCD47 restricted to glomerular cells (n = 2). Baboons in Group B received kidney grafts with expression of hCD47 on both glomerular and tubular cells of the kidneys (n = 4). Baboons in Group C received kidney grafts with expression of hCD47 on renal tubular cells alone (n = 4).

Results: Consistent with our hypothesis, GalT-KO/hCD47 kidney grafts with high expression of hCD47 on glomerular cells developed minimal proteinuria. Interestingly, high hCD47 expression in all renal cells (Group B) induced an apparent destructive inflammatory response associated with upregulated thrombospondin-1. This response did not affect survival or the development of proteinuria.

Limitations: Nephrotic syndrome remains a major barrier clinical barrier to KXTx. While our study is promising, the pathogenesis of proteinuria in this model is not completely understood. While we have shown that the transgenic expression of hCD47 on glomerular cells is certainly protective, it is possible that other additional transgenes (EPCR, HLA-E, TFPI, thrombomodulin [TBM], and CMAH- and/or B4-KO) present in the kidney grafts could also play an as yet not fully understood protective role.

Conclusions: Our data has shown that transgenic expression of hCD47 on glomerular cells in the GalT-KO donor kidneys can prevent xenograft nephropathy, a significant barrier for therapeutic applications of xenotransplantation. The ability to prevent nephrotic syndrome following KXTx is a critical step towards future clinical applications.

Original Investigation

Honorable Mention

The Ventilatory Ratio as a Tool for Predicting ICU Mortality in COVID-19 Pneumonia Patients Requiring Mechanical Ventilation: A Retrospective Multi-Center Analysis

Nikolay Korchemny, M.D.; Marcel Robles, M.D.; Laith Hattar, M.D.; Jonathan Dewald, M.D.; Lori Lyn Price, MAS; Andrew Moraco, M.D.; Peter LaCamera, M.D.

Background: Decreased gas exchange due to increased dead space is an important feature of COVID-19 pneumonia and can be seen in infected patients with severe disease undergoing mechanical ventilation. In ARDS, the ventilatory ratio (VR) has been shown to correlate with dead space and studies have shown that it is a useful tool to predict mortality. It is a simple index that can be calculated using arterial blood gas and mechanical ventilation data. VR is defined as (minute ventilation (ml/min) x PaCO2) / (predicted body weight x 100 x 37.5). We hypothesized that VR can be used as an independent predictor of mortality in COVID-19 pneumonia, much like in ARDS. Our objective was to assess if the VR can predict ICU mortality in patients with COVID-19 pneumonia.

Methods: We conducted a multi-center retrospective observational study that included 317 patients with severe COVID-19 pneumonia requiring mechanical ventilation. Data was obtained from hospitals in the Steward Health Care Network. The VR for these patients was calculated at the time of intubation, 1 day post intubation and at day 3 post intubation. We also looked at other variables that have proven prognostic value in the setting of ARDS, including APACHE score, red blood cell RDW, and the oxygenation index (OI, defined as FiO2 x Mean Airway Pressure / PaO2). For the data analysis we used ROC analysis in conjunction with Youden's index to identify the optimal threshold for the ventilatory ratio that would offer maximal sensitivity and specificity for predicting ICU mortality.

Results: Of the 317 patients included in the study, the mortality was 58%. Arterial blood gases were available to calculate the studied indices for 283 patients at intubation and 229 patients at days 1 through 3. The median APACHE score was 81. The median VR at days 1 through 3 was 1.89. Using the ROC analysis and Youden's index the optimal cut-off for VR during days 1 through 3 in predicting in-ICU mortality was 2.15 with an associated sensitivity of 0.40 and specificity of 0.78.

Limitations: Arterial blood gas data and ventilator data was matched as closely as possible however some dissociation in time was present which may affect the VR calculations. Blood gases were not present for all patients within the studied time frames which may have made this study underpowered to identify a significant correlation with mortality.

Conclusions: In our study the median VR was elevated, suggestive of substantially increased dead space and decreased gas exchange. The optimal cut-off for the ventilatory ratio in our study to predict mortality was 2.14 which is similar to previously reported data. However, the test performance was inferior to previous studies on ARDS patients. The findings for APACHE scores, RDW, and OI were similar. We suspect that because COVID-19 pneumonia patients typically have longer mechanical ventilation needs than previously studied ARDS patients, a longer trajectory of VR and other prognostic measurements is likely needed to predict mortality with better accuracy.

The Ventilatory Ratio as a Tool for Predicting ICU Mortality in COVID-19 Pneumonia Patients Requiring Mechanical Ventilation: A Retrospective Multi-Center Analysis (cont.)

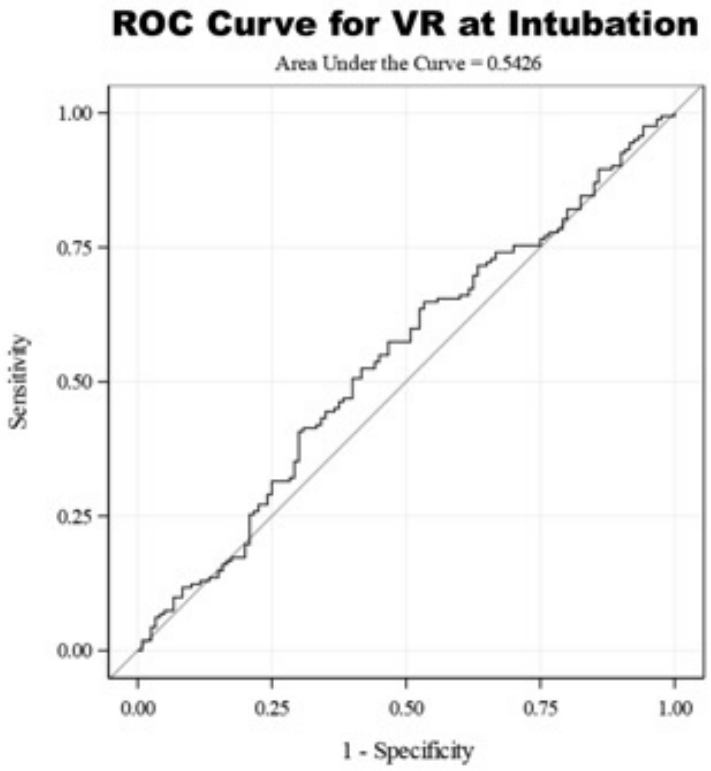


Figure 1. Shown is the ROC curve for VR at the time of intubation for predicting mortality in COVID-19 patients. The AUC calculated for the plot represents the overall performance of the test. The AUC is close to 0.5 meaning little difference from chance in predicting mortality.

Variable	Threshold	Sensitivity	Specificity	NPV	PPV
VR at Intubation	1.59	0.65	0.47	0.50	0.62
VR on Days 1 or 3	2.15	0.40	0.78	0.47	0.73
OI at Intubation	12.86	0.57	0.65	0.53	0.69
OI on Days 1 or 3	8.20	0.82	0.41	0.61	0.67
APACHE	74.5	0.70	0.50	0.54	0.66
RDW	14.05	0.60	0.53	0.49	0.64

Table 1. Shown are the optimal thresholds for VR, OI, APACHE and RDW for predicting mortaility in COVID-19 patients. These are calculated based on the ROC curves using Youden's Index. The table also shows corresponding pre- and post-test probabilities.

Original Investigation

A New Guide to Successful Left Bundle Area Pacing: the Importance of the Ring Measurements

Marianna Nikolaychuk, Ioannis Koulouridis, John Wylie, Alena Goldman, Shaw Natan, Adhiraj Bhattacharya, Amy Hicks, Michael King, Michael Orlov

Introduction: Successful criteria for left bundle area pacing (LBAP) are in flux and currently guided by lead tip measurements. Ring measurements during LBAP have not been well studied.

Objective: To investigate dynamics in pacing parameters during successful and unsuccessful lead implant attempts.

Methods: Select Secure 3830 pacing leads (Medtronic, Inc) guided by C315 sheaths for LBAP were placed for standard pacing indications in 73 patients. Retrospective review of procedural, echocardiographic and standard pacing data in all patients and detailed stepwise tip and ring measurements in a subset of 25 patients were performed. Depth and lead/septum angle (LSA) of implanted electrodes were determined from fluoroscopy with septal contrast delineation. Several implant attempts made during one procedure were adjudicated separately as successful or not.

Results: Ring impedance increased stepwise (Fig.) during successful attempts as opposed to unsuccessful ($p = 0.039$). A wider angle of LSA at implant position correlates with higher ring impedance ($p = 0.036$) whereas no association was found with tip impedance. Unipolar ring threshold correlates with depth of lead implant ($p = 0.029$). Tip impedance measurements at implant position are less predictive of lead depth (Fig.) and do not correlate with septal thickness.

Conclusions: Ring pacing parameters are more predictive of lead progress than tip measurements. Lead depth and LSA can be determined from ring impedance measurements. These measurements may provide determination of lead depth and could obviate the need for contract injection.

A New Guide to Successful Left Bundle Area Pacing: the Importance of the Ring Measurements (cont.)

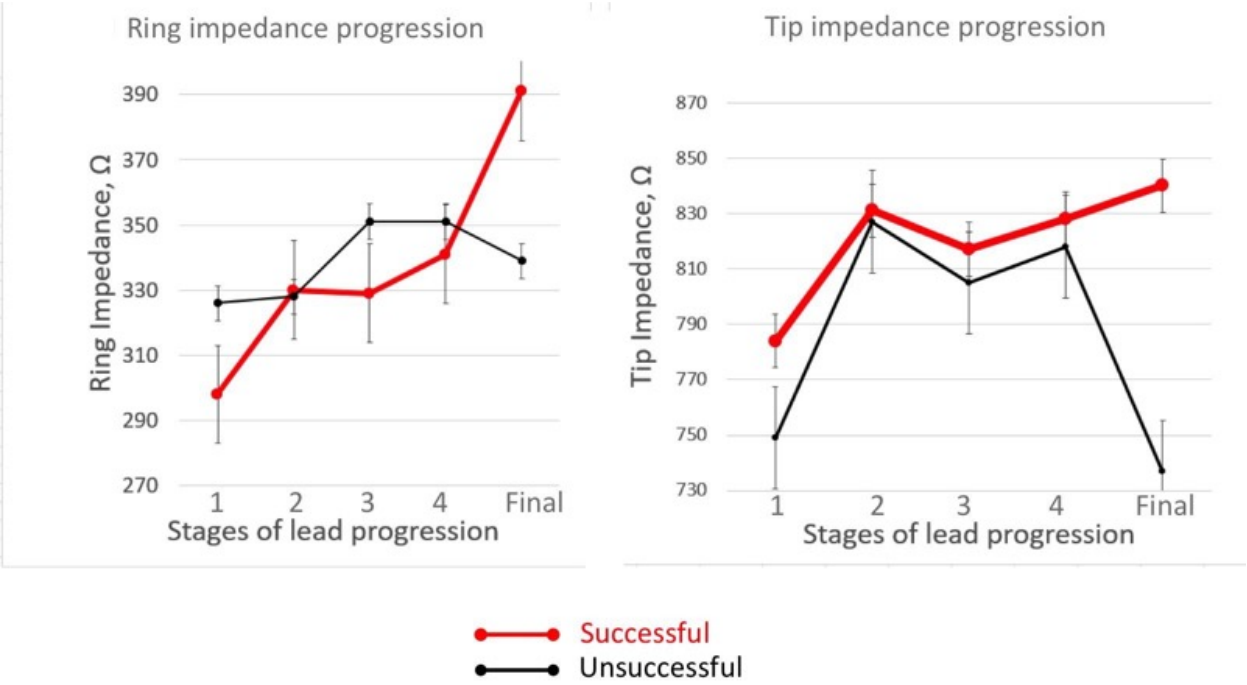


Figure 1. Ring vs. tip impedance trends throughout consecutive stages of lead advancement into the interventricular septum.

Original Investigation

Body Mass Index and Severity of Acute Kidney Injury in Critically ill Patients with COVID-19

Christopher El Mouhayyar, M.D.; Jonathan Dewald, M.D.; Jose Cabrales, M.D.; Hocine Tighiouart, MS; Andrew H. Moraco, M.D.; Bertrand L. Jaber, M.D., MS; Vaidyanathapuram S. Balakrishnan, M.D.

Introduction: Acute kidney injury (AKI) is a well-recognized complication of coronavirus disease 2019 (COVID-19). The short and long-term outcomes of patients who develop AKI have not been well characterized.

Methods: In this multicenter retrospective cohort study, we describe the clinical characteristics and outcomes of critically ill adults with severe COVID-19 and AKI. Patient-level variables were extracted from the electronic medical record. Using nadir-to-peak serum creatinine, AKI was defined using the KDIGO definition. Multivariable logistic regression analyses examined factors associated with development of moderate-to-severe (stage 2-3) AKI, severe (stage-3) AKI, and composite of renal replacement therapy (RRT) or in-hospital death.

Results: Among 459 critically ill adults with COVID-19, 371 (80.1%) developed AKI, with 179 (37.9%) developing stage-3 AKI. Male gender, Black and Asian/Native American race, lower eGFR, higher BMI, and higher APACHE IV score were more prevalent among patients with severe AKI, as well as systemic markers of inflammation. On multivariable analysis, male gender, Black and Asian/Native American race, higher APACHE IV score, lower baseline eGFR, and higher BMI (mainly the highest BMI stratum $\geq$ 35 kg/m2) were independently associated with severe AKI. There was a significant interaction between BMI and moderate-to-severe AKI for the outcome of in-hospital death. Among 83 (18.1%) patients who required RRT, 27 (32.5%) survived, and 12 (44.4%) remained dialysis-dependent at discharge. At 3 and 6 months, 5 (41.7%) and 4 (33.3%) remained dialysis-dependent, respectively.

Limitations: The study involved critically ill patients with COVID-19 and excluded hospitalized patients with COVID-19 who did not require ICU-level of care. This explains the very high rate of AKI in our cohort of critically ill patients. Our findings may not be generalizable to other health care systems or regions within the United States during the surge of COVID-19. Furthermore, our definition of AKI may have underestimated AKI of higher stages of severity because not all patients had a baseline serum creatinine level, which may have been lower than the nadir value observed during the hospitalization, thus resulting in smaller nadir-to-peak serum creatinine differences. Finally, our study was conducted during the first wave of the pandemic, and the evolving therapies for COVID-19 may have affected disease severity and rates of AKI.

Conclusions: AKI is common in critically ill adults with COVID-19. Several patient-level risk factors are associated with development of AKI. Most notably, higher BMI appears to be linked to severity of AKI and in-hospital death. Among AKI survivors, there is a high rate of short- and long-term RRT dependence.

Body Mass Index and Severity of Acute Kidney Injury in Critically ill Patients with COVID-19 (cont).

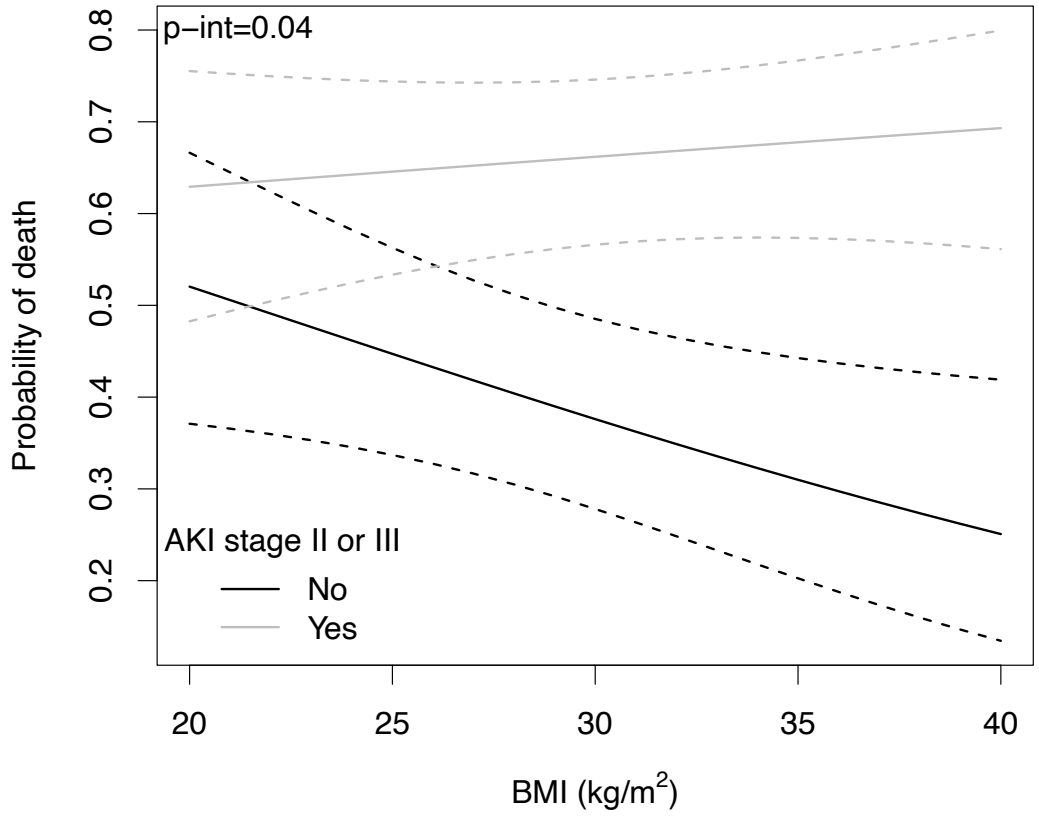


Figure 1. Interaction between BMI and moderate-to-severe (stage 2-3) AKI for the outcome of in-hospital death.

Original Investigation

Buprenorphine and its therapeutic potentials in psychiatric disorders

Siddhi Bhivandkar, M.D.; Fariba Miryousefi, M.D.

Introduction: Opioid receptor agonists have been shown to be effective in the treatment of some psychotic symptoms, affective symptoms, anxiety, and obsessive-compulsive disorder. Buprenorphine, a partial agonist, has long been used to treat opioid addiction. The purpose of this analytic review study is to determine the efficacy of buprenorphine in treating symptoms of psychosis, depression, anxiety, and suicidality.

Methods: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement recommendations were used to conduct this analytic systematic review. We systematically searched PubMed, Scopus, EMBASE, Web of Science, and the Cochrane Library from inception to August 2021. Articles written in English using keywords such as buprenorphine, antidepressant, anti-suicidal, mood stabilizer, and antipsychotic, among others. Using pre-defined eligibility criteria, two independent reviewers screened the titles and abstracts of the identified records. Following that, full texts were reviewed, and studies that met inclusion criteria were selected. Finally, a descriptive synthesis of the extracted data was carried out. Once studies were selected, we assessed study quality using a checklist for the grading of recommendation, assessment, development, and evaluation (GRADE approach).

Results: We identified 1341 results on our initial search. After removing duplicates, studies were screened based on titles, resulting in the inclusion of 419 citations. Abstracts were then screened, which resulted in exclusion of 233 citations. The remaining papers (186) were reviewed for eligibility, a total of 171 papers did not fit the inclusion criteria, resulting in 20 full-text articles that met the inclusion criteria. Of these 4 studies reported a significant reduction in symptoms of depression and some cases of treatment resistant depression, 2 studies reported moderate improvement in anxiety symptoms. 6 studies including 2 case report and a case series, suggested that buprenorphine may be useful in helping to resolve Suicidal ideation and successful treatment of severe Non-Suicidal Self Injury with buprenorphine. 1 study reported reduction in drug resistant Obsessive Compulsive Disorder with augmentation with Buprenorphine. 5 Studies reported psychotic symptoms reduction after receiving Buprenorphine monotherapy. 1 study suggested some role of buprenorphine as an augmenting agent for treatment of mania. Overall, the evidence demonstrates buprenorphine's efficacy and therapeutic potentials in psychiatric disorders.

Limitations and Conclusions: It is difficult to make a definitive conclusion about buprenorphine's therapeutic potentials in psychiatric disorders because some studies indicate antidepressant, antipsychotic and anxiolytic properties of buprenorphine while others may not. However, it is fair to say that published papers provide us with some preliminary promise to use the drug to treat psychiatric conditions, particularly in people with co-occurring opioid dependence and psychiatric conditions. Our conclusion is based on a limited number of studies. Larger controlled trials on this topic, however, are required to reach a firm and evidence-based conclusion.

Original Investigation

Correlation between CHA2DS2-VASc score and aortic atherosclerosis independent of the presence of atrial fibrillation: A retrospective cohort study

Adhiraj Bhattacharya, Leora Tofler, Michael Johnstone

Background: CHA2DS2-VASc scoring is a clinical tool used to determine the risk of stroke in patients with atrial fibrillation. The degree of aortic atherosclerosis and the presence of spontaneous echo contrast ("SMOKE") in the aorta are transesophageal echocardiographic predictors of stroke and myocardial infarction. Recent reports suggest that the CHA2DS2-VASc score can be used as a predictor of stroke even in patients not in atrial fibrillation. To date, it has not been determined if the CHA2DS2-VASc score correlates with the degree of aortic atherosclerosis and the presence of spontaneous echo contrast. Our aim is to determine whether the CHA2DS2-VASc score correlates with the degree of aortic atherosclerosis as well as the presence of aortic SMOKE, both predictors of stroke and myocardial infarction.

Methods: This study is a single-centered, retrospective cohort study. A total of 405 patients undergoing TEE between the years 2016-2019 were reviewed. Aortic atheromas, identified on multiplanar TEE, was measured and graded using ASE guidelines. Aortic SMOKE, formed by aortic atherosclerosis (Fig. 1) was identified. Baseline characteristics, CHA2DS2-VASc scores and 6-month follow up of major adverse cardiac events (MACE) such as stroke were collected. Patients with aortic SMOKE (study group) were compared to those without aortic SMOKE (control group) in terms of atheroma grades, CHA2DS2-VASc scores and incidence MACEs. Patient characteristics and study results are outlined in Table 1. Hypothesis testing was done using student t-tests for continuous variables and chi-square tests for categorical variables. Statistical analysis was done with SAS Enterprise Guide 8.2.1.

Results: There was a significant association between aortic atheroma grades and mean CHA2DS2-VASc scores using Pearson's correlation coefficient ($r=0.93$ $p<0.0001$). The mean CHA2DS2-VASc score was higher in cases with aortic SMOKE vs. those without aortic SMOKE (3.7+/- 1.8 vs. 3.0+/-1.3; $p=0.0095$). Furthermore, the percentage of patients with aortic SMOKE had higher grades of aortic atheromatous plaques compared to those without aortic SMOKE. Although not statistically significant, the patients with demonstrable aortic SMOKE had more MACEs such as stroke during 6-month follow up (34.3% vs. 28.5% $p=0.2073$).

Limitations: The use of different equipment, probes, and technical factors such as gain settings may have played a major impact on our study. Our study was also single-centered, which has inherent limitations.

Conclusions: Our study determined that CHA2DS2-VASc score correlates with the presence of: (a) the degree of aortic atherosclerosis and (b) the presence of SMOKE, known risk factors for both stroke and myocardial infarction. The study also demonstrates that (1) the presence of aortic SMOKE correlates with the severity of aortic atherosclerosis as well as heart failure, and (2) confirms aortic SMOKE, like CHA2DS2-VASc scores can be an independent predictor of the risk and development of cryptogenic stroke in patients with aortic atherosclerosis. To our knowledge, this is the first demonstration of the degree of aortic atherosclerosis correlating with aortic SMOKE and with CHA2DS2-VASc score. Further research is needed to determine if the use of anticoagulation affects only clot development in the left atrial appendage, the purported source of stroke in atrial fibrillation, or atherothrombosis on the aorta.

Original Investigation

Correlation between CHA2DS2-VASc score and aortic atherosclerosis independent of the presence of atrial fibrillation: A retrospective cohort study (cont.)

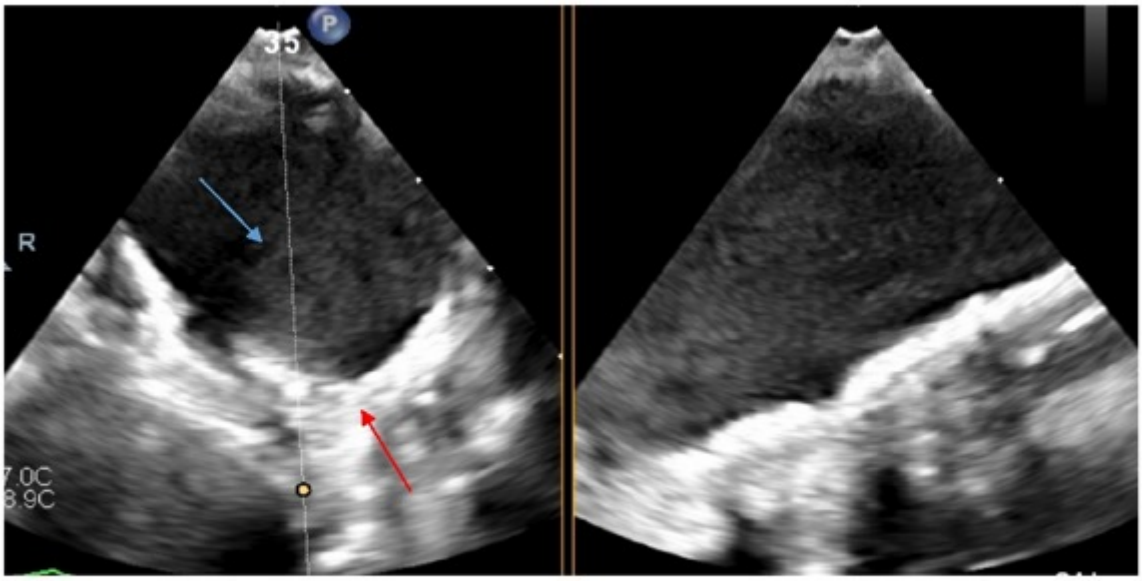


Fig 1: TEE of ascending thoracic aorta showing calcified aortic atheroma (red arrow) with adjacent swirling pattern of aortic spontaneous echocardiographic contrast/SMOKE (blue arrow).

Table 1: ***Baseline characteristics & results of patients with and without Aortic SMOKE***

Variable	Total Cohort (n=405)	Presence of Aortic Smoke (N=166)	No presence of Aortic Smoke (n=239)	p-value
Baseline Characteristics				
Mean Age (SD)	68.3 ± 14.9	71.8 ± 12.1	65.9 ± 16.1	<0.0001
Female (% of total sample)	169 (41.7%)	69 (41.6%)	100 (41.8%)	0.9560
Hypertension (% of total sample)	312 (77.0%)	136 (81.9%)	176 (73.6%)	0.0511
Diabetes (% of total sample)	123 (30.4%)	56 (33.7%)	67 (28.0%)	0.2198
Hyperlipidemia (% of total sample)	252 (62.2%)	106 (63.9%)	146 (61.1%)	0.5721
Smokers (% of total sample)	142 (35.1%)	56 (33.7%)	86 (36.0%)	0.6410
Previous Stroke or TIA or VTE (% of total sample)	75 (18.5%)	33 (19.9%)	42 (17.6%)	0.5568
History of CHF (% of total sample)	86 (21.2%)	40 (24.1%)	46 (19.2%)	0.2405
Acute HF/LV dysfunction (% of total sample)	112 (27.7%)	60 (36.1%)	52 (21.8%)	0.0015
Peripheral Vascular Disease (% of total sample)	137 (33.8%)	62 (37.3%)	75 (31.4%)	0.2118
Atrial Fibrillation/Atrial Aflutter (% of total sample)	201 (49.6%)	96 (57.8%)	105 (43.9%)	0.0059
On NOACs at time of study (% of total sample	190 (46.9%)	87 (52.4%)	103 (43.1%)	0.0647
On antiplatelets at time of study (% of total sample)	113 (27.9%)	48 (28.9%)	65 (27.2%)	0.7044
On Statins at time of study (% of total sample)	255 (63.0%)	105 (63.3%)	150 (62.8%)	0.9198
Results				
Presence of aortic atheroma on TEE study	88.6% (n=359)	89.1% (n=148)	88.3% (n=211)	<0.0001
Atheroma size of Grade 1 or less	37.9%(136)	16.2% (24)	53.1% (112)	<0.0001
Atheroma size of Grade 2-3	62.1% (223)	83.8% (124)	46.9% (99)	<0.0001
Atheroma size of Grade 4-5	40.9% (147)	62.2% (92)	26.1% (55)	<0.0001
Mean CHA_2DS_2-VASc ** score	3.5 ± 1.9	3.7 ± 1.8	3.0 ± 1.9	0.0095
Percentage of patients with CHA_2DS_2-VaSc >2	67.7% (274)	75.3% (125)	62.3% (149)	0.0061
Percentage of MACEs¶ within 6 months of TEE	30.9% (125)	34.3% (57)	28.5% (68)	0.2073

Original Investigation

Cost and Outcomes of Inpatient Open vs. Laparoscopic vs. Percutaneous Ablations for Hepatocellular Carcinoma

Emeka Agudile, M.D., MPH, ScD; Eduardo A. Vega, M.D.; Oscar Salirrosas, M.D., Andrew Crocker, M.D.; Eran Brauner, M.D.; Richard Freeman, M.D.; George P Sorescu, M.D.; and Claudius Conrad, M.D., PhD

Background: While open, laparoscopic, or percutaneous ablation for hepatocellular carcinoma (HCC) are all important liver direct treatment modalities for small HCC, it remains controversial which treatment approach is most effective from a cost and outcomes perspective. This study evaluates the 3 different approaches for patients with HCC in terms of in-hospital outcomes and cost. We also investigated the temporal trends in the utilization of the ablation approaches.

Methods: The National Inpatient Sample databases between 2011- 2018 was queried for patient with hepatocellular carcinoma. In-hospital mortality and total charge (cost) are the primary outcomes. Secondary outcomes include length of stay, disposition, and specific morbidities/ complications. Inverse probability of the treatment weighting (IPTW) method was used to adjust for the differences in patient and hospital baseline characteristics. Finally, we assessed the temporal trends in utilization of the 3 liver ablations approaches.

Results: Of 3414 patients, 1,125 laparoscopic liver ablation, 1,221 open liver ablation, and 1,068 percutaneous liver ablations were included. After IPTW, the risks of in-hospital mortality were significantly lower in the percutaneous liver ablation cohort compared to open liver ablation cohort (0.57% vs. 2.90%, p<0.001). The risks of in-hospital mortality were not statistically different between the percutaneous and laparoscopic groups (0.57% vs. 1.64%, p=0.056). Complication rates were lower in laparoscopic ablation (0.55% vs. 2.46%, p=0.002), and percutaneous ablation (0.80% vs. 2.46%, p=0.013) compared to open ablation, but not significantly different between the percutaneous and laparoscopic approach (0.80% vs. 0.44%, p=0.628). Laparoscopic and percutaneous ablation patients were more likely to be discharged home compared to open ablation patients (89.1% vs. 70.2%, p<0.001), and (88.4% vs. 70.2%) respectively. The median lengths of hospital stay were significantly lower in the laparoscopic and the percutaneous ablation group compared to open ablation group (2 days vs. 6 days, p<0.001).

The median hospitalization costs were significantly lower in the laparoscopic ($61,445 vs. $90,187, p<0.001), and percutaneous ($44,884 vs. $90,187, p<0.001) (Table 3) compared to the open ablation group. On the same hand, the median hospitalization cost was significantly lower in the percutaneous group compared to the laparoscopic group ($44,884 vs. $61,445, p=0.001) (Table 4), however when the cost of laparoscopic and percutaneous ablation was stratified by academic hospital status the significant lower cost of the percutaneous group disappears.

Overall, we observed a minimal but steady increase in the proportion of laparoscopic ablation procedures from 35.0% to 36.0% (p-trend<0.001), and a more pronounced and progressive increase in the proportion of percutaneous ablation procedures from 23.9% to 40.0% (p-trend<0.001), with a corresponding decrease in open ablation procedures from 41.4% to 24.1% (p-trend<0.001).

Limitations: Some limitations to the present study include the fact that HCC biology, tumor size, and location were not captured by the NIS, the cross-sectional nature of the datasets and the absence of randomization that limits the strength of the results.

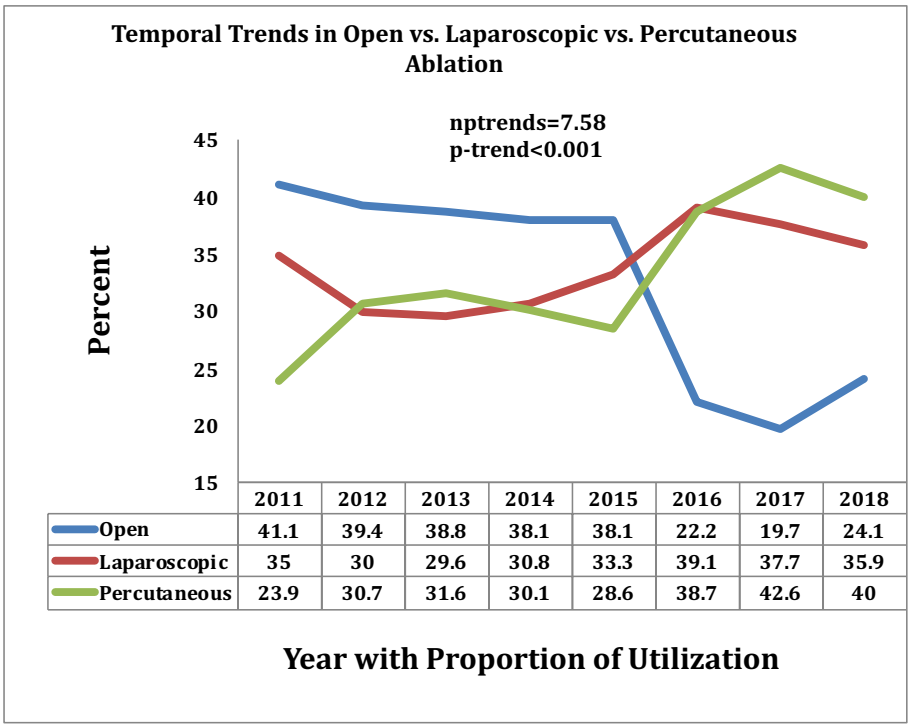
Conclusions: Among patients hospitalized for ablation, percutaneous ablation still demonstrates the lowest hospital cost, with both percutaneous and laparoscopic ablation being associated with lower peri-operative morbimortality relative to open approach.

Cost and Outcomes of Inpatient Open vs. Laparoscopic vs. Percutaneous Ablations for Hepatocellular Carcinoma (cont.)

	Outcome	Total n (%)	Open n (%)	Laparoscopic n (%)	P value
Open vs. Laparoscopic Liver Ablation	In-hospital Mortality	51.0/3,229.0 (1.58)	25.4/873.3 (2.90)	25.6/2,355.7 (1.09)	<0.001
	Cost (median +/- iqr)	65,261 (40,168 – 108,7777)	90,187 (57,855 – 142,692)	61,445 (41,949 – 97,227)	<0.001
	Length of Stay (median iqr)	4 (2 – 6)	6 (4 – 8)	2 (1 – 4)	<0.001
	Disposition				<0.001
	Home	2,670.5/3,178.1 (84.0)	595.2/848.0 (70.2)	2,075.1/2,330.1 (89.1)	
	Facility/Other	507.6/3,178.1 (16.0)	252.7/848.0 (29.8)	254.9/2,330.1 (10.9)	
	Aggregate Complications: necrosis, abscess, etc	34.5/3,230 (1.07)	21.5/874.3 (2.46)	13.0/2,355.7 (0.55)	0.002
	Outcome	Total n (%)	Open n (%)	Laparoscopic n (%)	P value
Open vs. Percutaneous Liver Ablation	In-hospital Mortality	42.8/3,228.8 (1.33)	30.4/1,047.9 (2.90)	12.4/2,180.9 (0.57)	<0.001
	Cost (median +/- iqr)	65,261 (40,168 – 77,490)	90,187 (57,855 – 142,692)	44,884 (25,804 – 77,490)	<0.001
	Length of Stay (median iqr)	4 (2 – 6)	6 (4 – 8)	2 (1 – 3)	<0.001
	Disposition				<0.001
	Home	2,631.2/3,186.0 (82.6)	714.2/1,017.4 (70.2)	1,917.0/2,168.6 (88.4)	
	Facility/Other	554.8/3,186.0 (17.4)	303.2/1,017.4 (29.8)	251.6/2,168.6 (11.6)	
	Aggregate Complications: necrosis, abscess, etc	43.2/3,230 (1.34)	25.8/1,049.1 (2.46)	17.4/2,180.9 (0.80)	0.013
	Outcome	Total n (%)	Open n (%)	Laparoscopic n (%)	P value
Laparoscopic vs. Percutaneous Liver Ablation	In-hospital Mortality	30.1/3,230 (0.93)	18.0/1,101.1 (1.64)	12.1/2,128.9 (0.57)	0.056
	Cost (median +/- iqr)	65,261 (40,168 – 77,490)	61,445 (41,949 – 97,227)	44,884 (25,804 – 77,490)	0.001
	Length of Stay (median iqr)	4 (2 – 6)	2 (1 – 4)	2 (1 – 3)	0.071
	Disposition				0.283
	Home	2,826.9/3,199.9 (88.3)	955.6/1,083.1 (88.2)	1,871.2/2,116.8 (88.4)	
	Facility/Other	373.0/3,199.9 (11.7)	127.4/1,083.1 (11.8)	245.6/2,116.8 (11.6)	
	Aggregate Complications: necrosis, abscess, etc	21.8/3,230 (0.67)	4.8/1,101.1 (0.44)	17.0/2,128.9 (0.80)	0.628

Table 1. In-hospital Outcomes of Open vs. Laparoscopic, Open vs. Percutaneous, and Laparoscopic vs. Percutaneous Ablations in Patients with Hepatic Cell Carcinoma after IPW matching

Cost and Outcomes of Inpatient Open vs. Laparoscopic vs. Percutaneous Ablations for Hepatocellular Carcinoma (cont.)



	2011	2012	2013	2014	2015	2016	2017	2018
Open	41.1	39.4	38.8	38.1	38.1	22.2	19.7	24.1
Laparoscopic	35	30	29.6	30.8	33.3	39.1	37.7	35.9
Percutaneous	23.9	30.7	31.6	30.1	28.6	38.7	42.6	40

Figure 1: Temporal Trends in the Utilization of Open vs. Laparoscopic vs. Percutaneous liver ablations between 2011 and 2018

Original Investigation

Early thoracic surgery consultation and location of therapy impact time to esophagectomy after completion of neoadjuvant chemoradiation

Ashley L. Deeb, M.D.; Aaron R. Dezube, M.D.; Luis E. De Leon, M.D.; Suden Kucukak, M.D.; Michael T. Jaklitsch, M.D.; Jon O. Wee, M.D.

Background: Since the results of the CROSS trial, neoadjuvant chemoradiation followed by esophagectomy has become the standard treatment for resectable, locally advanced esophageal cancer. Esophagectomy is usually performed 4-6 weeks after completion of chemoradiation, however, this time may be delayed for a variety of reasons. Delayed esophagectomy is associated with worse outcomes. We aimed to investigate which factors impacted time to esophagectomy in our patients to identify modifiable factors.

Methods: IRB approval was obtained for this project. We included patients with pT0-3N0-2 esophageal cancers who underwent CROSS trimodality therapy from May 2016 to January 2020. We examined differences in sociodemographic factors (race, gender, ethnicity, place of residence, median county income), comorbidities, and neoadjuvant factors (location of chemoradiation, treatment toxicity, discontinuation of treatment) between those who underwent surgery within 60 days and those who underwent surgery outside that window.

Results: 197 patients were analyzed. The median time to esophagectomy after CRT for the cohort was 49 days (IQR 24.5 days). 137 underwent esophagectomy within 60 days (early surgery) and 60 were outside that window (delayed surgery). Table 1 displays demographics and treatment factors for the cohort. Delayed surgery patients were older (68.45 years (IQR 10.08) vs. 65.82 years (IQR 13.00), p=0.01) and more were smokers (86.67% vs. 66.42%, p=0.003). More delayed surgery patients had a history of myocardial infarction or stroke (both 11.67% vs. 3.65%, p=0.05). A smaller portion of delayed surgery patients received chemoradiation at Dana Farber (DFCI) or a DFCI satellite site (20.00% DFCI and 13.33% satellite vs. 32.85% DFCI and 25.55% satellite, p=0.01). Similarly, less delayed surgery patients saw our surgeons before chemoradiation completion (68.33% vs 89.78%, p=0.00). More delayed surgery patients required neoadjuvant dose reduction (16.67% vs. 6.57%, p=0.04). In univariable logistic regression, chemoradiation at DFCI (OR 2.63 95% CI 1.24-5.59, p=0.01) or a satellite site (OR 3.07, 95% CI 1.29-7.31, p=0.01) and evaluation by thoracic surgery (OR 4.07 95% CI 1.87-8.84, p=0.00) favorably impacted time to esophagectomy. History of myocardial infarction (OR 0.29, 95% CI 0.09-0.94, p=0.04), stroke (OR 0.29, 95% CI 0.09-0.94, p=0.04), smoking (OR 0.3, 95% CI 0.13-0.69, p=0.01), and chemoradiation dose reduction (OR 0.35, 95% CI 0.13-0.92, p=0.03) negatively impacted timely esophagectomy.

Limitations: Our study is limited by its sample size and retrospective nature. Additionally, our population of patients was largely homogenous with regards to certain sociodemographic factors such as race, place of residence, and income.

Conclusions: Our study indicates that certain comorbidities, negative treatment effects, evaluation by thoracic surgeons at an academic institution, and location of chemoradiation impacted esophagectomy timing. Improving access to large multispecialty cancer centers may improve time to esophagectomy. Additionally, increasing satellite sites for these cancer centers may reduce rates of delayed surgery, though further study is warranted.

Early thoracic surgery consultation and location of therapy impact time to esophagectomy after completion of neoadjuvant chemoradiation (cont.)

	<=60 Days 137	>60 Days 60	Overall 197	p-value
Age, median (IQR)	65.82 (13)	68.45 (10.08)	66.35 (11.04)	**0.01**
Gender (male), n (%)	115 (83.94%)	48 (80.00%)	163 (82.74%)	0.50
BMI, median (IQR)	28.06 (7.11)	26.35 (6.54)	27.29 (6.87)	0.15
Smoking, n (%)	91 (66.42%)	52 (86.67%)	143 (72.59%)	**0.003**
Race, n (%)				1.00
White	125 (91.24%)	57 (95.00%)	182 (92.39%)	
Asian	4 (2.92%)	1 (1.67%)	5 (2.54%)	
African American	2 (1.46)	1 (1.67%)	3 (1.52%)	
American Indian	1 (0.73%)	0 (0.00%)	1 (0.51%)	
Declined	3 (2.19%)	1 (1.67%)	4 (2.03%)	
Other	2 (1.46%)	0 (0.00%)	2 (1.02%)	
Median County Income, n (range)	71895 (21072)	72186.5 (24532)	71895 (21072)	0.44
Thoracic Evaluation*, n (%)				**0.00**
Yes	123 (89.78%)	41 (68.33%)	164 (83.25%)	
No	14 (10.22%)	19 (31.67%)	33 (16.75)	
Neoadjuvant Therapy Location, n (%)				**0.01**
BWH/DCFI	45 (32.85%)	12 (20.00%)	57 (28.93%)	
DCFI Satellite	35 (25.55%)	8 (13.33%)	43 (21.83%)	
Outside	57 (41.61%)	40 (66.67%)	97 (49.24%)	
Neoadjuvant Therapy, n (%)				
Complete	116 (84.67%)	45 (75.00%)	161 (81.73%)	0.11
Discontinued	11 (8.03%)	5 (8.33%)	16 (8.12%)	1.00
Dose Reduction	9 (6.57%)	10 (16.67%)	19 (9.64%)	**0.04**

* Evaluation by BWH thoracic surgeon
IQR= Interquartile range
BMI= Body mass index
BWH= Brigham and Women's Hospital
DFCI= Dana Farber Cancer Institute

Table 1. Demographics and treatment course of cohort

Original Investigation

Evaluation of the Early Adoption Phase of Robotic Assisted Lung Resection in a Well-established Video Assisted Thoracic Surgery Practice

Ashley L. Deeb ,M.D.; Luis De Leon, M.D.; Suden Kucukak, M.D.; Emanuele Mazzola, PhD; Michael T. Jaklitsch, M.D.; Jon O. Wee, M.D.; Matthew M. Rochefort, M.D.

Background: Reported advantages to robotic thoracic surgery include shorter length of stay, improved lymphadenectomy, and decreased complications. It is uncertain if these benefits occur when introducing robotics into a well-established video-assisted thoracoscopy practice. We compared the two approaches to investigate these advantages.

Methods: IRB approval was obtained for this project. Patients who underwent segmentectomy or lobectomy from May 2016-December 2018 were propensity-matched 2:1 (video-assisted thoracic surgery: robotic) and compared using weighted logistic regression with age, gender, Charlson Comorbidity Index, surgery type, stage, Exparel, and epidural as covariates. Complication rates, operation times, number of sampled lymph nodes, pain level, disposition, and length of stay were compared using Wilcoxon rank-sum and with Rao-Scott Chi-squared tests.

Results: 213 patients (142 video-assisted thoracic surgery and 71 robot) were matched. Robotic cases were longer than video-assisted thoracic surgery (median 186 min (Interquartile ratio (IQR) 78) vs. 164 min (IQR 78.75); $p<0.001$). Significantly more lymph nodes (median 11 (IQR 7.50) vs. 8 (IQR 7.00); $p=0.004$) and stations were sampled (median 4 (IQR 2.00) vs. 3 (IQR 1.00); $p<0.001$) with the robot. Interestingly, robotic resections had higher 72-hour pain scores (median 3 (IQR 3.25) vs 2 (IQR 3.50); $p=0.04$) and 48-hour opioid usage (median 37.50 morphine milligram equivalents (IQR 45.50) vs 22.50 morphine milligram equivalents (IQR 37.50); $p=0.01$). Morbidity, Length of stay, and disposition were similar (all $p>0.05$).

Limitations: Limitations to this study include its retrospective nature which we attempted to overcome by utilizing a propensity match. Additionally, since this was conducted at one academic medical center, the findings may not be generalizable to other academic or community medical centers. With regards to pain scores and morphine milligram equivalents, we did not have information on whether patients had chronic opioid requirements. Finally, numerical pain scores are subjective and may not be an accurate measurement of postoperative pain.

Conclusions: The robotic approach facilitates better lymph node sampling, even in an established video-assisted thoracic surgery practice.

Evaluation of the Early Adoption Phase of Robotic Assisted Lung Resection in a Well-established Video Assisted Thoracic Surgery Practice (cont.)

		Matched Total 213	Matched VATS 142 (66.67%)	Matched Robot 71 (33.33%)	p-value
Surgery Type					0.55
Lobectomy	n (%)	150 (70.42%)	98 (69.01%)	52 (73.24%)	
Segmentectomy	n (%)	63 (29.58%)	44 (30.99%)	19 (26.76%)	
Surgical Variables					
Operative Time, minutes	median (IQR)	174 (73.00)	164 (78.75)	186 (78.00)	**<0.001**
Total LN Stations Sampled	median (IQR)	4 (2.00)	4 (2.00)	5 (2.00)	**<0.001**
Total LN Sampled	median (IQR)	9 (8.00)	8 (7.00)	11 (7.50)	**0.01**
Conversion	n (%)	10 (4.69%)	8 (5.63%)	2 (2.82%)[a]	0.52
Return to Operating Room	n (%)	7 (3.29%)	5 (3.52%)	2 (2.82%)	0.80
Postoperative Variables					
Patients with Complications	n (%)	54 (25.35%)	38 (26.76%)	16 (22.54%)	0.53
Grade II	n (%)	50 (23.47%)	37 (26.06%)	13 (18.31%)	0.25
Grade III	n (%)	12 (5.63%)	7 (4.93%)	5 (7.04%)	0.54
Grade IV	n (%)	2 (0.94%)	1 (0.70%)	1 (1.41%)	0.61
Grade V	n (%)	N/A			
Hospital LOS, days	median (IQR)	3 (3.00)	3 (3.00)	3 (2.50)	0.94
Disposition					0.88
Home	n (%)	44 (20.66%)	30 (21.13%)	14 (19.72%)	
Home with Services	n (%)	161 (75.59%)	106 (74.65%)	55 (77.46%)	
Rehab	n (%)	7 (3.29%)	5 (3.52%)	2 (2.82%)	
Nursing Home	n (%)	1 (0.47%)	1 (0.70%)	0 (0.00%)	

VATS= video-assisted thoracoscopy
LN= lymph node
IQR= interquartile range
LOS= length of stay
[a]One case converted to VATS

Table 1. Perioperative outcomes of cohort

		Matched Total 213	Matched VATS 142 (66.67%)	Matched Robot 71 (33.33%)	p-value
Postoperative Analgesic Method					
Exparel	n (%)	130 (61.03%)	91 (64.08%)	39 (54.93%)	0.22
Epidural	n (%)	63 (29.58%)	51 (35.92%)	12 (16.90%)	**0.01**
Postoperative Pain					
Pain Scores					
PACU	median (IQR)	6 (8.00)	5.50 (8.00)	6 (6.50)	0.97
12 Hours	median (IQR)	4 (4.00)	4 (4.00)	4 (3.00)	0.84
24 Hours	median (IQR)	4 (4.00)	4 (3.00)	4 (4.00)	0.58
48 Hours[a]	median (IQR)	3 (3.00)	3 (2.00)	3 (3.00)	0.36
72 Hours[b]	median (IQR)	2 (3.00)	2 (3.50)	3 (3.25)	**0.04**
Morphine Milligram Equivalents					
24 Hours	median (IQR)	48 (51.00)	43 (62.88)	52 (35.50)	0.56
48 Hours	median (IQR)	29 (43.50)	22.50 (37.50)	37.50 (45.50)	**0.01**

VATS= video-assisted thoracoscopy
PACU= post-anesthesia care unit
IQR= interquartile range
[a]Excluded patients discharged before 48 hours (206 included, 141 VATS, 65 robot)
[b]Excluded patients discharged before 72 hours (143 included, 103 VATS, 40 robot)

Table 2. Postoperative pain scores and opioid requirements for cohort

Original Investigation

High Lipoprotein(a) level is associated with an increased risk of early (age <60) coronary artery disease: retrospective chart review

Ceyda Akartuna, Sarthak Khare, Michael Johnstone

SEMC-Division of Cardiovascular Medicine

Background: Lipoprotein(a), a unique lipoprotein b which is attached to apolipoprotein(a), has gained attention as an important independent risk factor for the development of coronary artery disease, stroke and aortic stenosis.We evaluated whether this risk of coronary artery disease is equal throughout all ages or more important in younger age groups.

Methods: This is a single center, retrospective case-controlled study conducted in the outpatient setting in a tertiary care hospital. Electronic medical records of a total of 62 patients that were seen in the general cardiology clinic between the years 2019 and 2020 were reviewed initially. Patients with diabetes and smoking were excluded. Among the initial 62 patients, 40 had available laboratory data including lipoprotein(a) levels and comprehensive documentation of medical history. Patients were assigned to high-lipoprotein(a) group (≥ 50 mg/dl) and low-lipoprotein(a) group (< 50 mg/dl). Outcomes of interest were initial presentation of clinical coronary artery disease requiring admission, which included unstable angina, myocardial infarction, percutaneous intervention or bypass graft surgery, and the age at presentation of coronary artery disease. Chi Square Analysis was performed to examine the association between high lipoprotein(a) levels and coronary artery disease.

Results: The groups were similar in terms of characteristics including incidence of hypertension (15/22 in high lipoprotein(a) group; 7/18 in low lipoprotein(a) group), total cholesterol levels (mean of 144 in high lipoprotein(a) group; 174 in low lipoprotein(a) group), and LDL levels (mean of 76 in high lipoprotein(a) group; 80 in low lipoprotein(a) group). Mean lipoprotein(a) levels were 183 and 25 respectively in high and low lipoprotein(a) groups. 91% of the patients with high lipoprotein(a) levels had coronary artery disease compared to 72% in the low lipoprotein(a) group ($p = 0.03$). Mean age at diagnosis of coronary artery disease was 55 and 64 respectively in high and low lipoprotein(a) groups. ($p = 0.09$). In addition, the relative risk of high lipoprotein(a) associated with coronary artery disease is almost 3.8 fold greater likelihood than in those with no coronary artery disease.

Limitations: This is a single center, retrospective study with a small sample size. There is ascertainment bias as the data was collected in a single setting, which was the general cardiology clinic.

Conclusions: In the absence of smoking and diabetes, patients with high lipoprotein(a) levels (≥ 50 mg/dl) had an increased risk of coronary artery disease requiring percutaneous intervention or bypass graft surgery and an earlier age at diagnosis of coronary artery disease compared to patient with low lipoprotein(a) levels.

High Lipoprotein(a) level is associated with an increased risk of early (age <60) coronary artery disease: retrospective chart review (cont.)

	No CAD	CAD	*Marginal Row Totals*
Lp(a)<50	5 (3.15) [1.09]	13 (14.85) [0.23]	18
Lp(a)>50	2 (3.85) [0.89]	20 (18.15) [0.19]	22
Marginal Column Totals	7	33	40 (Grand Total)

Table 1. Chi Square Analysis

Age at Onset of CAD

Variables**AgeCADonset**

Lp(a) Group	N	Mean	Std. Deviation	Std. Error of Mean
Low (< 50 mg/dl)	10	64.3	11.37	3.60
High (≥ 50 mg/dl)	20	55.7	13.18	2.95

Test Statistics	
Mann-Whitney U	61.000
Wilcoxon W	271.000
Standardized Test Statistic (Z)	-1.718
Asymptotic Sig.(2-sided test)	.086
Exact Sig.(2-sided test)	.091

Table 2. Age at Onset of CAD

Original Investigation

Implementing 4-Meter Gait Speed as a Routine Vital Sign in a Thoracic Surgery Clinic

Ashley L. Deeb, M.D.; Matthew Garrity, BS; Lisa Cooper, M.D.; Laura N. Frain, M.D., MPH; Michael T. Jaklitsch, M.D.; Clark Dumontier, M.D., MPH

Background: Gait speed is a simple but powerful objective measure of physical performance; it may be a useful addition to preoperative assessment of older adults. However, it is uncertain how successfully this measure can be integrated into a busy thoracic surgery clinic. We examined the feasibility and acceptability of medical assistants measuring 4-meter gait speed (4MGS) as part of their routine vital sign assessment.

Methods: IRB approval was obtained for this project. Clinic staff were trained in 4MGS measurement by a board-certified geriatrician. To minimize disruptions in workflow, the 4-meter distance started where patients enter clinic and ended in front of the room where vital signs are obtained (Figure 1). New patients presenting to a single thoracic surgeon's clinic January 2021-July 2021 were eligible. Patients were timed with a stopwatch as they walked the marked distance starting from a standstill. If the patient uses a mobility aid, they were instructed to use this device. We examined the number of eligible patients who had 4MGS measured to determine feasibility. We additionally compared characteristics between patients with 4MGS measurement and those without. To measure burden and acceptability amongst the staff, we administered a survey once at the conclusion of the study period (Figure 2).

Results: Overall, 69 (63.3%) of 109 patients had 4MGS recorded in the medical record. The cohort was mainly female (51.4%), white (86.2%), and non-Hispanic (92.7%), with a median age of 67 years (interquartile range (IQR) 59-74). Additionally, 21 (19.3%) patients were assessed by a geriatrician. Median 4MGS was 0.94 m/s (IQR 0.80-1.11 m/s). Female patients (60.9% females vs. 35.0% males, p=0.01) and patients evaluated by a geriatrician (85.7% evaluated vs. 14.3% not evaluated, p=0.02) had significantly higher completion rates, respectively. There was a 100% response rate on the survey (7/7 medical assistants). Overall, the measure seemed easy to learn (100% responding with easy or very easy), administer (85.7% responding with easy or very easy), and was well accepted by the patients (100% responding with easy or very easy). The largest barrier was medical assistants not remembering to measure 4MGS in new patients (28.6% responding with easy or very easy). Common responses to what would help medical assistants remember included writing reminders on the patient board, providing reminders in the patient's medical record, and including it on the sheet where the medical assistants record their vitals.

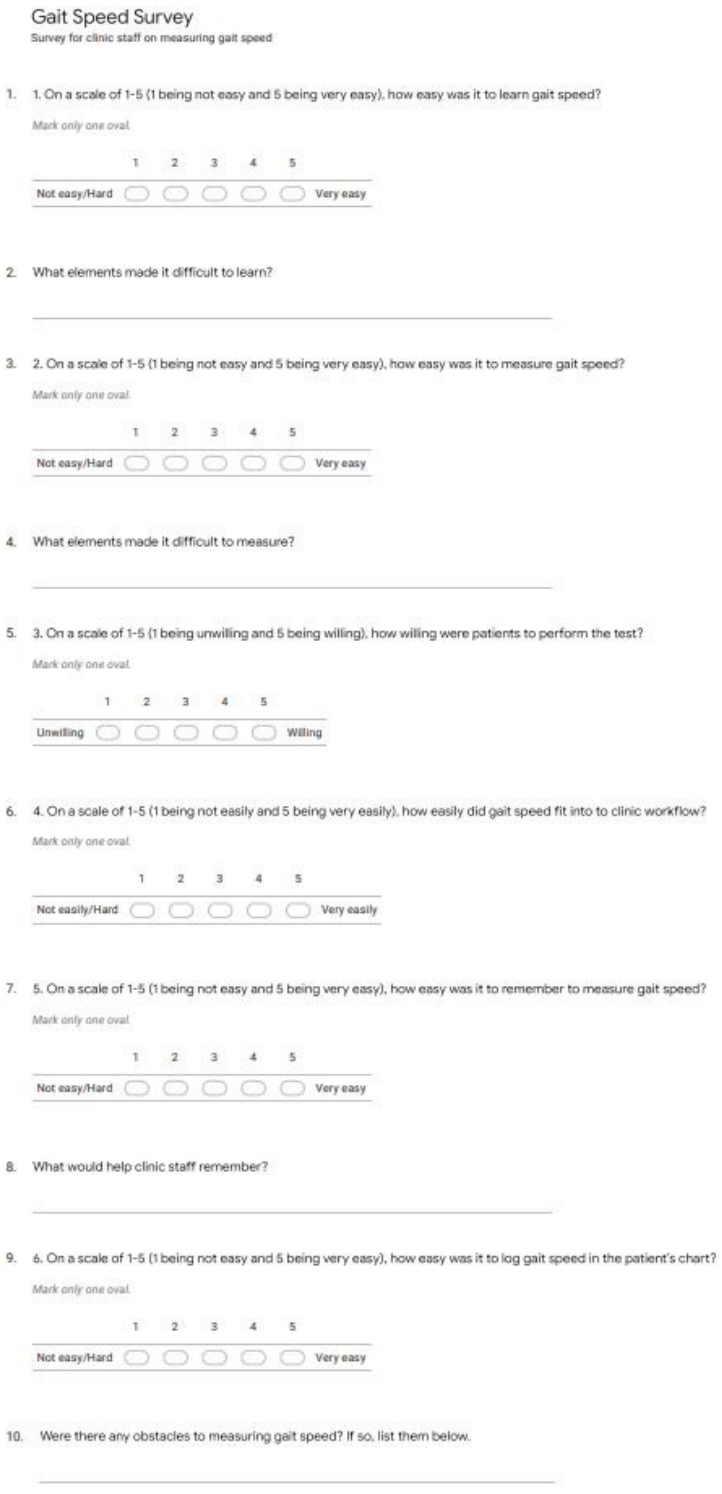
Limitations: One limitation to this study is that we only measured 4MGS once rather than taking the average of multiple trials. Additionally, we were not able to track some reasons (such as patient refusal) why 4MGS was not completed in an eligible patient. Finally, this study was conducted in one surgeon's clinic and may not be applicable to other thoracic surgery clinics both within and outside this institution.

Conclusions: 4MGS was successfully integrated into the medical assistant's workflow and was acceptable and moderately feasible to measure as a routine vital sign.

Implementing 4-Meter Gait Speed as a Routine Vital Sign in a Thoracic Surgery Clinic (cont.)

Figure 1. Starting and end points for measuring gait speed in clinic.

Implementing 4-Meter Gait Speed as a Routine Vital Sign in a Thoracic Surgery Clinic (cont.)



Gait Speed Survey

Survey for clinic staff on measuring gait speed

1. 1. On a scale of 1-5 (1 being not easy and 5 being very easy), how easy was it to learn gait speed?

   Mark only one oval.

	1	2	3	4	5	
Not easy/Hard	◯	◯	◯	◯	◯	Very easy

2. What elements made it difficult to learn?

3. 2. On a scale of 1-5 (1 being not easy and 5 being very easy), how easy was it to measure gait speed?

   Mark only one oval.

	1	2	3	4	5	
Not easy/Hard	◯	◯	◯	◯	◯	Very easy

4. What elements made it difficult to measure?

5. 3. On a scale of 1-5 (1 being unwilling and 5 being willing), how willing were patients to perform the test?

   Mark only one oval.

	1	2	3	4	5	
Unwilling	◯	◯	◯	◯	◯	Willing

6. 4. On a scale of 1-5 (1 being not easily and 5 being very easily), how easily did gait speed fit into to clinic workflow?

   Mark only one oval.

	1	2	3	4	5	
Not easily/Hard	◯	◯	◯	◯	◯	Very easily

7. 5. On a scale of 1-5 (1 being not easy and 5 being very easy), how easy was it to remember to measure gait speed?

   Mark only one oval.

	1	2	3	4	5	
Not easy/Hard	◯	◯	◯	◯	◯	Very easy

8. What would help clinic staff remember?

9. 6. On a scale of 1-5 (1 being not easy and 5 being very easy), how easy was it to log gait speed in the patient's chart?

   Mark only one oval.

	1	2	3	4	5	
Not easy/Hard	◯	◯	◯	◯	◯	Very easy

10. Were there any obstacles to measuring gait speed? If so, list them below.

Figure 2. Survey administered to clinic staff measuring difficulty of learning, measuring, recording, and remembering to measure 4MGS.

Original Investigation

Long-term outcomes following esophagectomy in older and younger adults with esophageal cancer

Aaron R. Dezube, M.D.; Lisa Cooper, M.D.; Emanuele Mazzola, PhD; Daniel P. Dolan, M.D.; Daniel N. Lee, BS; Suden Kucukak, M.D.; Luis E. De Leon, M.D.; Clark Dumontier, M.D.; Bayonle Ademola, M.D.; Emily Polhemus, BS; Raphael Bueno, M.D.; Abby White, DO; Scott J. Swanson, M.D.; Michael T. Jaklitsch, M.D.; Laura Frain, M.D.; Jon O. Wee, M.D.

Background: Patterns of overall and disease-free survival after esophagectomy for esophageal cancer in older adults have not been carefully studied.

Methods: Retrospective analysis of all patients with esophageal cancer undergoing esophagectomy from 2005-2020 at our institution was performed. Differences in outcomes were stratified by age groups, <75 and ≥75 years old, and two time periods, 2005-2012 and 2013-2020.

Results: A total of 1135 patients were included: 979 (86.3%) patients were <75 (86.3%), and 156 (13.7%) were ≥ 75 years old. Younger patients had fewer comorbidities, better nutritional status, and were more likely to receive neoadjuvant and adjuvant therapy (all p<0.05). However, tumor stage and operative approach were similar, except for increased performance of McKeown technique in younger patients (p=0.02).Perioperatively, younger patients experienced fewer overall and grade II complications (both p<0.05). They had better overall survival (log-rank p-value <0.001) and median survival, 62.2 vs. 21.5 months (p<0.05). When stratified by pathologic stage, survival was similar for yp0 and pathologic stage II disease (both log-rank p-value >0.05).Multivariable Cox models showed older age (≥75-year-old) had increased hazard for reduced overall-survival (HR 2.04 95% CI 1.5-2.8; p<0.001) but not disease-free survival (HR 1.1 95% CI 0.78-1.6; p=0.54).Over time, baseline characteristics remained largely similar, while stage became more advanced with a rise in neoadjuvant use and increased performance of minimally invasive esophagectomy (all p<0.05). While overall complication rates improved (p<0.05), overall and recurrence-free survival did not (Figure 1). Overall survival was better in younger patients during both time periods (both log-rank p<0.05) (Figure 2).

Limitations: This study has several limitations. First, this is a retrospective analysis of a single center prospectively collected database. As such, certain variables such as frailty measures, neoadjuvant and adjuvant regimen and toxicity, as well as causes of death outside the hospital were often not reported. Second, we acknowledge the potential for selection bias as we only analyzed data for those patients who underwent center, and particularly at a large tertiary referral center.

Conclusions: Despite similar disease-free survival rates, long-term survival was decreased in older adults as compared to younger patients. This may be related to unmeasured factors including frailty, long term complications after surgery, and competing causes of death. However, our results suggest that survival is similar in those with complete pathologic response.

Original Investigation

Long-term outcomes following esophagectomy in older and younger adults with esophageal cancer (cont.)

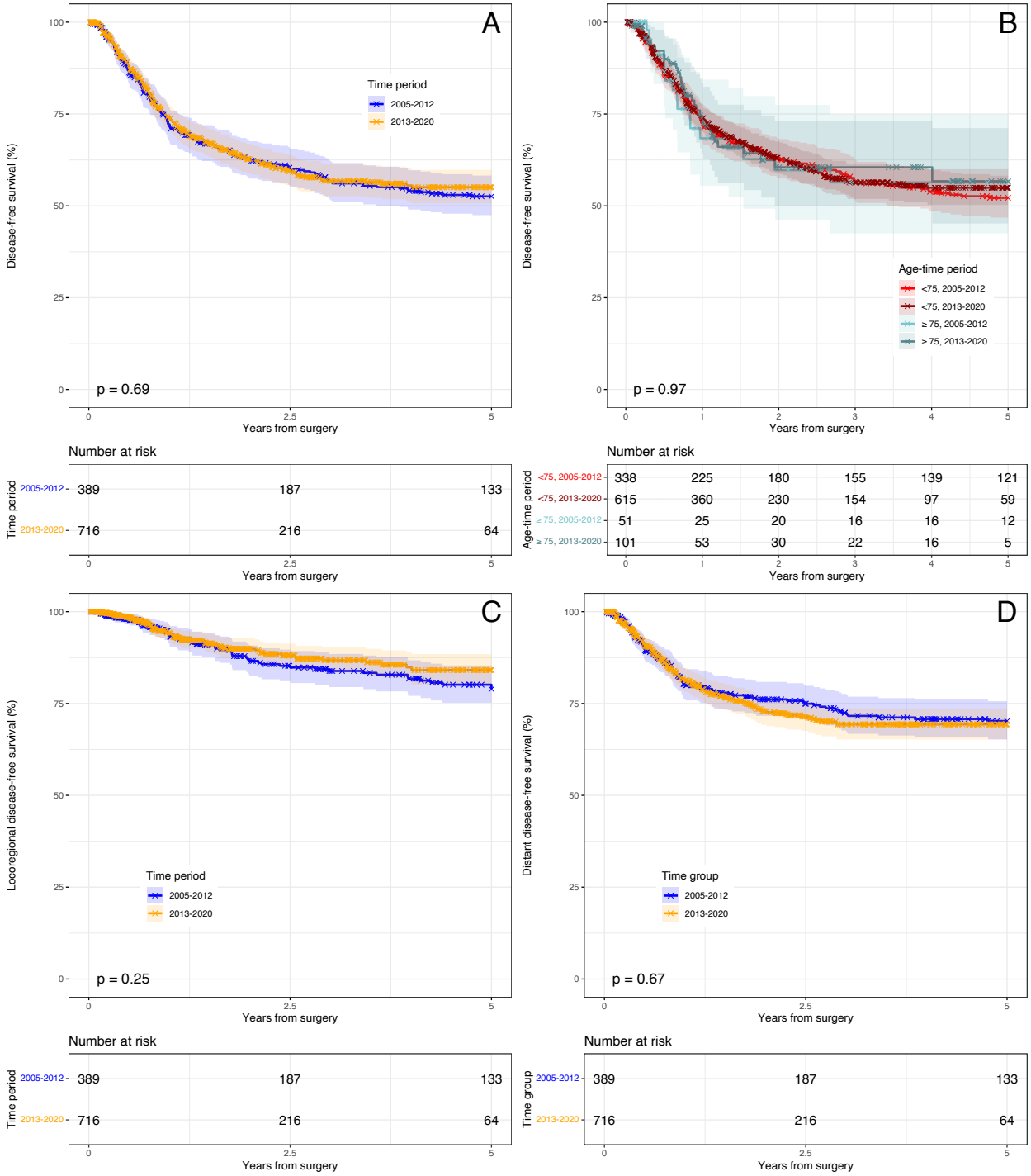


Figure 1. 1A shows overall disease-free survival by time; 1B shows overall disease-free survival by Age and Time; 1C shows locoregional disease-free survival by time; 1D shows distant disease-free survival by time

Original Investigation

Long-term outcomes following esophagectomy in older and younger adults with esophageal cancer (cont.)

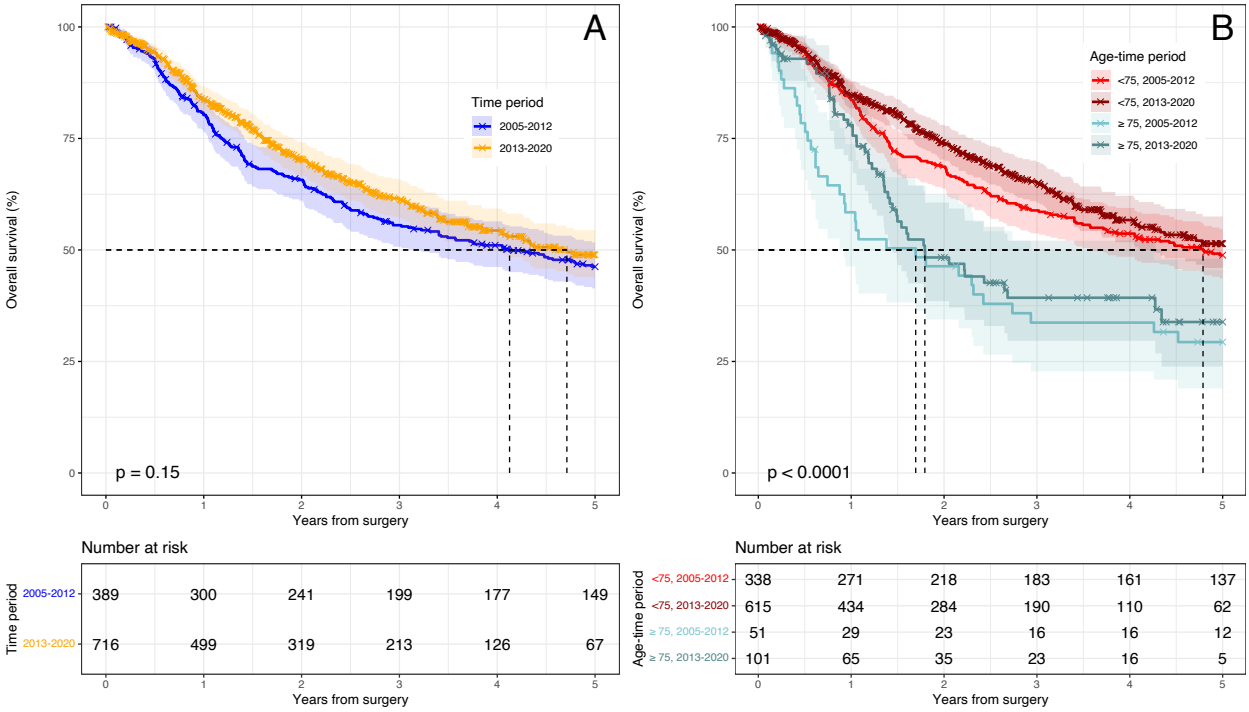


Figure 2. 2A: Overall survival between time periods; 2B: Overall survival between age groups and time periods

Original Investigation

Midlevel Providers Focusing on Geriatrics Improve Care and Outcomes of Fall Related Injuries Among the Elderly (DOI: 10.1177/00031348211050821)

Matthew F. Holt, MD, MPH; George M. Testerman, MD, FACS

Background: A rural level 1 trauma center underwent a consolidation to level 3 status in a new trauma network system. A group of midlevel practitioners emphasizing early mobilization, a geriatric care model, and fall prevention replaced surgical residents in the level 3 center. We hypothesized that outcomes of elderly fall related injuries may be enhanced with midlevel providers using a geriatric focused care model.

Methods: An Institutional Review Board (IRB) approved trauma registry review of patients over 65 years of age with a fall related injury admitted to a rural trauma center one year prior to and one year following a trauma center consolidation from level 1 to level 3 designation evaluated demographics, anticoagulant use, comorbidities, and clinical outcomes. Statistical analysis included t-test and regression analysis. The Ballad Health IRB approved this trauma registry review, approval number [1706037-1].

Results: 327 patients injured by falls were seen over a 2-year study period. The number of patients admitted with a fall related injury and the injury severity were similar over the study period. Increasing age and anticoagulant use increased length of stay and mortality (both with $P<.05$). Mortality rates and patient level of independence on discharge were improved in the later period involving midlevel practitioners (both with $P<.05$).

Limitations: Opportunities for the progression of this research include incorporating a larger sampler size, using frailty score as a predictor of outcomes, implementing propensity matching for a higher level of statistical analysis, and granulation of the data looking at specific comorbidities and medications the patients may be on which could influence their course of treatment and outcomes.

Conclusions: Trauma centers and trauma system networks face increasing challenges to provide resources and providers of care for patients injured by falls, especially for the growing elderly population. Midlevel providers focusing on geriatric clinical issues and goals may enhance care and outcomes of elderly fall related injuries.

Midlevel Providers Focusing on Geriatrics Improve Care and Outcomes of Fall Related Injuries Among the Elderly (DOI: 10.1177/00031348211050821) (cont.)

Variables	2019 (n=177)	2020 (n=150)	p value
Admissions, n (% of total)	177 (54.1%)	150 (45.8%)	
AIS Head/Neck	1.7	1.8	0.8
AIS Chest	0.6	0.5	0.5
AIS Extremities	0.7	0.7	0.7
AIS Abdomen	0.2	0.2	NS
Average Age (years)	79.1	79.4	NS
Male gender, n (%)	47%	40%	0.2
ISS*	10.2	9.8	0.9
GCS**	14.2	14.2	NS
LOS**	5.3	4.9	0.1
ICU LOS	2.2	2	0.8
% Ground Level Fall	64%	63%	NS
Outcome Death (%)	12.5%	8.7%	0.01*
% taking anticoagulants	45%	44%	NS
% with comorbidities	75%	87%	NS

Table 1. Demographics of 327 Fall Related Injuries (2019 & 2020)
*Age, ISS, anticoagulants, and AIS Head and Neck were predictors of death. Anticoagulants predicted death, worse head injuries and length of stay. Legend: Values as mean; AIS, Abbreviated Injury Score; *ISS, Injury Severity Score;
**GCS, Glasgow Coma Scale Score; LOS, Length of Stay,
days; $p<0.05$ significant; NS, non-significant.

Original Investigation

Pre-COVID19 National Mortality Trends in Open and Video-Assisted Lobectomy for Non-Small Cell Lung Cancer

Aaron R Dezube, M.D.; Sameer Hirji, M.D. ,MPH; Rohan Shah, M.D., MPH; Andrea Axtell, M.D., MPH; Maria Rodriguez, M.D.; Scott Swanson, M.D.; Michael T. Jaklitsch, M.D.; Gita N. Mody ,M.D., MPH

Background: In the current era of episode-based hospital reimbursements, it is important to determine the impact of hospital size on contemporary national trends in surgical technique and outcomes of lobectomy.

Methods: Patients age >18 years undergoing open and Video-Assisted Thorascopic lobectomy from 2008 to 2014 were identified using insurance claims data from the National Inpatient Sample (NIS). Impact of hospital size on surgical approach and outcomes for both open and VATS lobectomy were analyzed.

Results: Over the 7-year period, 202,668 lobectomies were performed nationally, including 71,638 VATS and 131,030 open. While the overall number of lobectomies decreased (30,058 in 2008 vs. 27,340 in 2014, $p<0.01$), the proportion of VATS lobectomies increased (24.0% vs. 46.9%) while open lobectomies decreased (76.0% vs. 53.0%, all $p<0.01$). When stratified by hospital size, small hospitals had a significant increase in proportion of open lobectomies (6.4% to 12.2%; $p=0.01$) and trend towards increased number of VATS lobectomies (2.7% to 12.2%). Annual mortality rates for VATS (range: 1.0%-1.9%) and open (range: 1.9%-2.4%) lobectomy did not significantly differ over time (all $p>0.05$) but did decrease among small hospitals (4.1% to 1.3% and 5.1% to 1.1% for VATS and open respectively; both $p<0.05$)(Figure 1 depicts open lobectomy rates; Figure 2 depicts VATS rates respectively). After adjusting for confounders, hospital bed size was not a predictor of in-hospital mortality.

Limitations: Results of our study should be interpreted in light of both its strengths and limitations. The NIS is derived from hospital claims data without access to individual medical records and is subject to the shortcomings of administrative datasets. The NIS also does not contain details on patient presentation, cancer pathology, surgeon experience, and details of surgical procedure, which would have been important as these have previously been identified as risk factors for adverse outcome.

Conclusions: Utilization of VATS lobectomies has increased over time, more so among small hospitals. Mortality rates for open lobectomy remain consistently higher than VATS lobectomy (range 0.4%-1.4%), but did not significantly differ over time. This data can help benchmark hospital performance in the future.

Pre-COVID19 National Mortality Trends in Open and Video-Assisted Lobectomy for Non-Small Cell Lung Cancer (cont.)

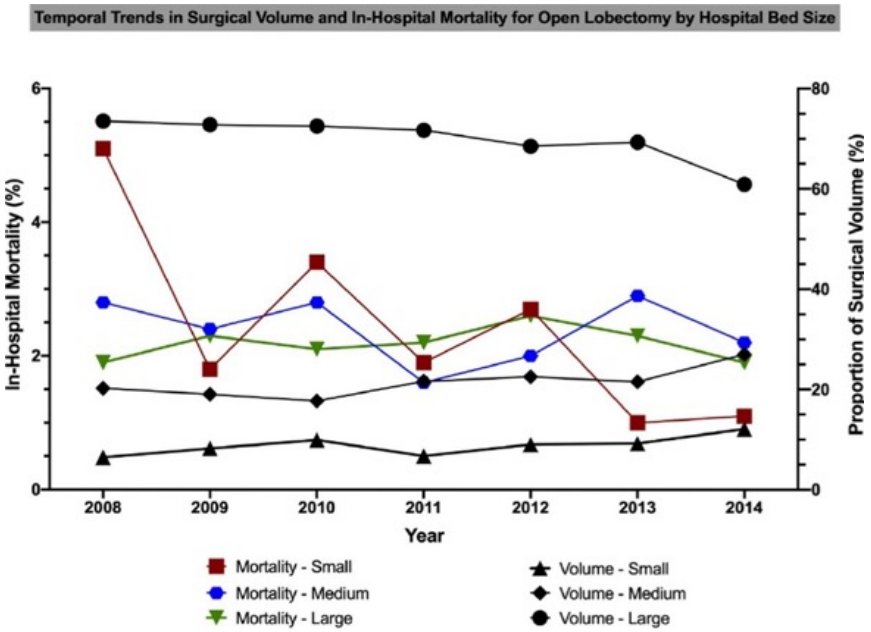


Figure 1. Open Lobectomy In-hospital mortality rates remained stable for medium/large hospitals. improvement in mortality was observed for small hospitals.

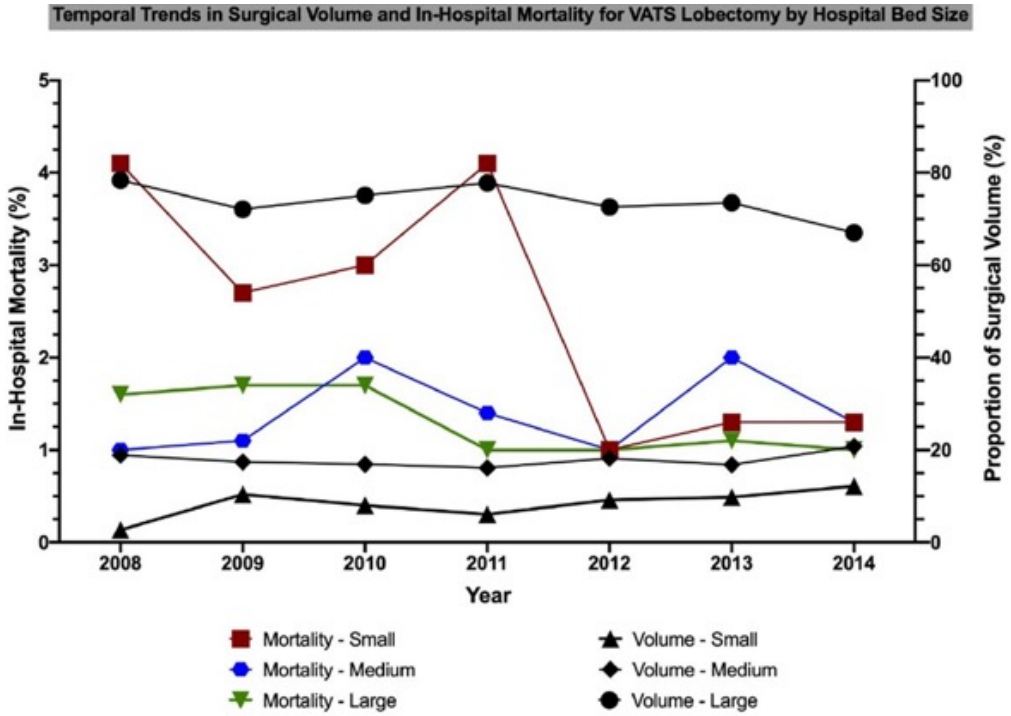


Figure 2. A similar trend for VATS Lobectomy was observed with In-hospital mortality rates remaining stable for medium/large hospitals. Statistical improvement in mortality was observed for small hospitals

Original Investigation

Pulmonary Wedge Resection Margin to Tumor Distance Measurement: Impact of Improved Frozen Section Techniques with In-Situ Staple Removal

Aaron R. Dezube, M.D.; Vivian Chan, BA; Emanuele Mazzola, PhD; Michael T. Jaklitsch, M.D.; Lynette M. Sholl, M.D.

Background: Frozen section evaluation of oncologic lung-resection specimens provides intraoperative diagnosis and margin distance. Pathology laboratories traditionally remove stapled margins with embedded lung tissue prior to microscopic examination which underestimates true margin distance. A novel method of obtaining frozen margins may address this issue.

Methods: Retrospective review of 281 consecutive pulmonary wedge-resections frozen margins utilizing two frozen section protocols: the Stapled Margin Protocol method, with staple removal from the margin during sectioning (Figure 1), and the "Traditional Protocol" involving removal of the stapled margin with scissors prior to sectioning. Inclusion criteria was margin <3cm and confirmed diagnosis of primary lung cancer, carcinoma in-situ, or metastatic disease at our institution between 2016-2017. Stapled Margin Protocol and Traditional Protocol were compared in terms of patient demographics, tumor characteristics, amount of tissue removed, and concordance between frozen microscopic and gross margin with final tumor margin with adjustment by tumor histology

Results: 122 specimens (43%) underwent Stapled Margin Protocol. Gross and microscopic measurements linear relationship (Spearman's correlation) and measurement agreement was generally better with Stapled Margin Protocol (Figure 2), especially for primary lung adenocarcinomas and precursors. Histology impacted measurement agreement. Traditional protocol led to an average of 0.36 cm of lung tissue being removed with the staple margin.

Limitations: Our study had several limitations as it was a single center non randomized trial with traditional protocol performed during different time period while the Stapled Margin Protocol method was performed by a single experienced operator which may lead to favorable bias towards the Stapled Margin Protocol method.

Conclusions: Stapled Margin Protocol margin evaluation is feasible in practice with increased correlation between gross and microscopic measurements which may reduce false positive margin rates compared to traditional handling.

Pulmonary Wedge Resection Margin to Tumor Distance Measurement: Impact of Improved Frozen Section Techniques with In-Situ Staple Removal)cont.)

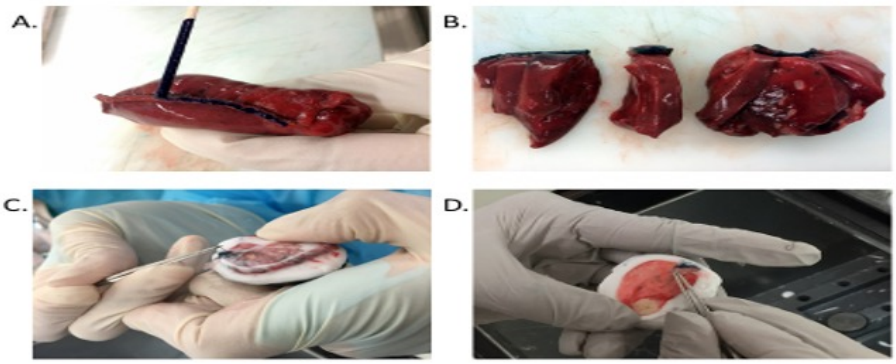


Figure 1. A: Wedge resection staple margin is inked. B: The specimen is serially sectioned, the section showing closest gross distance to margin is selected. C: After mounting and freezing in O.C.T. compound, visible staples are removed from the frozen tissue face. D: Staples are removed iteratively and relation to margin shown.

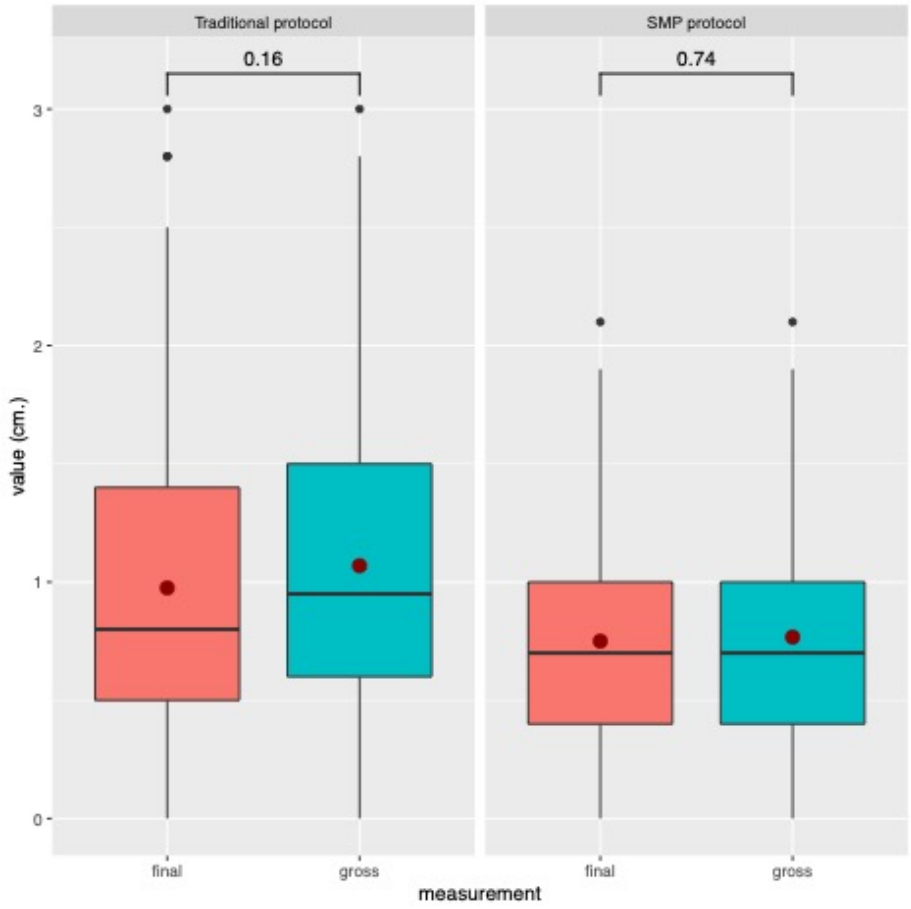


Figure 2. Boxplot representing variability of the gross and final microscopic measurements (cm) for the traditional and Stapled Margin Protocol protocols. Mean values are represented with the red dot.

Original Investigation

Right Sided Left Bundle Area Lead Implants - A Success Story?

Ioannis Koulouridis, Marianna Nikolaychuc, Adhiraj Bhattacharya, Donald Parlin, Artem Astsaturov, Danylo Zorin, John Wylie, Alena Goldman, Shaw Natan, Michael Orlov

Background: His bundle pacing has been challenging from right-sided access. Success rate for right-sided left bundle area pacing lead implants is unknown.

Objective: To investigate success rate and pacing parameters of right-sided implants in comparison to left-sided in a tertiary referral center.

Method: Procedural characteristics and electrophysiology parameters in 81 patients, who underwent left bundle area pacing at a tertiary referral center, were extracted from medical records. Data on right-sided implants were compared to left-sided. Anatomical implant failure was defined as inability to advance lead into septum. Electrophysiologic failure was defined as QRS > 130 msec and/or VAT > 90 msec.

Results: Eleven patients had right-sided implants and 70 – left-sided. C315™ sheaths (Medtronic Inc) were used in all right-sided implants and in 69/70 left sided patients. Deflectable sheath was used in 1 Left-sided implant. One septal perforation was observed in left-sided implant and lead was later repositioned in right ventricle. Acute lead dislodgment was seen in 1 right-sided and 3 left-sided patients. Procedural and pacing characteristics between right sided and left-sided implants were comparable (Table).

Limitations: Our study is observational and therefore prone to selection bias, the Simpson's paradox, and unknown confounding. The retrospective data extraction from medical records may have inserted ascertainment bias.

Conclusions:

1. High success rate with right-sided left bundle area implants was observed in a mixed patient population at a large tertiary referral center.
2. Procedural and pacing characteristics between right-sided and left-sided implants were comparable.

Right Sided Left Bundle Area Lead Implants - A Success Story?(cont.)

	Right	Left
Anatomical failure	0.0%	1.4%
Left bundle area pacing failure	0.0%	1.4%
Capture threshold (Volts)	0.6 (0.14)	0.8 (1.09)
Impedance (Ohms)	730 (119)	801 (151)
QRS width (msec)	114 (10)	106 (14)
Ventricular activation time (msec)	79 (9)	76 (11)
Fluoroscopy time (mins)	9.0 (3.4)	7.9 (3.6)
Perforation	0.0%	1.4%
Acute lead dislodgment	9.1%	4.3%

p = NS for all above comparisons

Table 1. Procedural and pacing characteristics in patients with right-sided vs. left-sided direct conduction system pacemaker.

Original Investigation

Secular trends in neoadjuvant chemotherapy utilization for pancreas cancer: Are we making progress?

Sebastian Mellado, BA, MD(c); Eduardo A. Vega, M.D.;; Mohammad Abudalou, M.D.; Onur C. Kutlu, M.D.; Omid Salehi, M.D.; Li Mu, M.D.; Olga Kozyreva, M.D.; Richard Freeman, M.D.; Claudius Conrad, M.D., PhD

Background: While neoadjuvant chemotherapy (NCT) in pancreatic cancer (PDAC) undergoing pancreaticoduodenectomy (PD) improves survival for all stages, barriers to the universal practice of NCT remain ill-defined. This study investigates, national rates, secular trends and factors affecting NCT utilization.

Methods: Using the National Cancer Database, patients who underwent PD for PDAC between 2006-2017 were identified. Changes in chemotherapy sequence over time were identified. For patients diagnosed after 2010, multivariable logistic regression models for factors affecting NCT were created.

Results: 128,980 patients were diagnosed and 23,206 underwent surgery. 3005 (12.9%) received NCT with a NCT utilization rate of 5.8% in 2004 that increased to 23.1% in 2017. Factors affecting utilization of NCT were age (OR 0.972), academic and integrated network institutions (OR 1.916, OR 1.559), institutional case volume (OR 1.007), distance from the hospital (OR 1.002), stage (IB OR 3.108, IIA OR 3.133, IIB OR 3.775, III OR 3.782), grade IV (OR 1.977), insurance status (private OR 2.371, Medicaid OR 1.811, and Medicare OR 2.191, government OR 2.645).

Limitations: First, this is an observational study and subject to the confounding inherent to any retrospective analysis. Second, it is unknown whether the intended chemotherapy was completed. Third, our study only investigated the national trend in neoadjuvant therapy in the setting of pancreatoduodenectomy due to its high rate of postoperative complications (40%-60%), which is the principal risk factor for failure to receive adjuvant treatment.14 Further, distal pancreatectomy for PDAC was excluded since such few patients present with symptoms early enough to allow for surgery, resulting in a small national sample size.

Conclusions: While more 3/4 of patients receive no NCT and up to 1/5 of patients still receive no chemotherapy at all, NCT is increasing. Moreover, since omission of NCT is associated with modifiable factors such as type of institution and health care disparity, reimbursement mechanisms geared to induce change in national practice guidelines may be the most effective approach of improving survival short-term.

Secular trends in neoadjuvant chemotherapy utilization for pancreas cancer: Are we making progress? (cont.)

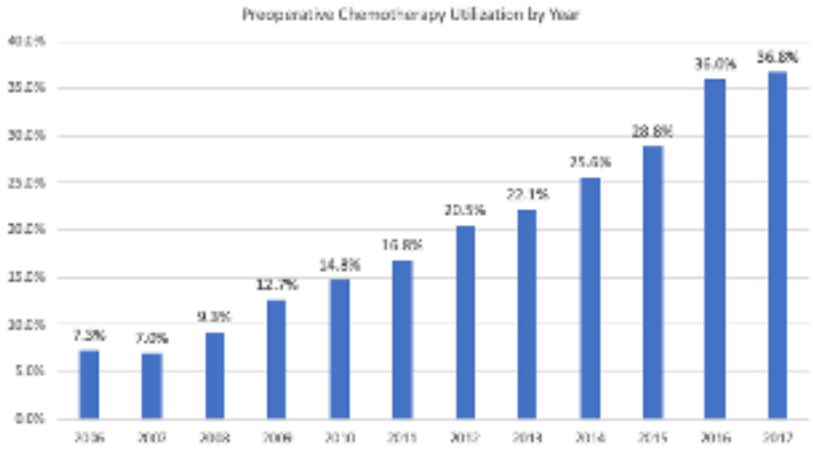


Figure 1. From 2006-2017, the utilization of preoperative chemotherapy (perioperative + neoadjuvant chemotherapy) increased from 7.3% to 36.8%.

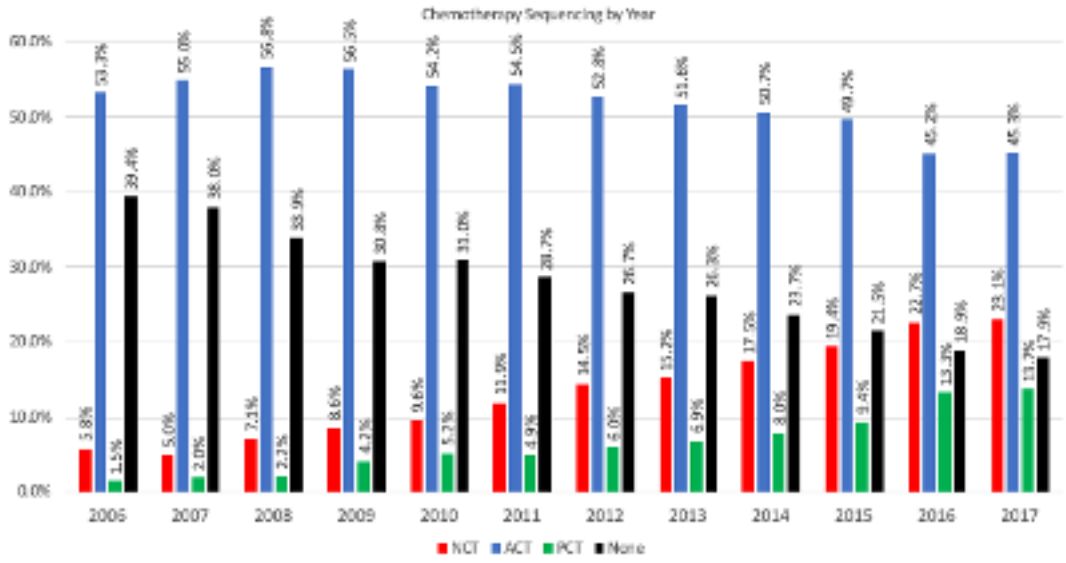


Figure 2. From 2006-2017, chemotherapy sequencing experienced a considerable change. Of note, the utilization of neoadjuvant chemotherapy (NCT) increased from 5.8% to 23.1%, while the percentage of patients receiving no chemotherapy decreased from 39.4% to 17.9%.

Original Investigation

Stigma and Psychosocial challenges to defeat COVID-19 Pandemic

Siddhi Bhivandkar, M.D.; Rashad Alikhan, M.D.; Chelsea Mendonca, M.D.; Jason Strauss, M.D.

Background: Despite national and global health leaders' insistence on science-based isolating measures, a socio-culture's response to a viral outbreak and willingness to follow its prescriptions plays a huge role in morbidity and mortality outcomes. Improper information, fear, anxiety along with quarantine and social distancing were endorsed to stigma during the ongoing COVID-19 pandemic. These challenges are often overlooked; however, to successfully flatten the curve, it is vital for public officials and others to address their impact on all people – including the different races and cultures in a population – to successfully combat the spread of COVID-19. It is vital to understand these issues during this type of health emergency.

Aims: To assess the stigma and psycho-socio-cultural challenges that have impeded efforts to contain the COVID-19 pandemic.

Methods: We performed a literature search using databases, PubMed, Embase, Litcovid, bioRxiv, medRxiv, Web of Science, and PsychINFO, from January 2020 to June 2021. Grey literature was searched through a web search and Google scholar. We used the following keyword combinations: "COVID-19, coronavirus, SARS-CoV-2," "COVID-19 pandemic," "Covid*," AND stigma OR psychosocial challenges OR mental health OR cultural issues OR stigma OR mental health access. After applying inclusion criteria to the initial 2038 search results, a total of 15 studies were included to extract information about stigma and psychosocial challenges associated with the COVID-19 pandemic.

Results: The findings indicate several factors are associated with an increased likelihood of stigma, including a lack of knowledge about the disease, shame associated with being diagnosed, avoiding healthcare, negative stereotypes, racial discrimination, social uprisings, and increased prejudice against certain races. Fear of unknown, social rejection and labeling were the most prominent domains of stigma that these individuals encountered. There are numerous critical psychosocial challenges associated with the transmission and control of COVID-19, including economic, political, social, and cultural ones. The magnitude of impact was also influenced by the socio-economic and ethno-cultural differences among many populations. Stigma and other psychosocial issues are on the rise in both the developed and the developing world, and anxiety, fear and stigma driven social isolation are likely to lead to serious mental health conditions.

Conclusions: Stigma has a negative impact on not only COVID-19 patients and survivors, but also the general population. Numerous unknowns about Covid-19 disease contribute to anxiety, confusion, and fear, and these unknowns and stigma have a detrimental effect on public health efforts. Stigma and psychosocial challenges must be addressed to halt the current pandemic and similar health crises in the future.

Original Investigation

Symptoms are Associated with an Obstructive Lung Disease Diagnosis in Subjects with the Non-Specific Pulmonary Function Test Pattern

James Tasch, D.O.; Samer Abujaber, M.D.; Laith Hattar, M.D.; Aju Jose, M.D.; Lori Lyn Price, MAS; Peter LaCamera, M.D.; Hernan Avella, M.D.

Background: Pulmonary function tests (PFT) are interpreted by comparing an individual's pulmonary measurements to accepted reference values. A normal forced exhalation volume in one second (FEV1)/forced vital capacity (FVC) ratio with a reduced FEV1 and/or FVC has been referred to as preserved ratio impaired spirometry (PRISm) [1]. Non-specific pattern (NSP) is a subgroup that additionally has normal total lung capacity (TLC) [2]. These terms have been commonly interchanged in much of the research in this field despite being representative of distinct populations. Clinical symptoms in patients with PRISm have been linked to the future development of chronic obstructive pulmonary disease [3]. The same has not yet been investigated in NSP, but this pattern has been shown to remain stable or evolve to both obstructed or restricted patterns over time [4]. The aim is to understand what clinical characteristics or spirometric differences are associated with a diagnosis of obstructive lung disease in a NSP population.

Methods: We retrospectively reviewed the charts of subjects who demonstrated NSP using pre-bronchodilator (pre-BD) values on at least one PFT between 2014-2020 at a single academic center (n=111). Diagnoses were then clustered into 'obstructive' or 'non-obstructive' groups based on the treating physician's primary pulmonary clinical diagnosis at the last known clinic visit that addressed pulmonary symptoms. The t-test or non-parametric Wilcoxon rank sum test were used to compare mean differences between groups, while the chi-square test or Fisher Exact tests were used to test for associations between group and categorical variables.

Results: Results: NSP using pre-BD values was present in 4% of screened PFTs that included both spirometry and lung volumes. In subjects demonstrating NSP, 71 (64%) were classified as obstructive according to their treating physician. Compared to the non-obstructive group, cough (p=0.01), wheezing (p=0.01) and sputum production (p=0.004) were documented more frequently in those with an obstructive lung disease diagnosis. There was significantly more inhaler use in the obstructive group. Interestingly, age, body mass index, tobacco use and residual volume/TLC ratio were not significantly associated with the obstructive group.

Limitations: The retrospective nature of this project and narrow sample size were limitations of this study.

Conclusions: The interpretation of NSP in clinical settings presents challenges. Nearly two thirds of patients with NSP carried a clinical diagnosis of obstructive lung disease, and regardless of smoking history, they were more likely to be affected by symptoms consistent with this group of disorders. In light of these findings, clinicians should be cautioned against using the assumption of obstruction with NSP in the absence of supporting clinical symptoms.

Original Investigation

The Effect of Adjunct Inhaled Epoprostenol on Improving Oxygenation in Critically Ill Patients with Acute Respiratory Distress Syndrome (ARDS) Associated with COVID-19 Infection

Ali Althubyani, PharmD, BCPS, PGY-1 Resident; Natalya Asipenko, PharmD, BCPS,BCCCP; Andrew Moraco, M.D.

Background: Acute Respiratory Distress Syndrome (ARDS) is a clinical syndrome of severe hypoxemia and diffuse pulmonary infiltrates causing respiratory failure. Current evidence suggests inhaled vasodilators, like epoprostenol, improve oxygenation in ARDS patients. Aerosolized epoprostenol is used as a last line therapy after other lung-protective strategies fail to provide adequate pulmonary support. There is limited data regarding the role of inhaled epoprostenol in patients with ARDS associated with COVID-19. The objective of this study was to evaluate the continued efficacy of extended therapy with inhaled epoprostenol in critically ill patients with ARDS associated with COVID-19 infection.

Methods: This was a retrospective, single center, IRB approved, observational study examined adult critically ill patients receiving inhaled epoprostenol for ARDS associated with COVID-19 infection. Patients were excluded if they received inhaled epoprostenol for less than 24 hours, received Extracorporeal Membrane Oxygenation (ECMO), inhaled epoprostenol was initiated before transferring to our hospital, or did not have baseline arterial blood gases. The primary outcome was the percent of time patients remained responders 24 hours after inhaled epoprostenol initiation. Patients were considered responders if they had at least 10% improvement in PaO2/FiO2 ratio within 24 hours of epoprostenol initiation. Secondary outcomes included ICU length of stay, and in-hospital mortality.

Results: Of the 32 patients included in our study, 20 patients (62.5%) were considered responders. For the primary outcome, the median percent of time patients remained responders after 24 hours of inhaled epoprostenol initiation was 19%. The average ICU length of stay was 17 days for responders and 16 days for non-responders. Finally, in-hospital mortality was 95% for responders and 92% for non-responders.

Limitations: The two main limitations for this study were limited documentation and lack of control group.

Conclusions: Inhaled epoprostenol may improve oxygenation within 24 hours of initiation in patients with ARDS associated with COVID-19 infection. However, responders may not maintain improved oxygenation following 24 hours of inhaled epoprostenol initiation. Furthermore, inhaled epoprostenol failed to improve mortality in those patients.

The Effect of Adjunct Inhaled Epoprostenol on Improving Oxygenation in Critically Ill Patients with Acute Respiratory Distress Syndrome (ARDS) Associated with COVID-19 Infection (cont.)

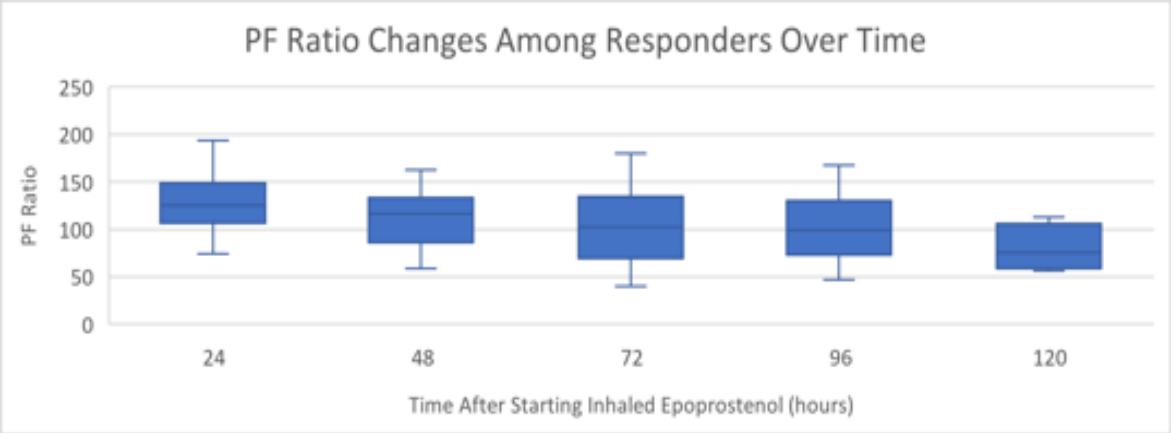


Figure 1. PF Ratio Changes Among Responders Over Time

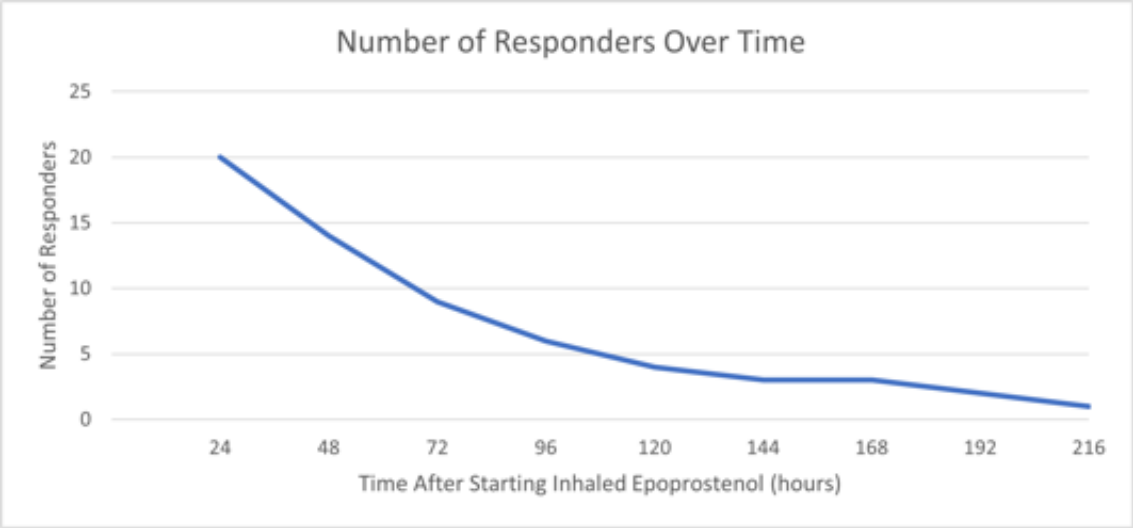


Figure 2. Number of Responders Over Time

Original Investigation

The First COVID-19 Surge Did Not Alter Lung Resection Risks: A Single Center Experience

Ashley L. Deeb, M.D.; Julio Herrera-Zamora, M.D.;Andrea B. Liebowitz, BA; Scott J. Swanson, M.D.; M. Blair Marshall, M.D.; Raphael Bueno, M.D.; Michael T. Jaklitsch, M.D.

Background: The first case of SARS-CoV-2 infection in our city was reported on February 1, 2020. By March 10, 2020, a public health emergency had been declared. Only urgent surgical patients (including oncologic cases) that would be harmed by a delay of 6 or more weeks were prioritized during March to May. During 2 weeks in early April, only emergent cases were performed due to constrained resources. This study aimed to compare outcomes of lung resections during and one year following the first surge of the pandemic to assess comparative risk of adverse outcomes.

Methods: IRB approval was obtained for this project. We retrospectively analyzed all patients who underwent lung resection (pneumonectomy, lobectomy, segmentectomy, and wedge resection) at a single institution from March-August 2020 compared to March-August 2021. Preoperative data and perioperative outcomes were retrieved from a divisional database. Primary outcomes were adverse events and mortality. Secondary outcomes were hospital length of stay and discharge disposition. Differences were analyzed utilizing chi-square or Fisher's exact test and continuous outcomes were examined with Wilcoxon Rank Sum.

Results: A total of 580 cases were performed over the two timepoints with a 17.8% reduction in lung resections in the pandemic year (239 cases in 2020 and 341 cases in 2021). There were no significant differences in demographics and comorbidities (Table 1). The distribution of surgical approach and procedure type did not differ significantly between 2020 and 2021. There were no differences in the number of patients who suffered adverse events, nor was there a change in the number of each Clavien-Dindo grade (2-5) (all $p>0.05$). The median length of stay was 3 days (range: 1-45 for 2020 and 1-44 for 2021) for both time periods. There was a non-significant trend toward less in-patient rehab and more home with services disposition during the pandemic surge. Similarly, there was a non-significant trend towards more discharges home after the surge.

Limitations: Limitations to this study include its retrospective nature which limits the ability to control for confounders. Additionally, as this was conducted at one high volume medical center, findings may not be applicable to or reflect the experiences at other hospitals in the surrounding area.

Conclusions: Despite the constrained resources during the surge, we did not experience an increase in perioperative adverse events. These preliminary results suggest that we were able to quickly adopt effective policies and continue to provide safe care to lung resection patients during the public health emergency.

The First COVID-19 Surge Did Not Alter Lung Resection Risks: A Single Center Experience (cont.)

	Total	Mar-Aug 2020	Mar-Aug 2021	p value
	580	239 (41.2%)	341 (58.8%)	
Demographics				
Age, median (range)	67 (25-92)	66 (25-87)	68 (25-92)	0.10
Gender, n (%)				0.59
Female	345 (59.5%)	139 (58.2%)	206 (60.4%)	
Male	235 (40.5%)	100 (41.8%)	135 (39.6%)	
Body Mass Index, median (range)	26.5 (14.5-55.9)	26.4 (16.4-55.9)	26.6 (14.5-52.4)	0.91
Past Medical History				
Atrial Fibrillation, n (%)	68 (11.7%)	23 (9.6%)	45 (13.2%)	0.20
Congestive Heart Failure, n (%)	23 (4.0%)	7 (2.9%)	16 (4.7%)	0.20
Coronary Artery Disease, n (%)	75 (12.9%)	28 (11.7%)	47 (13.8%)	0.47
Myocardial Infarction, n (%)	32 (5.5%)	13 (5.4%)	19 (5.6%)	0.95
Hypertension, n (%)	315 (54.3%)	128 (53.6%)	187 (54.8%)	0.76
COPD, n (%)	106 (18.3%)	39 (16.3%)	67 (19.7%)	0.31
ILD, n (%)	15 (2.6%)	1 (0.4%)	14 (4.1%)	0.01
Diabetes, n (%)	84 (14.5%)	29 (12.1%)	55 (16.1%)	0.18
Surgical Variables				
Procedure, n (%)				0.95
Pneumonectomy	9 (1.6%)	4 (1.7%)	5 (1.5%)	
Lobectomy	190 (32.8%)	81 (33.9%)	109 (32.0%)	
Segmentectomy	81 (14.0%)	32 (13.4%)	49 (14.4%)	
Wedge	300 (51.7%)	122 (51.1%)	178 (52.2%)	
Approach, n (%)				0.41
Open	24 (4.1%)	13 (5.4%)	11 (3.2%)	
VATS	488 (84.1%)	199 (83.3%)	289 (84.8%)	
Robotic	68 (11.7%)	27 (11.3%)	41 (12.0%)	
Postoperative Variables				
Disposition				0.52
Extended Care/Rehab	15 (2.6)	4 (1.7%)	11 (3.2%)	
Home with Services	309 (53.3%)	134 (56.1%)	175 (51.3%)	
Home	250 (43.1%)	100 (41.8%)	150 (44.0%)	
Inpatient	2 (0.3%)	0 (0%)	2 (0.6%)	
Mortality	4 (0.7%)	1 (0.4%)	3 (0.9%)	

Table 1. Perioperative Variables for the Cohort by Timepoint

Original Investigation

Thoracic Surgery Division Growth at a Tertiary Referral Center: If You Build It, Will They Come?

Aaron Dezube, M.D.; Emanuele Mazzola, PhD; Ashley L. Deeb, M.D.; Michael T. Jaklitsch, M.D.; Paula Ugalde Figueroa, M.D.; Raphael Bueno, M.D.

Background: The number of patients requiring thoracic surgery is increasing, however, some argue that the need is greatest in rural areas and additional surgeons in metropolitan areas and would lead to unnecessary procedures. Thoracic cases are dominated by staging and resection of esophageal cancer, lung cancer, and mesothelioma. Thus, there are rarely unnecessary procedures in the field. We believe that an unmet need still exists despite a surplus of surgeons in these areas. We investigated whether case volume growth was limited by patient or surgeon availability.

Methods: All thoracic cases from fiscal years (FY) 1992-2018 at a tertiary referral center were included. Annual division volume and average volume per surgeon based on full-time-equivalents (FTE) were analyzed. Sub-analyses by number of surgeons and operating rooms were performed to identify rate-limiting factors of volume growth.

Results: Division surgical volume increased from 809 cases in FY 1992 to 3430 cases in FY 2018 (mean growth 89.7 cases annually, 424% increase). The division grew from 4 to 13 surgeons (325% increase) with an increase of 232.1 cases per year on average added for each additional surgeon. While hiring a new surgeon caused a decrease in average individual surgeon volume of 8.3 cases per year (Figure 1), the net division growth was 223.8 cases annually (Figure 2). Increased operating rooms was not associated with average surgeon volume but allowed for divisional growth.

Limitations: The limitations of our study include the retrospective nature of our data. As our case volumes never reached a peak after which a descending trend was observed, nor did average surgeon volumes fall below national averages despite increased hiring, we are unable to identify an "optimal surgeon to case" ratio or like-minded models. Furthermore, our analysis counts each surgical case the same which analyzes supply and demand, but magnitude of complexity was not accounted for which may impact volume of cases performed.

Conclusions: We could not identify a limit in the number of available thoracic surgery cases, nor did individual surgeon's volume fall below national averages to suggest that patient disease burden was a limiting factor in divisional growth. Our study suggests that hiring thoracic surgeons is still warranted despite the high density of thoracic surgery capable hospitals in our metropolitan area.

Thoracic Surgery Division Growth at a Tertiary Referral Center: If You Build It, Will They Come? (cont.)

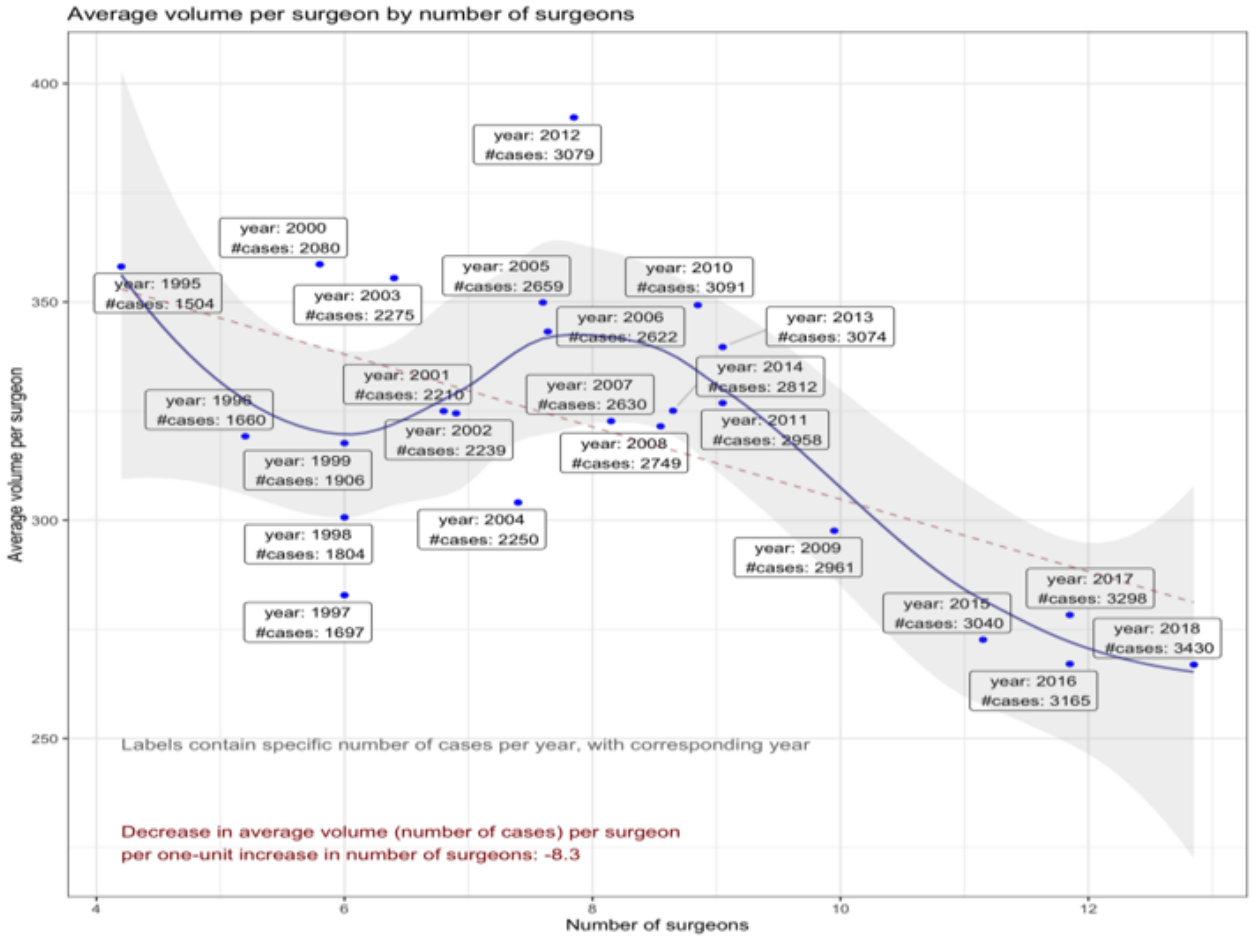


Figure 1. Relationship between the average case volume per surgeon and the number of surgeons. Corresponding case volume and years are listed. Linear approximation shows a decrease in average of 8.3 cases per surgeon per one-unit increase in number of surgeons. Loess smoothing with corresponding 95% confidence interval also shown.

Thoracic Surgery Division Growth at a Tertiary Referral Center: If You Build It, Will They Come? (cont.)

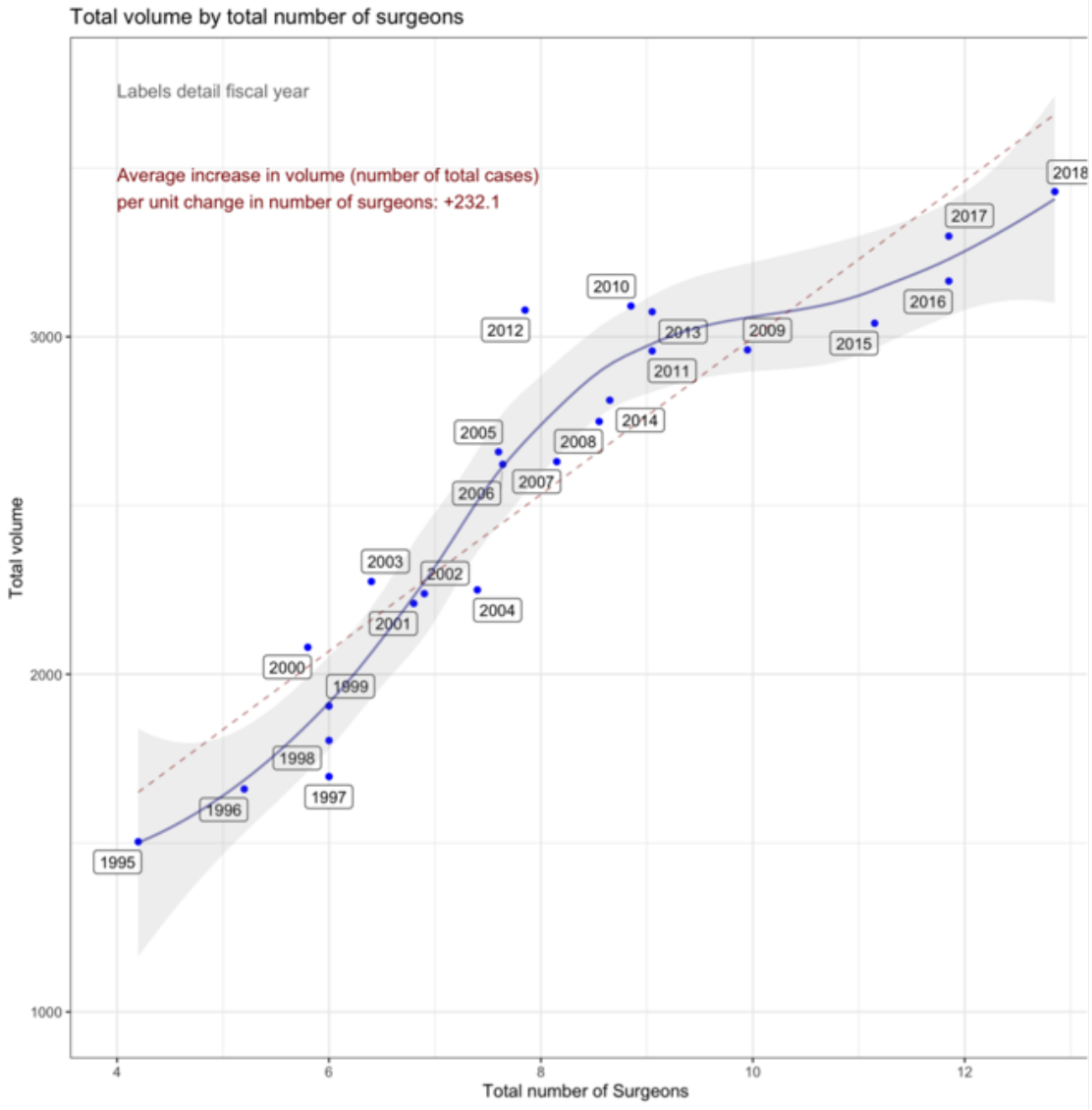


Figure 2. Relationship between the total division case volume to the total number of surgeons. Linear approximation shows an average increase of 232.1 cases for each surgeon unit added. Each year is labeled correspondingly. Loess smoothing with corresponding 95% confidence interval also shown.

Original Investigation

Trauma Surgeon-Led and Funded Injury Prevention Program Decreases Number of All-Terrain Vehicle-Related Admissions (DOI: 10.1177/00031348211050815)

Matthew F. Holt, M.D., MPH; Josh Fortmann, MPH; George M. Testerman, M.D., FACS

Background: All-Terrain Vehicle (ATV) laws regarding helmet use, alcohol involvement, and roadway riding are poorly enforced or largely ignored. We hypothesized that direct surgeon funding and leadership in injury prevention would decrease ATV crashes. To focus prevention efforts, we reviewed a rural level 1 trauma center eleven-year experience with ATV crashes comparing helmeted and unhelmeted rider outcomes.

Methods: For the latter five years of the study period a trauma surgeon sponsored an injury prevention fund promoting ATV safety using simulators and discussions for the area high school students. Helmet use, alcohol avoidance, and safe ATV operating were emphasized. A trauma registry review of ATV admissions from 2009 through 2020 examined demographics, helmet use, and clinical outcomes using chi square, t-test, and regression analysis. We received institutional review board (IRB) approval through the Ballad Health System Institutional Review Board on September 3, 2020 for this retrospective trauma registry study, approval number [1649690-1].

Results: Unhelmeted ATV riders suffered more severe head and neck injuries (OR 19, CI 1.5 - 1.8, $p < .001$), worse overall injury severity (ISS), (OR 25, CI 12.1 – 14.2, $p < .001$), and higher mortality rates (OR 4.0, CI 0.02 – 0.05, $p < .001$). Helmet use corresponded with an average decrease in abbreviated injury scale (AIS) and increase in Glasgow Coma Scale (GCS) status. Although only 15% of riders were helmeted, ATV crash admissions have decreased in the last 5 years ($p < .001$).

Limitations: Limitations include the lack of crash data (for example, roll-overs, head-on collisions, collisions with vehicles, operating ATVs on roads), difficulties documenting helmet use, the state location of injury, the status as passengers on ATVs versus drivers, deaths at the scene of accidents, lack of alcohol and drugs data, changes in state helmet and safety laws, and the limitations of a retrospective registry study. It could it be that the same people who choose to ride an ATV without a helmet are also the ones who may be intoxicated at the time, riding very fast, or attempting stunts. The decrease in ATV admissions over the last 5 years could result from factors other than better public awareness through injury prevention efforts by medical practitioners.

Conclusions: ATV trauma and mortality is still frequent especially in unhelmeted riders. The recent decrease in area ATV crashes is encouraging. Trauma surgeons have an opportunity to make a difference in public awareness and education through comprehensive physician funded and directed injury prevention and research efforts.

Trauma Surgeon-Led and Funded Injury Prevention Program Decreases Number of All-Terrain Vehicle-Related Admissions (DOI: 10.1177/00031348211050815) (cont.)

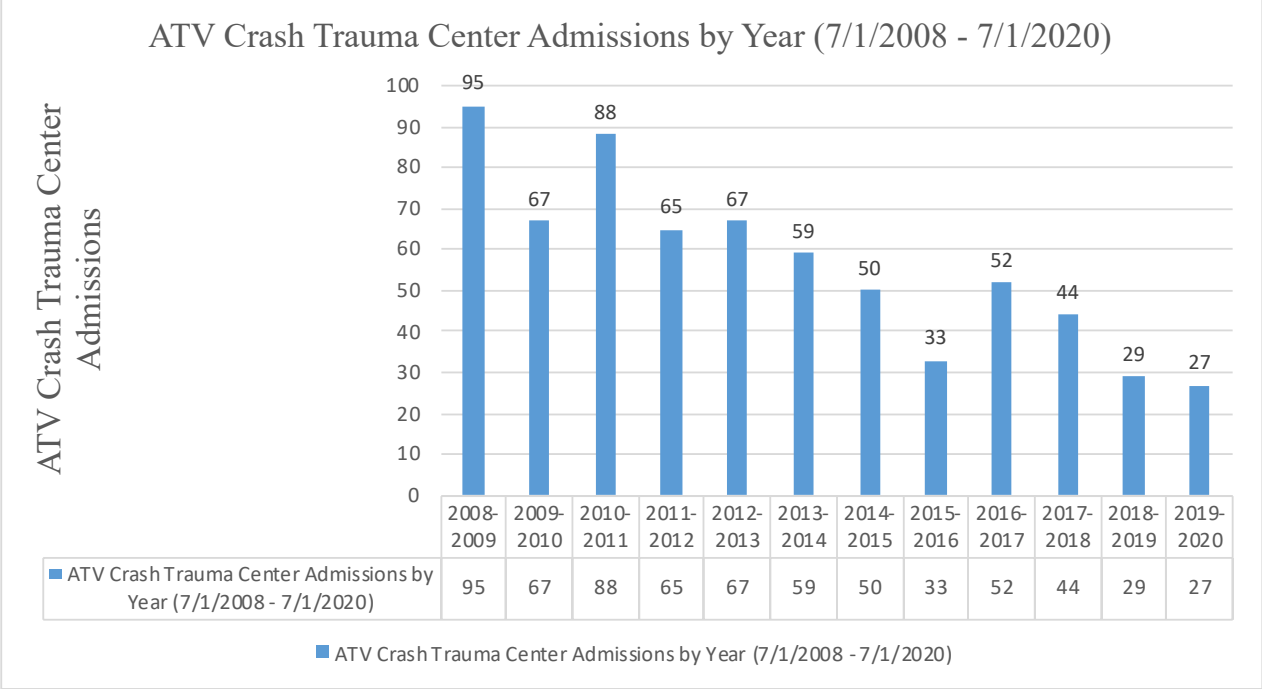


Figure 1. ATV Crash Admissions by Year

Variables	VA Deaths	TN Deaths	KY Deaths	p value
Deaths / Crashes*	1 / 180	4 / 125	9 / 240	p < .001
% Deaths	0.6%	3.2%	4.4%	p < .001
Helmets (%)	0%	0%	4.4%	NS
Age (years)	55.9 ± 25.3	26.4 ± 12.0	43.3 ± 17.0	p < .001
ISS**	17	28.2 ± 16.7	28.8 ± 9.5	p < .001
AIS† Head	4.0	4.5 ± 0.5	2.3 ± 2.0	p < .001
AIS† Chest	2.0	2.0 ± 2.0	3.3 ± 0.8	p < .001
AIS† Extremities	2.0	0.8 ± 1.2	0	p = 0.2
% Male	100%	100%	44%	p < .001

†† Un-helmeted ATV rider status predicted more severe head injuries (Relative Risk 23.5, P<0.001) and death (Relative Risk 4.6, P<0.001).

Legend:
Deaths / Crashes*: deaths per total number of admissions or crashes
ISS**: injury severity score
AIS†: abbreviated injury scale score for head, chest, or extremity injuries

Figure 2. ATV Deaths by State (n=14 Deaths and 581 Total Crashes)

Original Investigation

Trauma Surgeon-led and Funded Injury Prevention Program Decreases Admission for Motorcycle Crash Injuries (DOI: 10.1177/00031348211050837)

Matthew F. Holt, M.D., MPH; George M. Testerman, M.D., FACS

Background: Unhelmeted motorcyclists injured in states with lax or poorly enforced helmet safety laws are frequently seen in rural trauma centers. A trauma surgeon started a comprehensive injury prevention and research fund with outreach to a three-state trauma center catchment area promoting injury prevention at area high schools and local communities. We hypothesized that unhelmeted riders would have more severe head injuries and fatalities than helmeted riders.

Methods: A trauma registry review of 708 injured motorcycle riders over an eleven-year period examined demographics, helmet use, and clinical outcomes of helmeted and unhelmeted riders. A full-time injury prevention coordinator collaborating with law enforcement provided electronic and mechanical simulations with discussions regarding helmet use, alcohol avoidance, and responsible motorcycle riding for area high school students. This program coincided with the second half of our eleven-year study. Multiple regression analysis evaluated predictors for head injury and death. The Ballad Health Institutional Review Board approved this retrospective cross-sectional trauma registry study, approval number [1 649 771-1].

Results: Unhelmeted motorcyclists suffered worse head injuries, (OR 8.8, CI 1.6-2.4, $p<.001$), more severe overall injury (OR 10, CI 12.7-18.6, $p< .001$), and higher mortality (OR 2.7, CI .02-.15, $p< .001$). Local motorcycle related trauma center admissions and deaths have stabilized in recent years while statewide motorcycle crashes have increased ($p<.05$).

Limitations: Limitations include the lack of crash data (mechanism, head-on collisions, collisions with vehicles), difficulties documenting helmet use, the state location of injury, the status as passengers on motorcycles versus drivers, deaths at the scene of accidents, lack of alcohol and drugs data, changes in state helmet and safety laws, and the limitations of a retrospective registry study. It could it be that the same people who choose to ride a motorcycle without a helmet are also the ones who may be intoxicated at the time, riding very fast, or attempting stunts.

Conclusions: Unhelmeted motorcyclists suffer worse head injuries and mortality rates. Physician-led outreach efforts for injury prevention may be effective. Trauma surgeons have ongoing opportunities to promote responsible motorcycle riding for schools and local communities.

Trauma Surgeon-led and Funded Injury Prevention Program Decreases Admission for Motorcycle Crash Injuries (DOI: 10.1177/00031348211050837) (cont.)

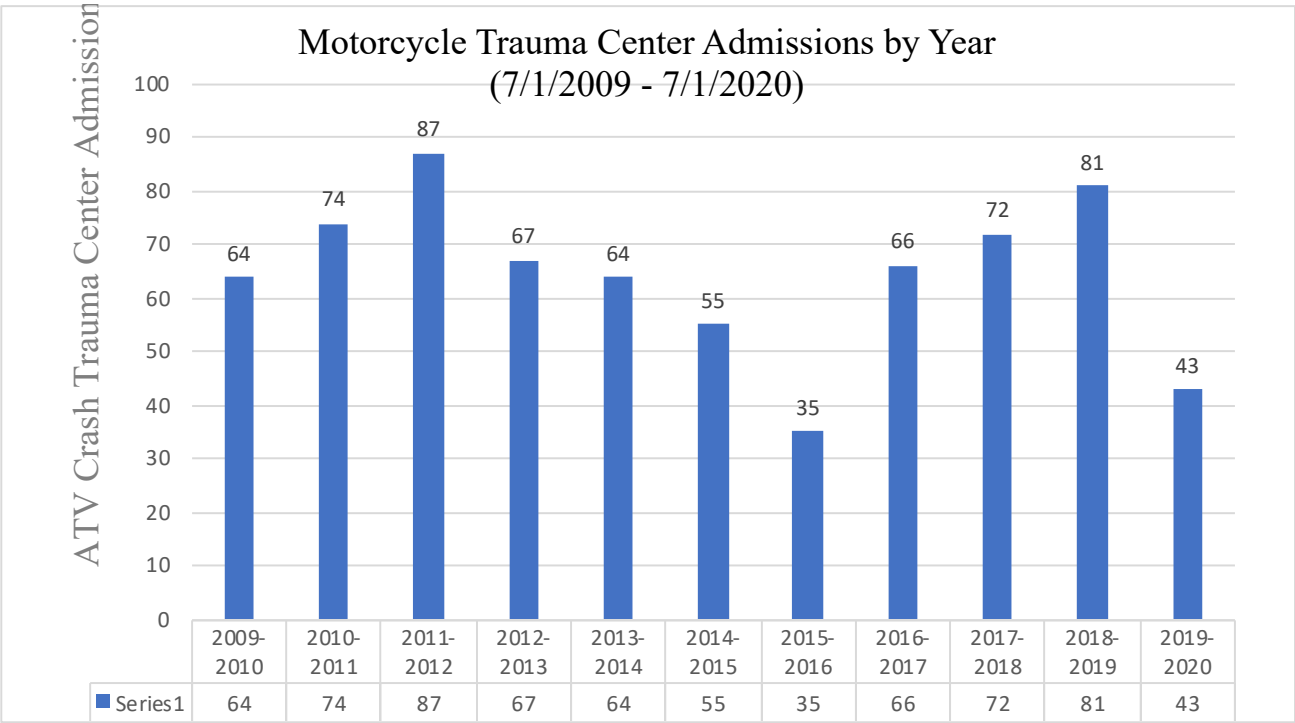


Figure 1. Motorcycle Crash Admissions July 1, 2009 – July 1, 2020

	Kentucky	Virginia	Tennessee	p value
Deaths/# Crashes	4 / 110	3 / 160	16 / 409	<0.001*
% Deaths	3.6%	1.9%	3.9%	<0.001*
Age (average)	37.2 ± 14.6	29.2± 22.3	45.5± 18.5	0.02*
% Male	100%	66%	100%	<0.001*
% Helmets	25%	33%	94%	<0.001*
ISS*	20.5 ± 11.7	29.6 ± 5.8	20.5 ± 16.0	0.002*
AIS chest**	1.8± 1.3	2.7 ± 0.5	1.8 ± 1.8	0.5
AIS head-neck	3.3 ± 0.9	3.3 ± 1.1	2.6 ± 1.8	0.02*
AIS extremity	1.3 ± 1.1	2.0 ± 0.5	1.7 ± 0.9	0.8
AIS abdomen	0.9 ± 1.1	0.6 ± 1.1	1.2 ± 1.5	0.02*

***Unhelmeted motorcycle rider status predicted more severe head injuries (OR 8.8, CI 1.6-2.4, p<0.001), worse injury severity scores (OR 10, CI 12.7-18.6, p<0.001), and death (OR 2.7 CI .02-.15, p=0.007).

Legend:
ISS*: Injury Severity Score **AIS**:** Abbreviated Injury Scales score
Values expressed as percent or mean ± standard deviation

Figure 2. Demographics and Outcomes of Motorcycle Deaths by State

Original Investigation

Vascular Complications in patients undergoing Transcatheter Aortic Valve Replacement (TAVR): A Single Center Experience

Aijaz Bilal, MD; Mumtaz, Tayebah MD; Bhat Tariq MD; Yesodharan Gemini, MD; Watrous, Jeanne, RT(R)(CV); Carrozza Joseph P, MD

Background: Vascular complications are common during TAVR, despite improvement in device technology and operator experience, and negatively impact patient outcomes. The incidence of vascular complications at St. Elizabeth's Medical Center – a large tertiary care referral center, has not been previously studied. The goals of this study were :1) To determine the prevalence of vascular complications in consecutive patients undergoing TAVR at our institution, and 2) To assess the predictors of vascular complications.

Methods: Study data was obtained from our Society of Thoracic Surgeons-American College of Cardiology Transcatheter Valve Therapeutics registry database, which has been collected since initiation of TAVR program at St. Elizabeth's Medical Center. All patients who had TAVR performed between November 13th, 2012 and November 16th, 2021 were included. Valve Academic Research Consortium (VARC)-2 definition was used to define procedural complications.

Results: Between November 13th, 2012 and November 16th, 2021 a total of 619 adults aged ≥18 years underwent TAVR at our institution of which 464 (75%) were performed via transfemoral access (48/464; 10.3% were done via a surgical cut down). Mean age of the study population was 81 years (51% men) and mean body mass index (BMI) was 30.3 kg/m2. 62.3%. Baseline characteristics are shown in Table 1. 17% (n=79) of the patients had previous history of peripheral arterial disease and 42.7% (n=198) had prior PCI or CABG. 97% (n=451) of the TAVR devices were balloon expandable Edwards-Sapien valve, and majority of the patients had a 14 Fr transfemoral sheath (n=379, 82%). Of the 464 patients undergoing transfemoral TAVR 6.7% (31) had a vascular complication (Table 2). Of these, 3.9% (n=18) were classified as a major vascular complication by VARC-2 definitions and 2.8% (n=13) were classified as minor vascular complications. 30-day and 1-year all-cause mortality was 0.9% (n=4) and 7.5% (n=35) respectively.

Limitations: This is an observational, retrospective study and therefore the effect of unmeasured variables and confounders cannot be estimated. The study is limited to a single tertiary care center, and the results may not be generalizable.

Conclusions: Overall risk of vascular complications (6.7%) at our institution appears to be comparable to the previously reported data. A low 30 day and 1-year all-cause mortality was observed. A multi-variate regression analysis is planned to identify predictors of vascular complications in particular obesity, non-TAVR access site bleeding and use of closure device determining incidence of complications at our institution allows performing an accurate informed consent regarding procedure risk, during the heart team discussion.

Vascular Complications in patients undergoing Transcatheter Aortic Valve Replacement (TAVR): A Single Center Experience (cont.)

Table 1. Baseline Characteristics *	
Male Patients	236 (50.9)
Female Patients	228 (49.1)
Age (years)	80.7 +/- 8.8
Diabetes	167 (36.0)
Hypertension	432 (93.1)
Obese (BMI >30)	175 (37.7)
Coronary Artery Disease	159 (34.3)
Peripheral Vascular Disease	79 (17.0)
Prior Coronary Angioplasty	216 (27.2)
Prior Coronary Artery Bypass Grafting	72 (15.5)
Smoking History/ Active Smoking	32 (6.9)
Prior Pacemaker Placement	47 (10.1)
Prior Implantable Cardioverter Defibrillator	11(2.4)
Prior Cerebrovascular Accident	32 (6.9)
History of Dialysis	14 (3.0)
Patient Height (m)	1.65 +/- 0.13
Patient Weight (kg)	80.2 +/- 21.7
Body Mass Index (kg/m2)	30.3 +/- 15
* Data expressed as mean (± SD) for continuous variables and n (%) for categorical variables.	
* Data expressed as n (%) for categorical variables.	

Table 1. Baseline Characteristics

Original Investigation

Long-Term (>1 year) Rejection/Thrombotic Microangiopathy (TMA) Free Survival of Kidney Xenografts with Triple Xenoantigen Knockout and Multiple Human Transgenes in nonhuman primates

Grace Lassiter[1], Takayuki Hirose[1], David Ma1, Ashley D'Attilio[1], Ivy Rosales[1], Daniel Cloonan[1], Rudy Matheson[1], Robert B Colvin[1], Wenning Qin[2], Yinan Kan[2], Jacob Layer[2], Ranjith Anand[2], Violette Paragas[2], Luis Queroz[2], Xiaoqing Tan[2], Ian Kohnle[2], Kathryn Stiede[2], Katherine Hall[2], Michele Youd[2], Michael Curtis[2], James F Markmann[1,2], ,Tatsuo Kawai[1]

[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, United States
[2]eGenesis Inc., Cambridge, MA, United States

Background: Pigs with deletion of 3 carbohydrate xenoantigens (triple knock-out, TKO) are expected to be optimal donors for human xenotransplantation. We hypothesized that concomitantly inserted human transgenes (hTGs) are important to attenuate anti-xenograft immune responses. In the current study, kidney xenotransplants from four TKO pig lines with different hTGs as well as TKO without hTGs were evaluated.

Methods: Nineteen cynomolgus monkeys received kidneys from four different TKO pig lines (TKO-A to D) with various expression of human immune regulatory proteins (ImmuRPs), complement regulatory proteins (CompRPs) and coagulation regulatory proteins (CoagRPs) or no hTGs. Recipients were treated with anti-thymocyte globulin (ATG) and rituximab induction followed by anti-CD154 antibody (every 1-2 weeks) and daily mycophenolate mofetil (MMF). Prednisone and either rapamycin or tacrolimus were also administered for the first two months.

Results: Two recipients of TKO-A, which expressed higher ImmuRP with lower CompRPs, survived for 2 and 61 days, while recipients of TKO-B with high CompRPs and lower ImmuRPs survived for 15, 20, 71, 135, 265 and 316 days (Table 2). 15 NHPs received xenografts from TKO-C with CompRP, ImmuRP, CoagRPs thrombomodulin (TM)/ endothelial cell protein C receptor (EPCR), and with or without endogenous retrovirus inactivation (RI). Ongoing recipients (7) show no signs of rejection or thrombotic microangiopathy (TMA), currently at days >489, >482, >292, >160, >104, and >48, treated with only anti-CD154 mAb and MMF after 2 months. Rejection and TMA appeared to contribute to graft loss in the remaining 8 recipients between 8 and 240 days following transplant. Both recipients of TKO-D, in which CoagRPs TM and TFPI were present, survived for 243 and 267 days without rejection or TMA but were euthanized due to infectious complications. Finally, both recipients of TKO without hTG lost their xenografts early on day 4 and 50, due to severe tubular injury and significant proteinuria (final pathologic diagnosis pending but antibody-mediated rejection (AMR) is suspected) respectively.

Conclusions: Prolonged (>1 year) rejection and TMA-free survival of kidney xenografts with TKO and multiple hTGs have been achieved. Whether the hTGs are essential for long-term xenograft survival remains to be determined with more control animals without hTGs, our preliminary results that two recipients of TKO without hTG lost their xenografts early, suggest an essential role of hTGs for long-term xenograft survival.

Long-Term (>1 year) Rejection/Thrombotic Microangiopathy (TMA) Free Survival of Kidney Xenografts with Triple Xenoantigen Knockout and Multiple Human Transgenes in nonhuman primates (cont.)

Table 1. Xenoantigen knockout and Expression of transgenes in each

(+) expression detectable, (-) no expression level based on immunohistochemical analysis of kidney tissue for each transgene. NT: no transgene, THBD and PROCR: gene that encodes thrombomodulin (TM) and EPCR, respectively.

Modification	Description	Gene	**TKO-A** EGEN-2528	**TKO-B** EGEN-2536	**TKO-C** EGEN-2734 & 2784 (RI)	**TKO-D** EGEN-2060	**TKO No hTGs** EGEN-2676
Knockout	Xenoantigens	GGTA1	KO	KO	KO	KO	KO
		CMAH	KO	KO	KO	KO	KO
		B4GALNT2	KO	KO	KO	KO	KO
hTGs NT: no transgenes (-):no expression	Complement Related Proteins (CompRPs)	CD46	+	+	+	+	NT
		CD55	-	+	+	+	NT
		CD59	-	+	NT	NT	NT
	Immune/inflammation Related Proteins (ImmuRPs)	HLA-E-B2M	+	+	NT	+	NT
		CD47	+	+	+	+	NT
		HO1	+	-	+	NT	NT
		A20	+	-	+	NT	NT
		PDL-1	+	-	NT	NT	NT
	Coagulation Related proteins (CoagRPs)	THBD	-	-	+	+	NT
		PROCR	NT	NT	+	NT	NT
		TFPI	+	+	NT	+	NT
		CD39	-	-	NT	NT	NT

Table 1.

Quality Improvement Report

1st Place

Improving Cardiac Rehabilitation Referral Rates – A Quality Improvement Project at a Tertiary Cardiac Center

Abdelazeem, M.; Lilford, E.; Khare, S.; Lam, U.

Background: Cardiac rehabilitation (CR) is a comprehensive lifestyle modification program, consisting of prescribed exercise and counseling for risk modification that has proven benefits for patients with cardiovascular disease (1). The Pritikin Intensive Cardiac Rehabilitation Program offered at St. Elizabeth's has been shown to reverse coronary atherosclerosis. Despite widespread evidence on its benefits in term of reduced hospital readmission rates and long-term survival, CR referral and attendance remains low (2). There is a global movement towards increasing CR services to patients (3).

Clinical Setting & Stakeholders:
This quality improvement (QI) project performed at a tertiary cardiac care center aimed to identify and overcome barriers to CR referral with a multipronged approach. Focus of intervention was on educating internal medicine interns and residents as well as cardiology fellows. CR has been shown to reduce hospital readmission and decrease cardiovascular morbidity and mortality, leading to reduced disease burden and healthcare related costs.

Quality Improvement Plan (Measures & Outcomes):
House staff CR referral rates were followed. Data was collected pre-intervention and every 2 months (for a total of 3 PDSA cycles) thereafter in conjunction with incrementally added focused interventions. Medical records of all patients with a discharge diagnosis qualifying for a referral to CR were reviewed. Qualifying diagnoses included acute myocardial infarction, angioplasty or stent placement, coronary artery disease with angina, cardiomyopathy with EF ≤35%, and valve replacement. Successful CR referral was defined as a computerized provider order entry (CPOE) for CR. We also collected and analyzed data on the patients who qualified but were not successfully referred to identify barriers and opportunities for improvement. House staff were also surveyed to identify additional causes for low referral rates despite ACC/AHA Class 1 recommendations. Incremental interventions implemented included general didactic sessions, visual cues placed at house staff workstations (Figure 1), and targeted didactics in the form of a biweekly email to the incoming inpatient cardiology team as a reminder of indications and the process of CR referral. Patients were screened weekly by a CR liaison for appropriate indications and a list of qualifying patients was provided to the house staff.

Results: Over the course of 3 PDSA cycles, with incremental intervention implementation, the successful CR referral rate increased from 8.1% during the pre-intervention period to 37.7% at the end of the third PDSA cycle (P = 0.004 by Chi-square test; Figure 2).

Limitations: Our project was limited to improving the referral process, but not whether patients eventually enrolled in CR and partially or fully completed the program. Although the interventions brought about a significant improvement, the referral rate is still short of the national goal of 80%.

Conclusions: Through the implementation of a well-designed multipronged education campaign targeted at the house staff working on the inpatient cardiology service and the nursing staff, CR referral rate can be increased to the benefit of patients and the healthcare system.

Improving Cardiac Rehabilitation Referral Rates – A Quality Improvement Project at a Tertiary Cardiac Center (cont.)

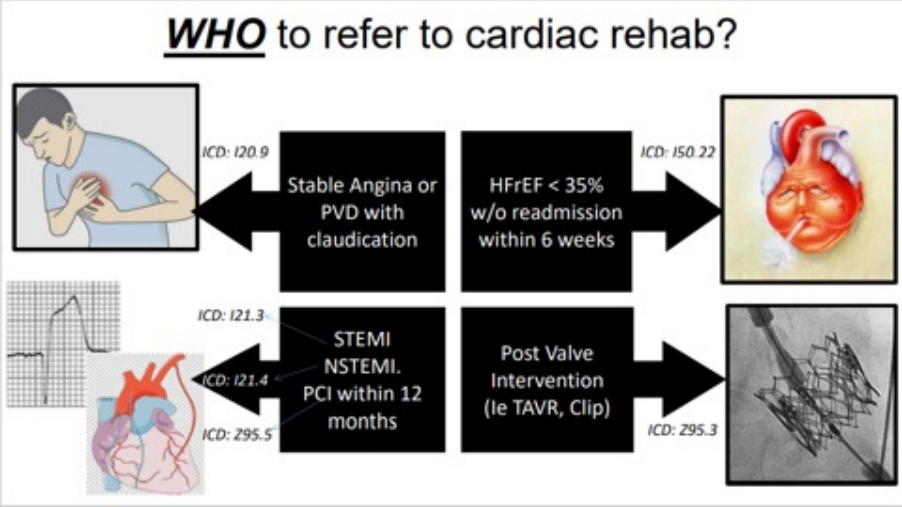
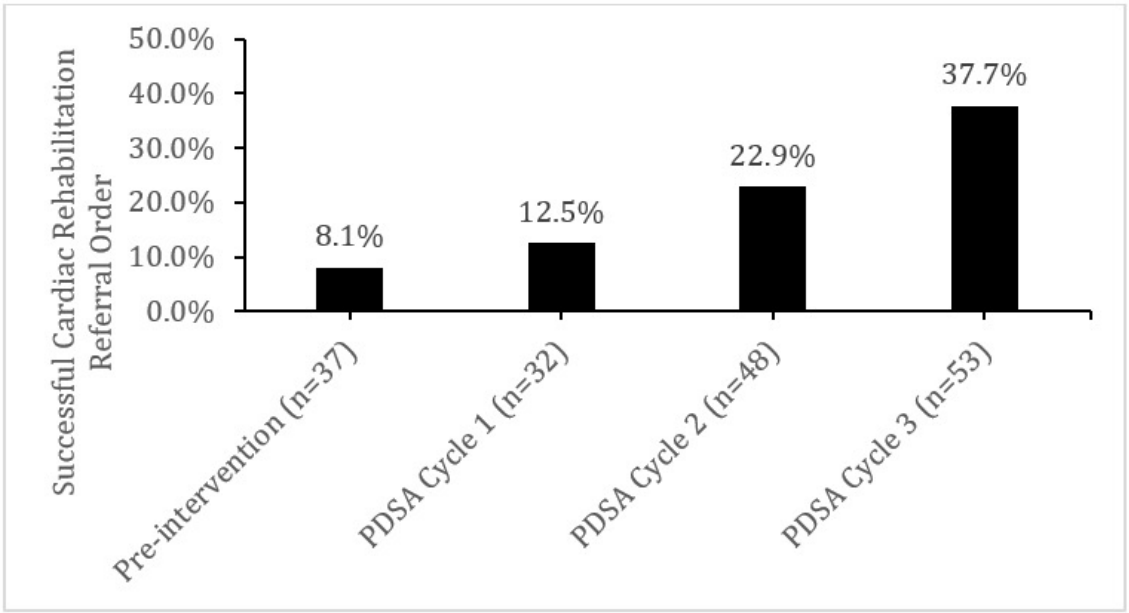


Figure 1. Targeted educational poster with visual cues on indications and procedure of CR referral. This was placed by workstations as well as emailed biweekly to oncoming cardiology teams.



P = 0.004 by Pearson Chi-Square test.

Table 2. Successful CR referral rate: pre-intervention and with incrementally added interventions.

Quality Improvement Report

2nd Place

Improving Care to Hospitalized Patients with Alcohol Use Disorder Managed on the Medical Service

Michael Malkowski, MD[1,3]; Marcel R. Robles, MD[1,3]; Hazim Allos, MD[1,3]; Bertrand L. Jaber, MD, MS[3]; Fariba Miryousefi, MD[2,3]

[1]Internal Medicine Residency Program, St. Elizabeth's Medical Center, Boston, MA;
[2]Division of Addiction Medicine, St. Elizabeth's Medical Center, Boston, MA;
[3]Department of Medicine, St. Elizabeth's Medical Center, Boston, MA

Background: Alcohol use disorder (AUD) represents a pattern of alcohol use leading to psychosocial, behavioral, and physiologic impairments. Despite representing the third leading cause of preventable death in the United States (U.S.) and its association with approximately 88,000 deaths annually in the U.S. alone, fewer than one in six people affected globally receives treatment. There is a growing body of evidence that advocates for a multidisciplinary approach for treatment of AUD; however, effective treatments including FDA approved pharmacotherapy, collectively known as medication assisted therapy (MAT), and referral to specialized care services are underutilized.

Clinical Setting & Stakeholders:
This quality improvement project aimed to improve, standardize, and implement an evidence-based protocol in patients with AUD hospitalized on an internal medicine teaching service. Our specific goals were to increase the rate of inpatient addiction medicine consults as well as to educate stakeholders on MAT and psychosocial interventions. The main stakeholders included medical residents, hospitalists, addiction medicine consultants, and patients.

Quality Improvement Plan (Measures & Outcomes):
We conducted a retrospective chart review of patients admitted to the internal medicine service under the diagnosis of AUD during the period of October 2020 – February 2021. This chart review was conducted to assess for the presence of an inpatient addiction medicine consultation, documentation of physician counseling on AUD, prescription of MAT, potential transfer to the inpatient addiction medicine service, and discharge instructions to outpatient addiction medicine services. During the intervention period, August 2021 – October 2021, a structured didactic education campaign was conducted and directed towards all physician stakeholders. This included targeted didactic sessions with large and small groups as well as an ad-campaign. During the post-intervention period, August 2021 – December 2021, a second chart review was conducted to assess the same process measures of interest and compare rates to the pre-intervention period.

Results: 45 patients were identified during the pre-intervention period and 32 patients were identified during the post-intervention period. In brief, 11.3% of patients during the pre-intervention period had an addiction medicine consult, compared to 40.6% in the post-intervention period (p=0.003). Similarly, in the pre-intervention period, 37.8% of patients had documented alcohol cessation counseling, compared to 68.8% in the post-intervention period (p=0.007). In the pre-intervention period, 2.2% of patients were prescribed MAT, compared to 9.4% in the post-intervention period (p=0.163). In the pre-intervention period, 4.4% of patients were transferred to the inpatient addiction medicine service, compared to 18.8% in the post-intervention period (p=0.043). Finally, 13.3% of patients had documented discharge instructions to follow up with an addiction medicine specialist in the pre-intervention period compared to 56.3% in the post-intervention period (p<0.001).

Limitations: Single center intervention with one PDSA cycle and a limited sample size with uneven sampling during pre- and post-intervention periods.

Improving Care to Hospitalized Patients with Alcohol Use Disorder Managed on the Medical Service (cont.)

Conclusions: Alcohol use disorder remains a very common and under-treated condition. Our targeted educational intervention demonstrated a statistically significant improvement in all measured outcomes except in prescription of MAT. This quality improvement study serves as a foundation for future efforts on implementing larger scale multidisciplinary approaches for treatment of AUD with enhanced education on adoption of MAT at hospital discharge with coordination of post-discharge care.

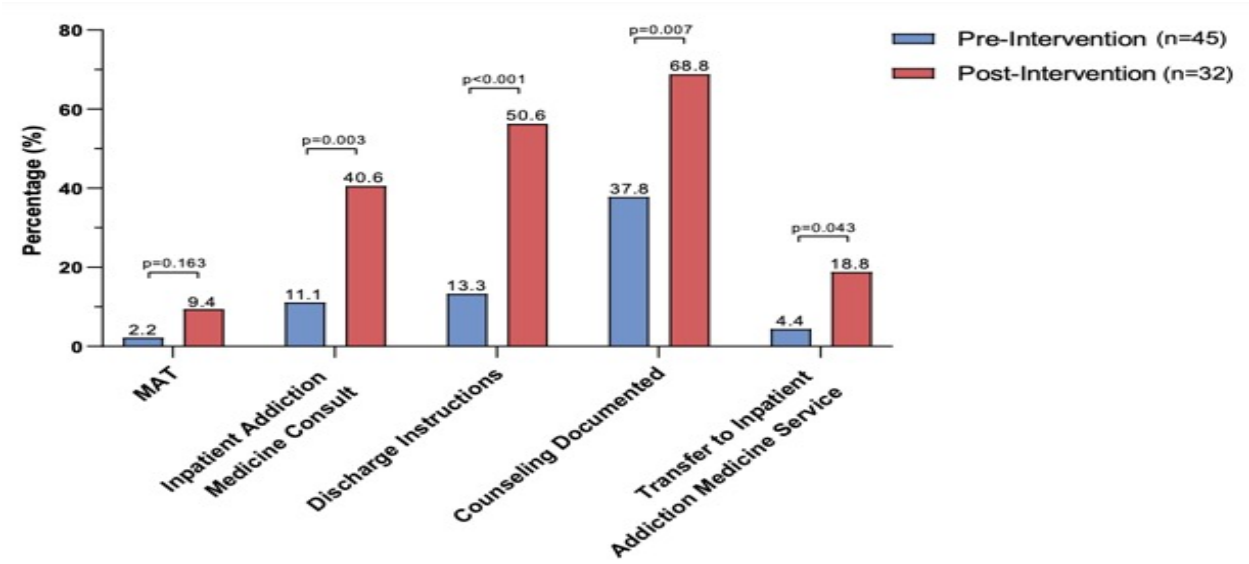


Figure 1. Summary of the multi-pronged intervention on key quality of care indicators among hospitalized patients with alcohol use disorder. Summary of the multi-pronged intervention on key quality of care indicators among hospitalized patients with alcohol use disorder, including prescription of medication assisted therapy (MAT), inpatient addiction medicine consult, alcohol counseling documentation, transfer to inpatient addiction medicine service, and discharge instructions (to follow up with an addiction medicine specialist).

Quality Improvement Report

3rd Place

Adding the PCP to Meditech: An Initiative to Educate Medical Residents about the Relevance of Updated PCP Information for Continuity of Care

Matthias Bergmann, M.D.; Tishena Lloyd, M.D.; Ryan Barrette, M.D.; Ceyda Akartuna, M.D.; Emilie Lilford, M.D.; Sajid Saraf, M.D.

Background: Upon hospital discharge, patients are instructed to follow up with their Primary Care Provider (PCP) to ensure continuity of care which has shown to improve long-term care and decrease hospital re-admission [1]. Every patient requires a discharge summary that is automatically faxed to the PCP listed in the Electronic Medical Record (EMR). Patients may not have a PCP listed in the EMR upon discharge, which impedes continuity of care as the discharge summary is not automatically transmitted to the patient's PCP in a timely manner [2].

Clinical Setting & Stakeholders:
This quality improvement (QI) project was conducted in the inpatient setting at a tertiary care teaching hospital. Stakeholders included medical residents, hospitalists, PCPs, and hospital senior leadership; however, the main target group was medical residents.

Quality Improvement Plan (Measures & Outcomes):
Outcome measures included a survey sent to stakeholders before and after the three Plan-Do-Study-Act (PDSA) cycles with a focus on medical residents. The survey was conducted before the first PDSA cycle to analyze the baseline awareness of the responsibility and understanding of the process to update a patient's PCP in the EMR. The same survey was repeated after completion of the third PDSA cycle. Our multipronged interventions over the three PDSA cycles were comprised of educational sessions with the medical residents through targeted lectures and hands-on teaching sessions, educational emails, posters, and visual reminders which included a workflow on how to place an order to add the PCP to the EMR, as well as a standardized care bundle for physician notes.

Results: We compared responses to the pre-intervention and the post-intervention surveys with 35 and 40 participants, respectively (Figure 1). Prior to the first PDSA cycle, 65.7% of participants confirmed the patient's PCP with the patient, compared to 87.5% post-intervention. While prior to this QI project 85.7% knew how to locate PCP-related information in the EMR, only 31.4% knew how to update missing or incorrect information. After the third PDSA cycle, we saw a slight increase to 92.5% regarding the knowledge of how to locate the PCP in the EMR, while the percentage of house staff able to update this information increased almost three-fold to 87.5%. The improvement in all three question items indicates increased awareness regarding the importance of PCP documentation.

Limitations: Our survey relies on the answers of the survey participants and did not test knowledge, making the results prone to subject bias. While we had similar numbers of participants in the pre- and post-intervention surveys, these only represent a fraction of the medical residents and other house staff. We did not collect demographic data and representativeness of the entire hospital staff cannot be assumed.

Conclusions: This QI project achieved an increase in awareness and knowledge regarding PCP information in the EMR among survey participants of the medical house staff, and specifically medical residents. Prior to our QI project, physicians were not systematically trained to update the PCP in the EMR. We educated the house staff about the relevance of updated PCP information in the EMR and provided the means for improvement of continuity of care after discharge from the hospital.

Adding the PCP to Meditech: An Initiative to Educate Medical Residents about the Relevance of Updated PCP Information for Continuity of Care (cont.)

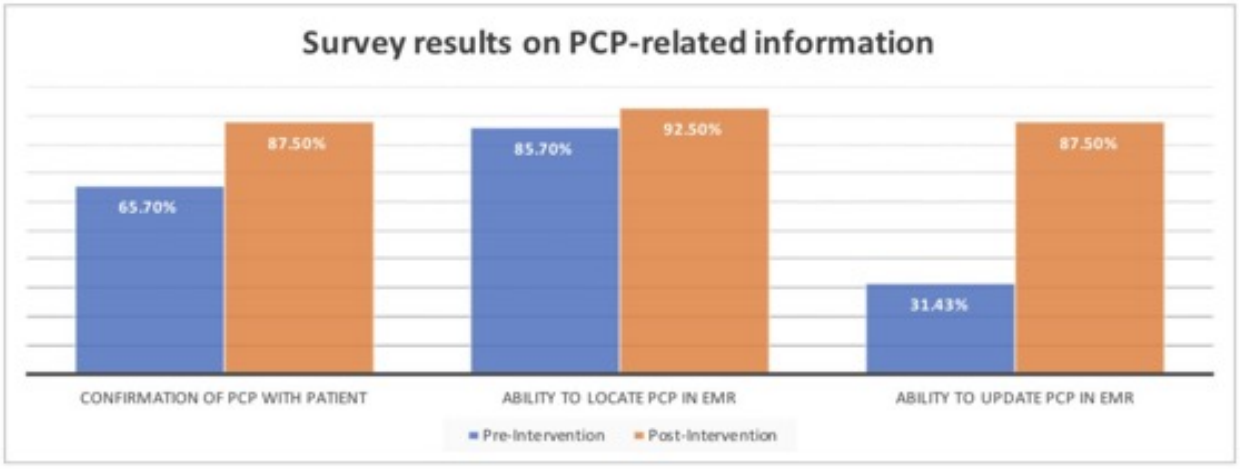


Figure 1. According to pre- and post-interventional survey results, 65.7% confirmed the PCP before our QI project and 87.5% after. While a similar percentage of participants knew how to locate PCP information, we saw an increase from 31.3% to 87.5% regarding the knowledge of how to update the PCP in the EMR.

Quality Improvement Report

Honorable Mention

Adding the PCP to Meditech: Ensuring continuity of care by improving inpatient to outpatient care transition

Tishena Lloyd, M.D.; Matthias Bergmann, M.D.; Ryan Barrette, M.D.; Ceyda Akartuna, M.D.; Emilie Lilford, M.D.; Sajid Saraf, M.D.;

Background: Upon hospital discharge, patients are instructed to follow up with their Primary Care Provider (PCP). Every patient requires a discharge summary that is automatically faxed to the PCP listed in the Electronic Medical Record (EMR). Patients may not have a PCP listed in the EMR upon discharge, which impedes continuation of care as this summary cannot be transmitted to the patient's PCP in a timely manner.

Clinical Setting & Stakeholders:
SThis quality improvement (QI) project was conducted in the inpatient setting at a tertiary care teaching hospital. Stakeholders included medical residents, hospitalists, PCPs, and hospital senior leadership, however, the main target group were medical residents.

Quality Improvement Plan (Measures & Outcomes):
We performed three PDSA cycles. Outcome measures included surveys sent to stakeholders before and after interventions and the percentage of patient cases discharged without a PCP listed compared to all discharges. Approximately 300 medical records were reviewed initially, and a similar number were reviewed after each cycle. The required data was obtained through chart review. Our multipronged interventions included holding lecture-based and hands-on teaching sessions for residents, distributing educational emails and posters, creating a standardized care bundle and developing a workflow for adding the PCP to EMR.

Results: As shown in Figure 1, the percentage of hospitalized patients without a PCP on file decreased from 15.2% (46/302) to 13% (39/301) with multiple interventions over 3 PDSA cycles ($p = 0.87$). Further, we reviewed the medical records of 119 patients who did not have an assigned PCP in the EMR to ascertain whether the name of the PCP was otherwise documented in any hospital notes (i.e., admission notes or discharge summary) and whether there was an order to add the PCP which was not executed by the hospital staff. Pre-intervention, 86% of the reviewed patients without a PCP on file did not have any other documentation or order in the chart. Post-PDSA cycles, there was a significant reduction in this rate, ranging between 73% and 82% ($p = 0.01$). Among the 119 medical records with no assigned PCP in the EMR, 8% had an order placed that was not executed compared to 0% pre-intervention. If the unexecuted orders had been executed, the percentage of patients without a PCP on file would have decreased from 15.2% in the pre-intervention period to 11.0% after PDSA cycle 3 ($p = 0.07$)

Limitations: We identified several medical records with correctly placed orders that did not result in an update of the PCP in the EMR, which was an unanticipated obstacle involving the work-flow of hospital staff beyond residents. Further, not all admitted patients have an assigned PCP, which is beyond this project's scope.

Conclusions: This QI project achieved a decrease in the number of patients without PCP listed in the EMR, which is expected to increase the timely transmission of hospital discharge summaries to PCPs. This project contributed to an increase in PCPs listed on file, documentation of PCP in hospital notes, and orders to update the PCP. This result improved the conditions that are required for optimal care coordination post hospitalization.

Adding the PCP to Meditech: Ensuring continuity of care by improving inpatient to outpatient care transition (cont.)

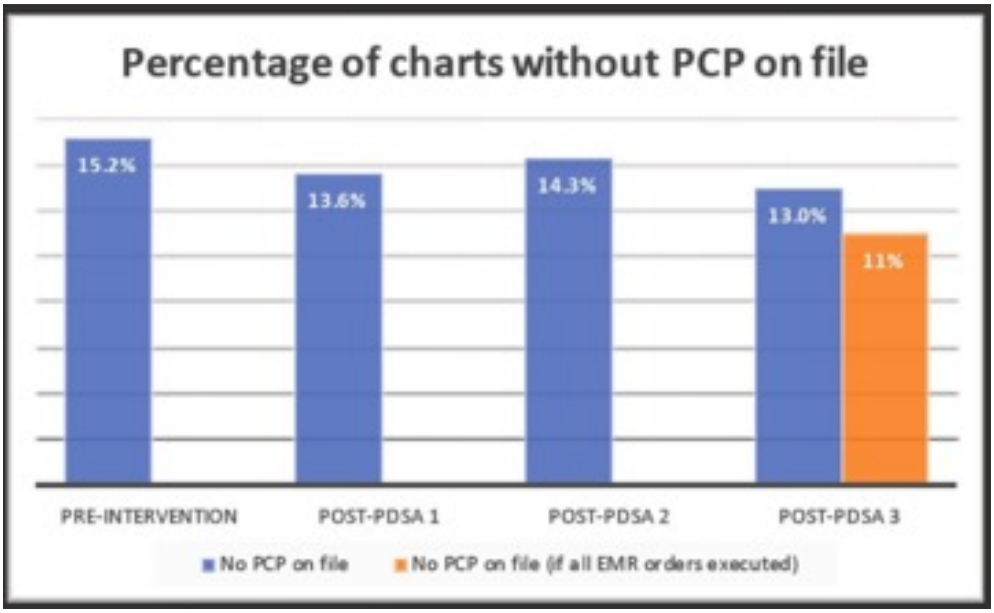


Figure 1. A decrease in patient charts without PCP on file can be seen over the three PDSA cycles ($p = 0.87$), from 15.2% pre-interventional to 13% after the third PDSA cycle (blue). If all EMR orders to update missing PCPs had been executed, the latter would decrease further to 11% (orange).

Quality Improvement Report

Honorable Mention

Pain is Gone with Just A Few Lidocaine Drop

Danielle Levin, M.D.; Martin Acquadro, M.D.; DMD; Joseph James, DO; Olusola Akenroye, M.D.; Bishoy Michaels, DO; Frederic Gerges, M.D.

Background: Sphenopalatine ganglion block (SPGB) is a simple and valuable technique that was discovered in 1908, but few anesthesiology providers are familiar with this block. Over the years, multiple companies have created intranasal devices for the administration of the SPG block through the transnasal approach. However, these devices can be expensive and are not readily available at all institutions. As a quality improvement project, we have created our own device from supplies that are readily available in every medical facility to safely, effectively, and inexpensively perform the SPGB to treat headaches and extend the treatment to other types of pain.

Clinical Setting & Stakeholders: Saint Elizabeth's Medical Center Pain Clinic.

Quality Improvement Plan (Measures & Outcomes): The SPGB applicator was created from hollow cotton swabs, intravenous extension tubing with a stop cock, 3-ml-syringes, 5% lidocaine ointment, and 4% lidocaine topical. We positioned patients in the supine position with the patient's neck extended ("chin-up position") and monitored their hemodynamics throughout. The SPGB applicator dipped into lidocaine ointment USP was gently inserted into each nostril and advanced until gentle resistance was met at the back of the nasopharynx. Lidocaine 4% was dripped drop by drop through the applicators into each nostril until the patients felt the medication in the back of the throat. Typically, 0.5mL to 3mL of the medication was required for each nostril. Patients remained in the position described above for 15-minutes. If the symptoms were not sufficiently relieved, the procedure was repeated in a row, up to two more times. Numeric Rating Scale was used to evaluate pre- and post-treatment pain.

Results: 1st report of a five-month history of a COVID-19 headache being successfully aborted with a single session of our SPGB. 1st report of an intractable ipsilateral shoulder pain following an open pancreaticoduodenectomy successfully aborted with a single session of our SPGB. 2 patients with Lower Extremity Complex Regional Pain Syndrome experienced significant pain relief after our SPGB session. 1 patient experienced significant relief of arthritic knee pain after the block. 1 patient with blurred vision for years had the blurred vision resolved after just one block. 10+ patients with chronic headaches of various etiologies and resistant to numerous treatments received our variation of the SPGB and left our pain clinic headache free. Those with neck/shoulder pain also had decreased pain and improved range of motion of the neck after the block. Patients experienced no severe adverse effects from this treatment besides a mild bitter taste that resolved within several minutes and one patient had nausea that also resolved on its own within several minutes.

Limitations: Few patients have been treated with this block so far, but based on our current results, there is a potential of progression to further advanced studies.

Conclusions: The SPGB has an interesting phenomenon where even after the temporary effects of lidocaine wear off, certain types of pain completely resolved and never came back after this treatment. This topic would benefit from further investigation. Furthermore, this is a benign block, with minimal risks. We suggest that this technique to be considered more often due to its simplicity and effectiveness.

Pain is Gone with Just A Few Lidocaine Drop (cont.)

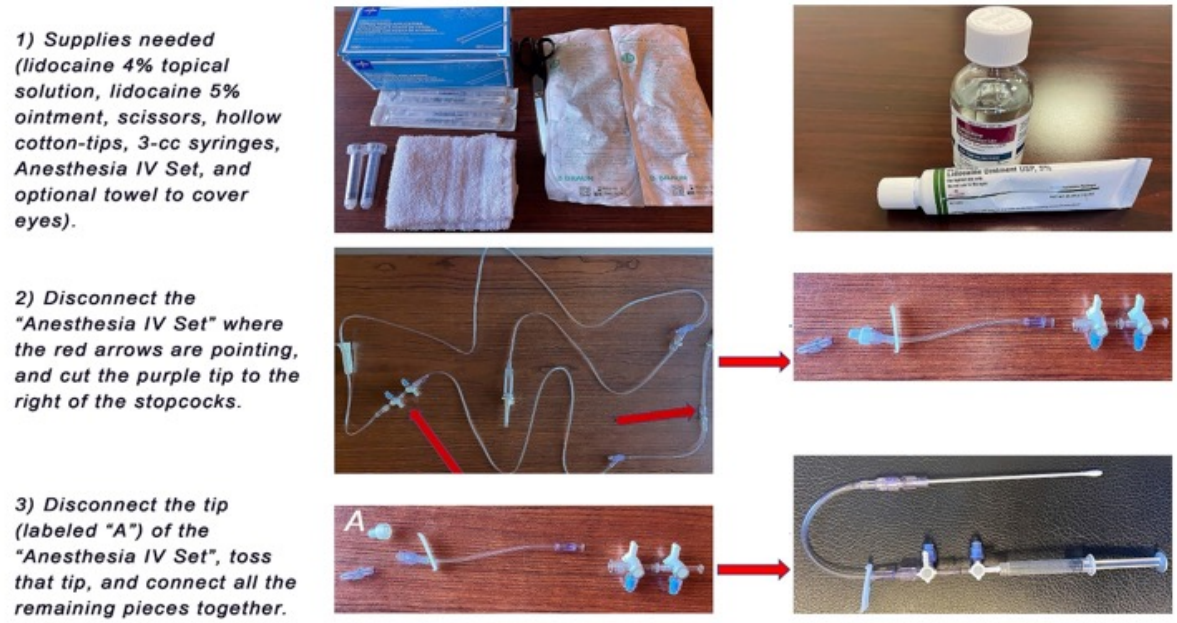


Figure 1. Step-by-step guide to create the transnasal sphenopalatine ganglion block via the cotton-tip applicators.

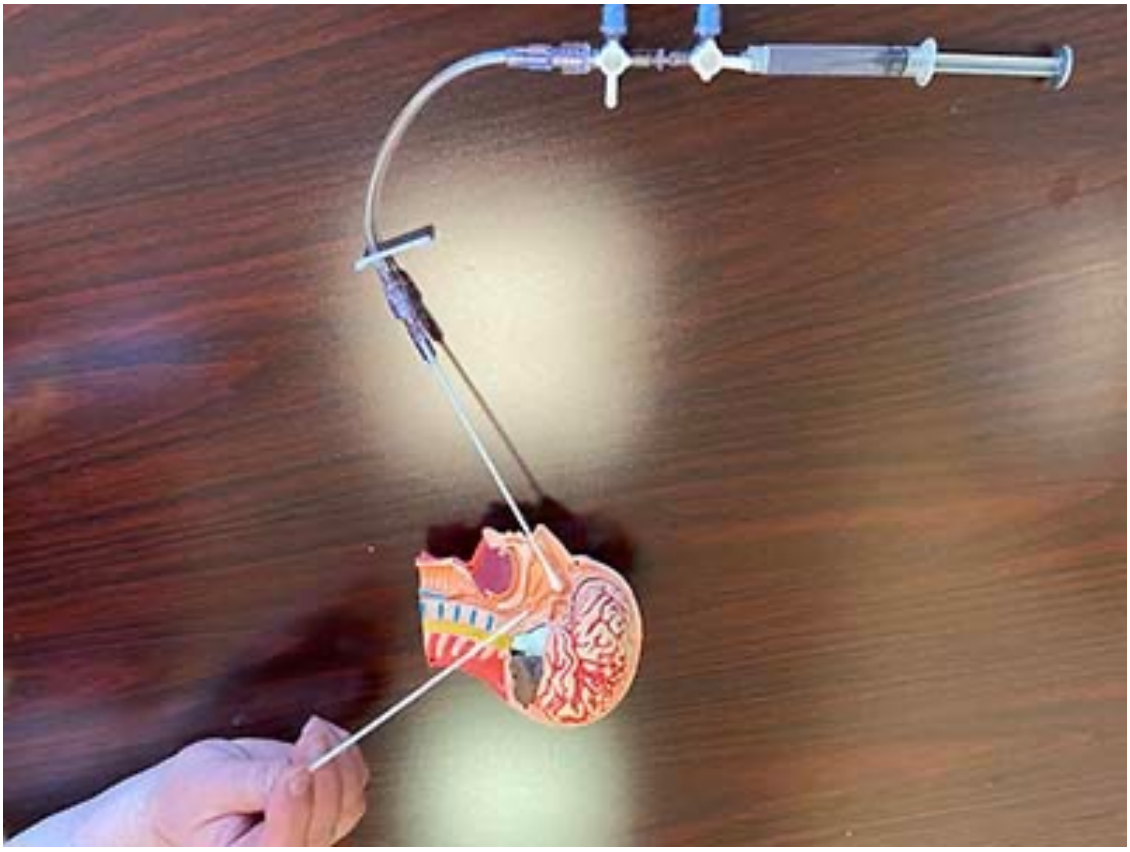


Figure 2. The SPGB applicator in relation to the SPG.

Quality Improvement Report

Honorable Mention

Improving Anti-Epileptic Drug Administration Time: An Interval Report

Natalya Asipenko, PharmD, BCPS, BCCCP; Alicia Dupre, M.D.; Nikolay Korchemny, M.D.; Duncan M. Kuh, M.D.

Background: Status epilepticus is defined as either continuous seizure activity lasting five or more minutes, or repetitive seizures with no return of consciousness in between episodes. The severe seizures that characterize status epilepticus can cause neuronal cell death and lead to irreversible brain injury within minutes. Timely administration of antiepileptic drugs (AEDs) is therefore a critical part of status epilepticus management. The Neurocritical Care Society recommends as a standard of care that intravenous AEDs (phenytoin/fosphenytoin, levetiracetam, lacosamide, and phenobarbital) are available for administration in less than 15 minutes after a STAT order is placed.

Clinical Setting & Stakeholders: The current SEMC system of administrating AEDs involves several steps: order placement by the provider, order verification by the pharmacist, medication preparation at the in-hospital pharmacy, medication delivery to the medication room, and administration by the nurse. Delays in drug administration can occur during any of these stages. Alternatively, medications that are kept in the Pyxis MedStation may be available for emergent and targeted treatment, as many of these steps are bypassed.

Quality Improvement Plan (Measures & Outcomes): We set out to identify the presence of a systematic delay in AED administration to patients admitted to different medical units of the hospital with the goal to improve administration time by creating a STAT AED administration protocol at SEMC. The order-to-administration time of one-time orders of AEDs were reviewed during the years 2020 and 2021. The medications reviewed included levetiracetam, phenytoin, fosphenytoin, and lacosamide.

Results: 120 one-time orders of AEDs from seven departments were identified. Only 2.54% of one-time orders of AED were administered within the recommended time of 15 minutes. In ICU-5, only 4% of AED orders were administered within 15 minutes. The median time from AED order to administration in the hospital and ICU-5 were 58 minutes and 56 minutes, respectively. The distribution of time-to administration for different AEDs was very similar. We presented these results and our proposal for the STAT AED administration protocol at the monthly critical care department meeting.

Limitations: Our data review does not allow us to demonstrate the exact clinical scenarios in which these one-time orders were placed. We will not therefore be able to report changes in neurologic outcomes. However, we will be able to report changes in time-to-administration as well as hospital and ICU length of stay.

Conclusions: There exists a very significant delay in AED administration times at SEMC across all departments with only 2.54% of AED orders overall being administered within the timeframe recommended by the Neurocritical Care Society. Based on these findings we developed a protocol that will allow storing these medications in the Pyxis MedStations with appropriate nursing instructions with the aim of improving time-to administration.

Improving Anti-Epileptic Drug Administration Time: An Interval Report (cont.)

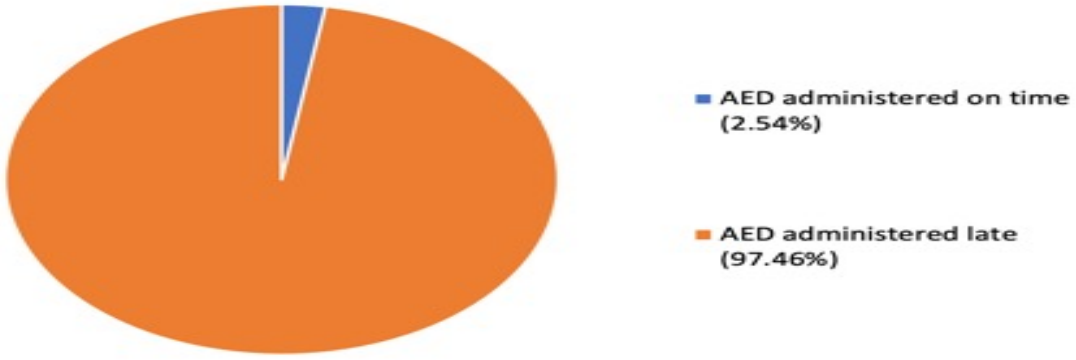


Figure 1. This chart illustrates the proportion of AED administrations given on time (i.e., within 15 minutes of being ordered) across all hospital departments.

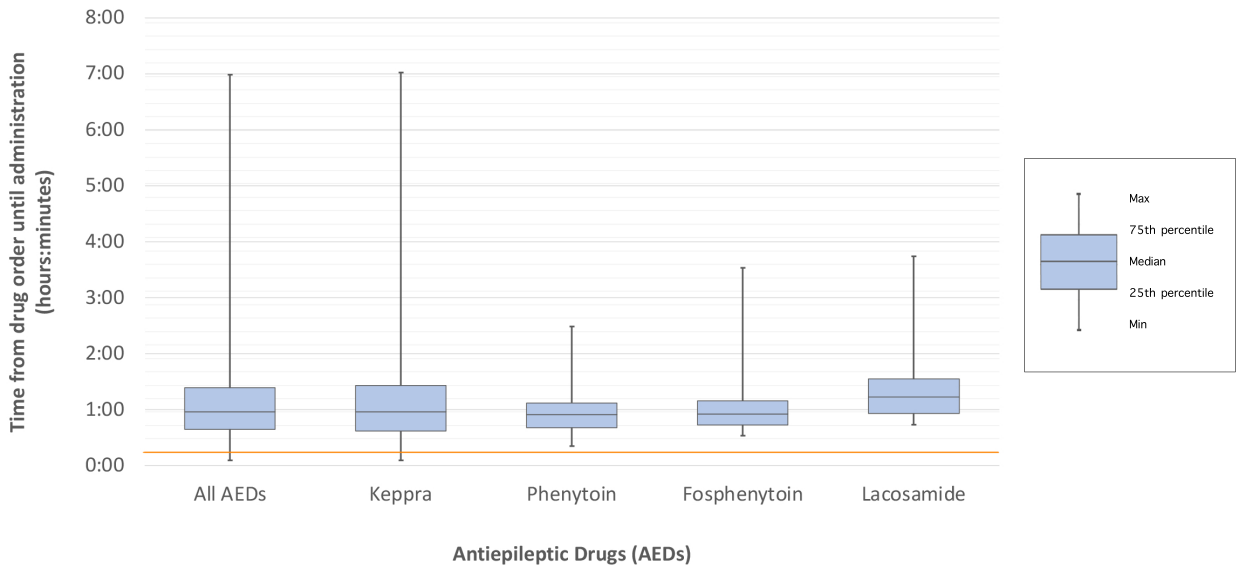
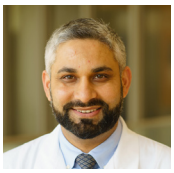


Figure 2. This graph represents the distributions of time from order until administration for 4 AEDs in all hospital departments. The orange line represents the target time-to-administration of 15 minutes.

Quality Improvement Report

Honorable Mention



The Necessity of Proofreading a Dictated Psychiatric Note in The Hospital: A Quality Improvement Project

Kamil Dar, M.D.; Sabrina Dar, M.D.; Olga Kuznetsova, M.D.; Filip Baldzhiyski, M.D.; Qays Munir, M.D.; Chelsea Mendonca, M.D.; Jason Strauss, M.D.

Background: Using dictation devices can cause errors when writing a note, despite following recommended guidelines including speaking into the microphone, keeping the microphone at the side of your mouth to avoid breathing directly into it, and speaking in your natural voice. Errors can be categorized into punctuation, word-misinterpretation, and sentence-misinterpretation (three or more words misinterpreted). When residents dictate a note during a busy shift, they don't have time to proofread. This results in misinterpretation of the content and significant difficulties for the primary team, when referring to the note for their evaluation and assessment. Additionally, psychiatric notes are used in court, and held legally, which may negatively affect the court's decision. According to Zhou, et al., the error rate in physician's dictated notes is 7.4% (per 100 words), which decreased to 0.3% after proofreading.

Clinical Setting & Stakeholders:
Psychiatry admission and consult notes were studied. Main stakeholders include psychiatry residents and attendings, risk management and legal, medical records, and patients.

Quality Improvement Plan (Measures & Outcomes):
In October 2021, we measured the number of errors made in dictated notes. Two psychiatry resident night-floaters (PGY1 and PGY3) documented their dictated notes on a Word document over two-weeks. They proofread and used the track change function to record errors. Errors were divided into three categories: punctuation, word-misinterpretation, and sentence-misinterpretation. 62 of these documents were reviewed by four PGY4s for additional errors and recorded on a shared spreadsheet. Both night-floaters were asked to proofread all dictated documents for one month, and the PGY4s audited 20 of these documents. The intervention measured errors with and without proofreading. Our intention was to make residents aware of their significant dictating errors and motivate them to make proofreading part of their regular practice.

Results: Total errors in all 62 notes were 254 in punctuation, 689 in word-misinterpretation, and 43 in sentence-misinterpretation (Figure 1). Errors made without proofreading a document ranged from 1-71 per note, with a mean of 16.24, median of 11, and a mode of 9. The audit showed errors ranging from 0-21 per document, with a mean of 5, median of 1.5, and mode of 0 (Figure 2).

Limitations: Observer bias is possible, as only one resident was audited. However, this intern used specific dictation guidelines, which limits this bias. Due to significant outliers, the statistic used for average was best represented by the median.

Conclusions: Dictating notes is convenient; however, proofreading is essential and not always done. Our study showed a median of 11 errors per note with a dictation device, most frequent error being word-misinterpretation. Once proofreading was implemented in the night-floaters regular practice, we noted a significant drop to only 1.5 errors per note. Both night-floaters were able to maintain a very low number of errors in their documentation beyond the study period. This project is to remind residents that an intervention of proofreading results in an improved quality of admission/consult and better patient care. After sharing the results with the psychiatry department, providers realized the need to proofread. We recommend Meditech implements a mandatory checkbox for attestation of proofreading.

Improving Anti-Epileptic Drug Administration Time: An Interval Report (cont.)

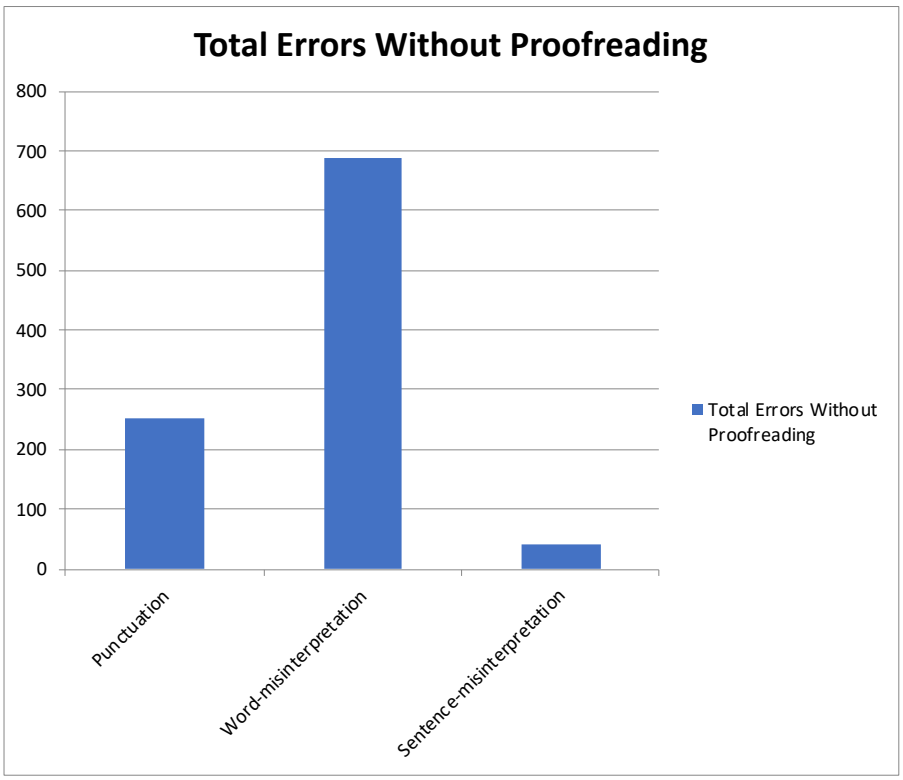


Figure 1. This figure shows the total errors made by both residents during a two-week night-float rotation. It compares errors made without proofreading, divided into three categories. Total errors were 254 in punctuation, 689 in word-misinterpretation, and 43 in sentence-misinterpretation (causing the need for the most alterations).

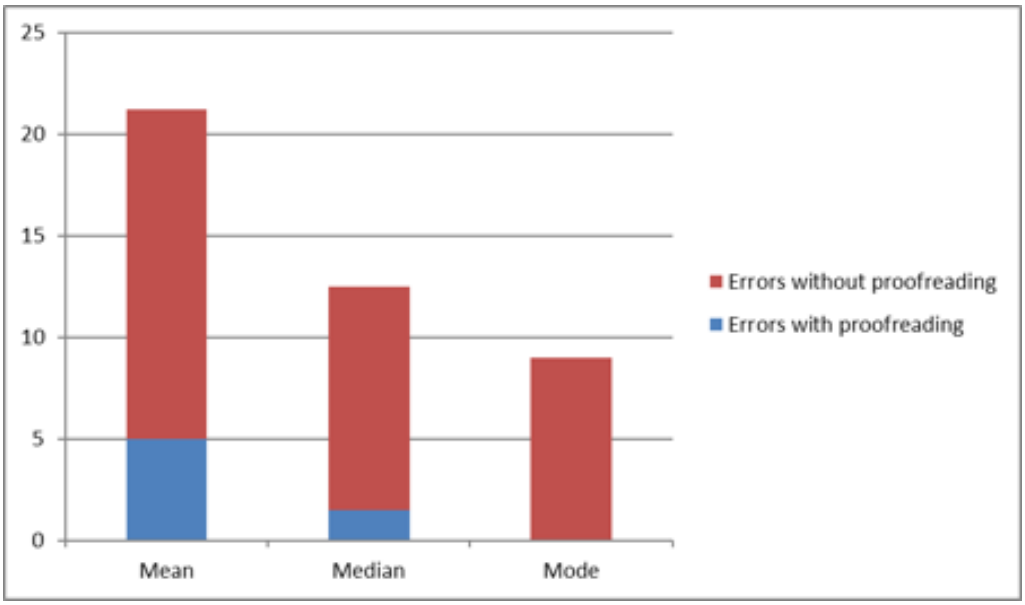


Figure 2. This chart compares the errors made with and without proofreading a dictated note. Average errors per note without proofreading are as follows; Mean: 16.24, Median: 11, and Mode: 9. Average errors per note with proofreading are as follows; Mean: 5, Median: 1.5, and Mode: 0.

Quality Improvement Report

Honorable Mention

Documentation of hematological and oncological histories amongst medical residents – A quality improvement project

Thy Dang, Tatiana Joseph, Cheryl Evans, Mu Li, Olga Kozyreva

Background: Accurate and complete documentation is essential to the quality of care to hospitalized patients with a history of cancer. We identified that accurate clinical documentation pertaining to cancer history among patients hospitalized on a general medicine teaching service was lacking. We sought to improve clinical documentation by implementing a standardized checklist to aid in gathering data on cancer history and providing educational sessions with stakeholders to improve accuracy of documentation.

Clinical Setting & Stakeholders: Internal Medicine residents enrolled in the St. Elizabeth's Internal Medicine Residency and the Medical Oncologists of the Dana Farber Cancer Institute at St. Elizabeth's Medical Center.

Quality Improvement Plan (Measures & Outcomes): In the pre-intervention period, we performed a retrospective review of medical records of patients on the general medicine service with a known prior diagnosis of a cancer (previously treated at the Dana Farber Cancer Institute at St. Elizabeth's Medical Center) who were hospitalized at St. Elizabeth's Medical Center for an alternative diagnosis, between October 2020 and February 2021 and evaluated whether key components in the past medical history were present in relation to their cancer history, with a focus on type (or subtype), date of diagnosis, timeline of treatment, type of treatment received, current cancer status, and current treatment/ongoing surveillance plan. Patients with a newly diagnosed or uninvestigated malignancy were excluded. We then developed a standardized checklist template to aid in gathering essential information pertaining to patients with a history of cancer. This template was distributed to the Internal Medicine residents and posted in internal medicine resident work rooms. Internal Medicine residents also received educational sessions about the importance of proper clinical documentation in relation to patients with a history of cancer. After 4 months, in the post-intervention period, we conducted a similar retrospective review of medical records with a focus on the same afore mentioned key components of interest, between August 2021 and October 2021.

Results: At the initiation of this quality improvement project, there was no standardized method to document cancer histories. The results of our single PDSA cycle are show in the Table 1. In brief, providing educational sessions and implementing a standardized checklist to gather cancer histories, we observed a 7% increase in documentation of cancer type or subtype, a 31% increase in documentation of date of cancer diagnosis, an 11% increase in timeline of cancer treatment documentation, a 7% increase in documentation of type of cancer treatment received, a 10% increase in documentation of current cancer status, and a 17% increase in documentation of ongoing cancer treatment or surveillance plan.

Limitations: We only performed one PDSA cycle and our sampling of medical records was small. The only significant improvement in clinical documentation was the date of cancer diagnosis. The hospital-based (Meditech) and cancer-based (Epic) electronic health records are not integrated hindering this clinical documentation effort

Conclusions: Documentation of cancer histories in the medical records is crucial for the optimal care of cancer survivors. Following the implementation of a standardized checklist and educational sessions, we were able to improve the clinical documentation of key components of the cancer history among patients hospitalized on general medicine services. Further efforts to improve the culture of documentation for cancer patients remains a crucial aspect of quality and safety and requires integration of electronic health records.

Documentation of hematological and oncological histories amongst medical residents – A quality improvement project (cont.)

	Pre-intervention Period (n = 33)	Post-intervention Period (n = 35)	*P value
Cancer type or subtype	81.8%	88.6%	0.43
Date of cancer diagnosis	57.6%	88.6%	0.004
Timeline of cancer treatment	57.6%	68.6%	0.35
Type of cancer treatment received	72.7%	80.0%	0.48
Current cancer status	72.7%	82.9%	0.31
Cancer treatment/ongoing surveillance plan	54.5%	71.4%	0.15

*By Pearson Chi-Square

Table 1. Results after a single PDSA cycle.

Quality Improvement Report

Implementation of Pharmacists' Electronic Feedback Note to Improve Antimicrobial Stewardship Program

Afaq Alabbasi, PharmD; Salwa Elarabi, R.Ph. BCPS-AQ Infectious Diseases; Jorge Fleisher, MD

Background: The Centers for Disease Control and Prevention (CDC) Core Elements of Hospital Antibiotic Stewardship Programs (ASP) guideline states 30% of antibiotics initiated in United States hospitals are inconsistent with guidelines recommendations. Inappropriate antibiotic use increases the risk of adverse events, antibiotic resistance, and healthcare associated cost. Prospective audit and feedback and preauthorization are key ASP core elements recommended by the CDC to improve antibiotic use. However, feedback to practitioners regarding appropriate antimicrobial selection could be a challenge.

Clinical Setting & Stakeholders:
This quality improvement project was implemented at St. Elizabeth's Medical Center (SEMC) for patients starting on selected antimicrobials (vancomycin, cefepime, meropenem, piperacillin/tazobactam). The goal is to enforce the feedback core element and improve antimicrobial utilization including antibiotic selection and duration of therapy.

Quality Improvement Plan (Measures & Outcomes):
This project involved implementing a written antimicrobial stewardship (AMS) feedback note in the electronic medical record (EMR) by the ID Pharmacist. The feedback note was utilized to include recommendations to optimize utilization of the selected antibiotics (vancomycin, cefepime, meropenem, piperacillin/tazobactam). The project aim was ≥ 30% of selected antimicrobial interventions made by ID Pharmacist through an EMR note will be accepted in ≤ 48 hours of note initiation by March 4th, 2022. The outcome measure was the percentage of accepted interventions made by ID Pharmacist on weekdays. Process measures included Days of therapy (DOT) (per 1000 days) for each antibiotic, time (in hours) to accept pharmacist recommendations and number of each intervention type. The balancing measure was the average time spent by the pharmacist reviewing patient chart and documenting an AMS feedback note.

Results: Between October 4th 2021 until March 4th 2022, the ID pharmacist evaluated 193 patients who were initiated on one or more of the selected antimicrobials and wrote an AMS feedback note with recommendations. The percentage of interventions accepted per week ranged between 80% to 100% with a mean of 95%. A total of 102 interventions were accepted by the primary team. Examples of interventions included antibiotic de-escalation and duration of therapy. DOT/1000 days was trending down for vancomycin and cefepime. The average time to accept pharmacist recommendations was 4 hours. The average time spent by pharmacist reviewing patient chart and documenting an AMS feedback note was 15 minutes.

Limitations: An increase in the ID Pharmacist's workload and time required to identify patients starting on the selected antimicrobials throughout the day were some challenges provoking additional Plan-Do-Study-Act (PDSA) cycles. Physicians may not always read the AMS feedback note which could include key recommendations regarding patient's antimicrobial regimen. In addition, there are missing opportunities when the ID Pharmacist is not available such as evenings and weekends.

Conclusions: From the implementation of the project until March 4th, 2022, ID Pharmacist interventions through AMS feedback notes were highly accepted. This resulted in an overall improvement in antimicrobials utilization including de-escalation and appropriate duration of therapy. Future PDSA cycles to create AMS note for all restricted antimicrobials could further enhance SEMC's ASP.

Implementation of Pharmacists' Electronic Feedback Note to Improve Antimicrobial Stewardship Program (cont.)

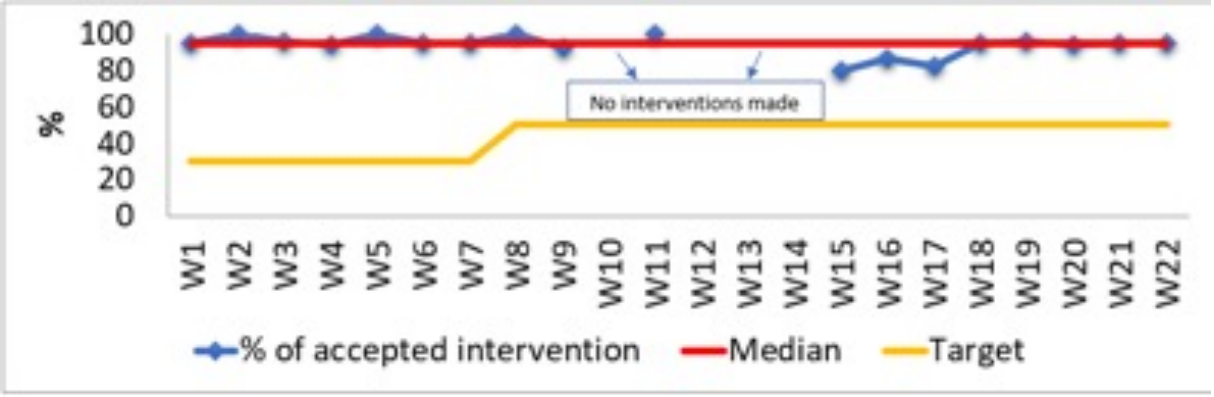


Figure 1. Data shown reflects the weekly percentage of accepted interventions through AMS feedback notes. The blue arrows indicate weeks where interventions were not made due to unavailability of the ID Pharmacist. Due to the high intervention acceptance rate, target was changed from 30% to 50% by week eight.

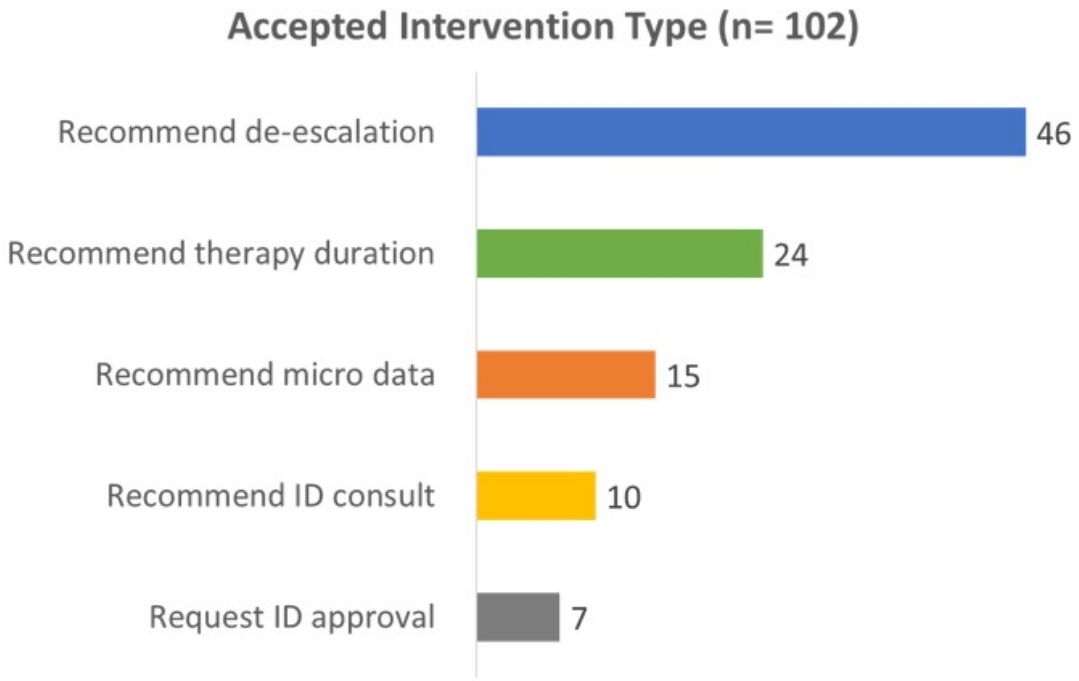


Figure 2. Number of each intervention type made by the ID Pharmacist through an AMS feedback note.

Quality Improvement Report

Impact of a Nurse-Pharmacist Driven Antimicrobial Stewardship: Redefining the Team

Aislinn Brooks, PharmD, BCPS; Salwa Elarabi, R.Ph. BCPS-AQ ID; Jorge Fleisher, MD

Background: The Centers for Disease Control and Prevention and the World Health Organization have recognized the worldwide emergence of antimicrobial resistance that has limited and complicated the treatment of infections. The Joint Commission mandated acute care hospitals to implement antimicrobial stewardship (AMS) programs. Core elements were developed to help hospitals achieve this goal. Historically, nurses were not fully integrated into stewardship efforts. As a result, the core elements were updated incorporating nursing-based actions such as optimizing microbiology cultures.

Clinical Setting & Stakeholders: St. Elizabeth's Medical Center's (SEMC) AMS program incorporates all the core elements except for nursing involvement. This quality improvement project was implemented at SEMC to motivate bedside nurses to assess the appropriateness of Clostridioides difficile (C. difficile), respiratory, and urine cultures ordered in the intensive care unit (ICU).

Quality Improvement Plan (Measures & Outcomes): The goal of this quality improvement project is to integrate bedside nurses in collaboration with pharmacy to expand our AMS program. The aim is ≥20% of ICU C. difficile, respiratory, and urine culture interventions made by the Nurse-Infectious Diseases (ID) Pharmacist AMS team will be accepted by March 4th, 2022. The ID Pharmacist identified AMS nurse champions and engaged front line nurses in SEMC's AMS program by providing contining education, attending morning nursing huddles, and creating algorithms to guide nursing to appropriate culturing practices. Nurses utilized the algorithms to assess appropriateness of the cultures ordered. If deemed inappropriate, nurses contacted the ID Pharmacist and/or ordering physician to intervene. The outcome measure assessed was the percentage of interventions accepted for inappropriate C. difficile, respiratory, and/or urine cultures weekly. Process measures included time (in hours) to discontinue inappropriate cultures and the type of culture addressed. The balancing measure was the average time the Nurse/ID Pharmacist spent to assess appropriateness of ordered cultures.

Results: From the implementation of the project until March 4, 2022, a total of 69 interventions were made by the Nurse/ID Pharmacist AMS team. Due to a high intervention acceptance rate, the target was changed from 20% to 60% at week eight. Out of the 69 interventions, 91% (n=63) were accepted and resulted in the discontinuation of the culture. The majority of accepted interventions were among urine cultures, with the least being respiratory. The average time to discontinue inappropriate C. difficile, respiratory, and/or urine cultures was 2 hours. The average time the Nurse/ID Pharmacist spent to assess appropriateness of C. difficile, respiratory, and/or urine cultures was 15 minutes.

Limitations: Inability to provide comprehensive ID pharmacist coverage on weekday evenings, weekends, and holidays resulted in missed opportunities to intervene on cultures ordered during this time. In addition, the nursing staff experienced a high rate of employee turnover which made consistent education of the project initiative challenging.

Conclusions: The implementation of a Nurse/ID Pharmacist AMS collaboration resulted in a high acceptance of culture interventions leading to discontinuation of inappropriate cultures. AMS nurse champions expanded SEMC's AMS team and led to improved microbial culture practices in the ICU. Future expansion of this collaborative effort to other hospital units could further strengthen SEMC's AMS program.

Impact of a Nurse-Pharmacist Driven Antimicrobial Stewardship: Redefining the Team (cont.)

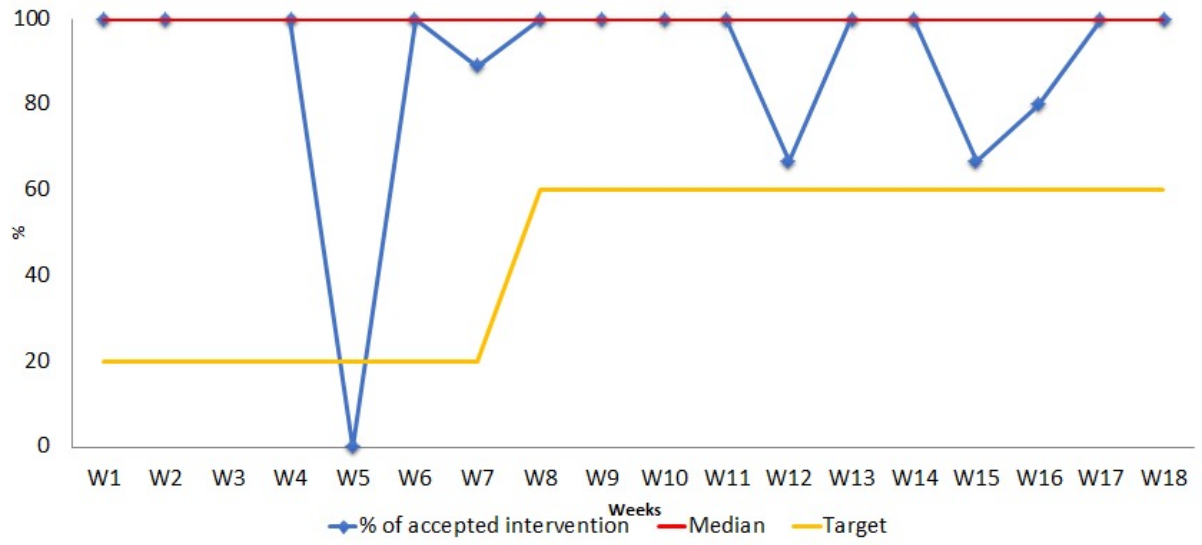


Figure 1. Data shown reflects the weekly percentage of accepted interventions recommended by the nurse/ID Pharmacist AMS team. Due to the high intervention acceptance rate, target was changed from 20% to 60% in week eight.

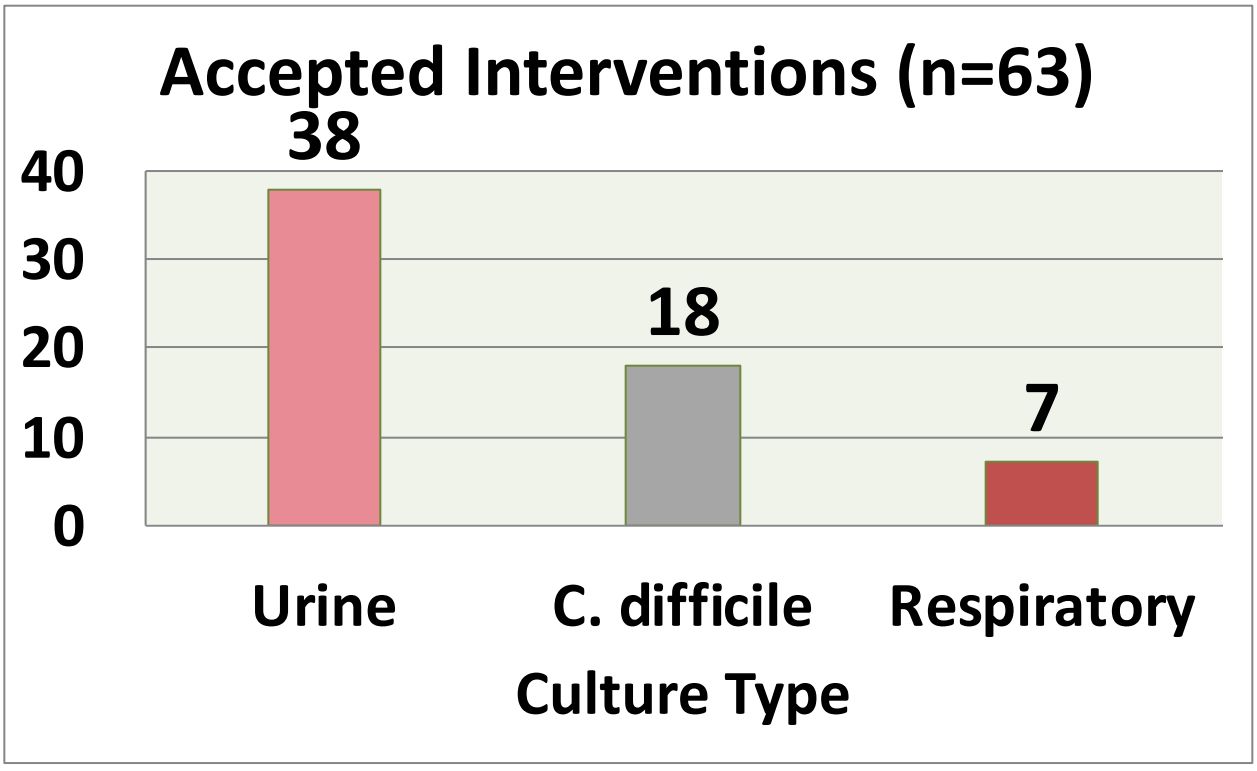


Figure 2. This data reflects the number of accepted interventions for each culture type made by Nurse/ID Pharmacist AMS team resulting in the discontinuation of the inappropriate culture.

Quality Improvement Report

High Rates of Oral Anticoagulation in Atrial Fibrillation Patients Observed In a Large Multi-Specialty Health System in the Northeast

Roop Dutta, MD; John V Wylie, MD

St Elizabeth's Medical Center, Boston

Background: While anticoagulation is a cornerstone in management of atrial fibrillation for stroke prevention, historic data, taken when Warfarin was the predominant oral anticoagulant (OAC), showed that OAC's were underused in stroke prevention. In years since, novel oral anticoagulants (NOAC's) have seen widespread adoption but it has not been shown whether there has been a subsequent increase in OAC usage in atrial fibrillation patients.

Clinical Setting & Stakeholders:
We aimed to quantify the rates of appropriate OAC use in atrial fibrillation patients in a large multispecialty health system in the Northeast United States, OAC rates stratified by CHA2DS2-VASc scores, and OAC rates by patients managed by cardiology or primary care.

Quality Improvement Plan (Measures & Outcomes):
We developed a clinical dashboard drawing data from the outpatient electronic health record (EHR) to calculate CHA2DS2-VASc scores for patients with a diagnosis of AF, and OAC use was evaluated. Patients were included if they have had an in person or telehealth visit with a provider in the network in the prior 18 months. The most recent active problem list and diagnosis codes during this time period were used to define the population diagnosed with atrial fibrillation. The CHA2DS2-VASc score was calculated based on SNOMED codes, problem lists, and demographic data. An IRB for this research was submitted and approved by SEMC.

Results: Of the 8727 patients with a diagnosis of AF, 6703 (77%) were treated with OAC. Of the 6933 patients with a CHA2DS2-VASc score of 2 or higher, 5576 (80.4%) had an OAC listed as an active medication or had received a left atrial appendage occlusion device. Of the 6605 patients with any risk score treated with an OAC, 5308 (80.4%) were treated with a NOAC and 1295 (19.6%) were prescribed Warfarin. A higher percentage of patients with CHA2DS2-VASc $\geq$ 2 who had seen a cardiologist were treated with an OAC vs. those who had not seen a cardiologist in the prior 18 months (83.95% vs. 67.43%, $p < 0.01$).

Limitations: Limitations include selecting atrial fibrillation patients by ICD codes and not confirmed by EKG, not excluding atrial fibrillation patients with equivocal indications for anticoagulation.

Conclusions: We show dramatically increased oral anticoagulation usage among patients with atrial fibrillation as well as NOAC's comprising the large majority of OAC's compared with previous registry data suggesting an association between widespread adoption of NOAC's and increased oral anticoagulation rates. Patients with atrial fibrillation who had seen a cardiologist with in 18 months were more likely to have OACs as compared to patients who had solely seen primary care. Future directions include educational interventions to clinics with low anticoagulation rates and then assessing subsequent anticoagulation rates.

High Rates of Oral Anticoagulation in Atrial Fibrillation Patients Observed In a Large Multi-Specialty Health System in the Northeast (cont.)

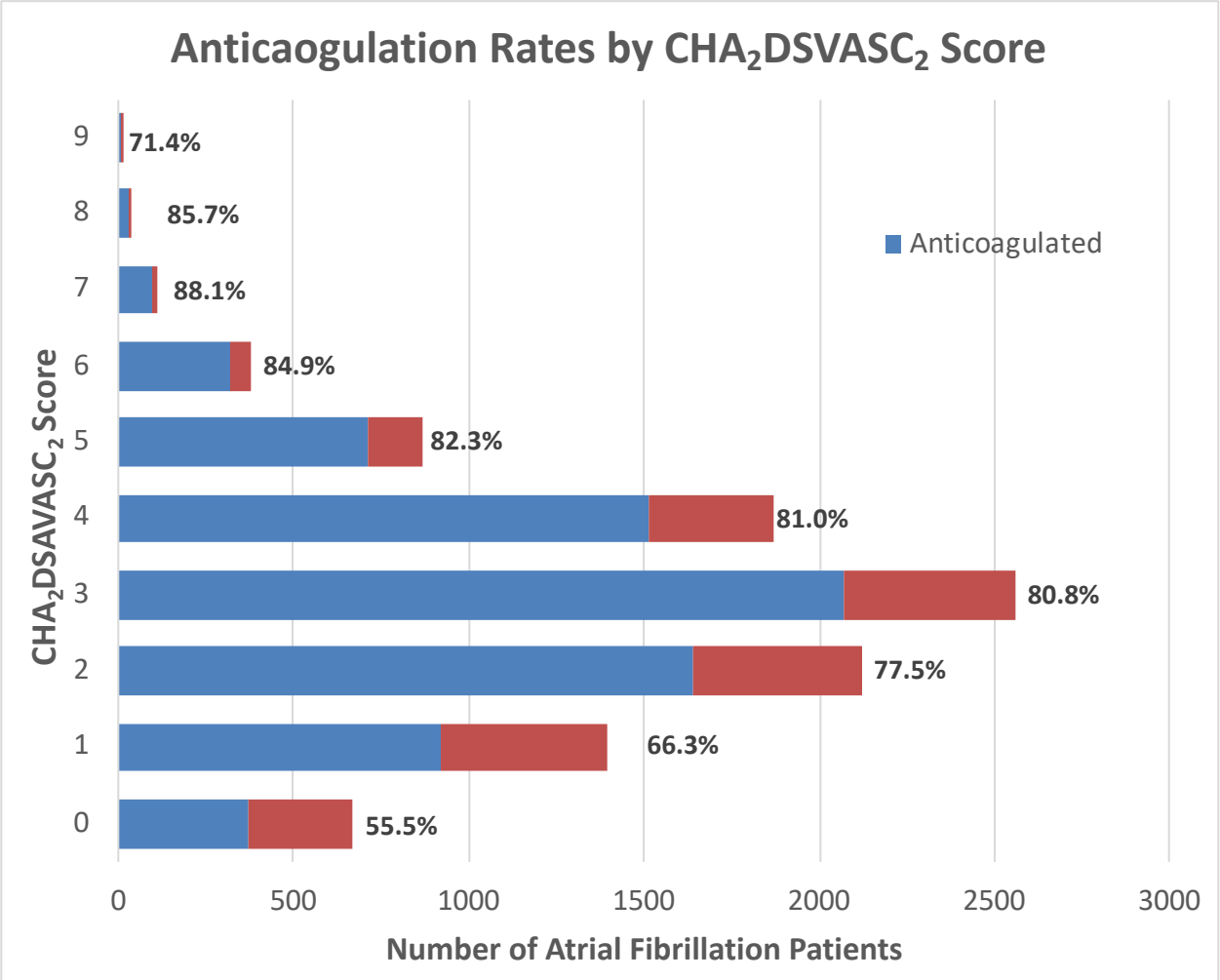


Figure 1. Anticoagulation rate by CHA2DS2-VASc Score. Bars show the number of patients with AF at each CHA2DS2-VASc score. Blue segments represent the percentage of patients receiving OAC or left atrial appendage occlusion.

High Rates of Oral Anticoagulation in Atrial Fibrillation Patients Observed In a Large Multi-Specialty Health System in the Northeast (cont.)

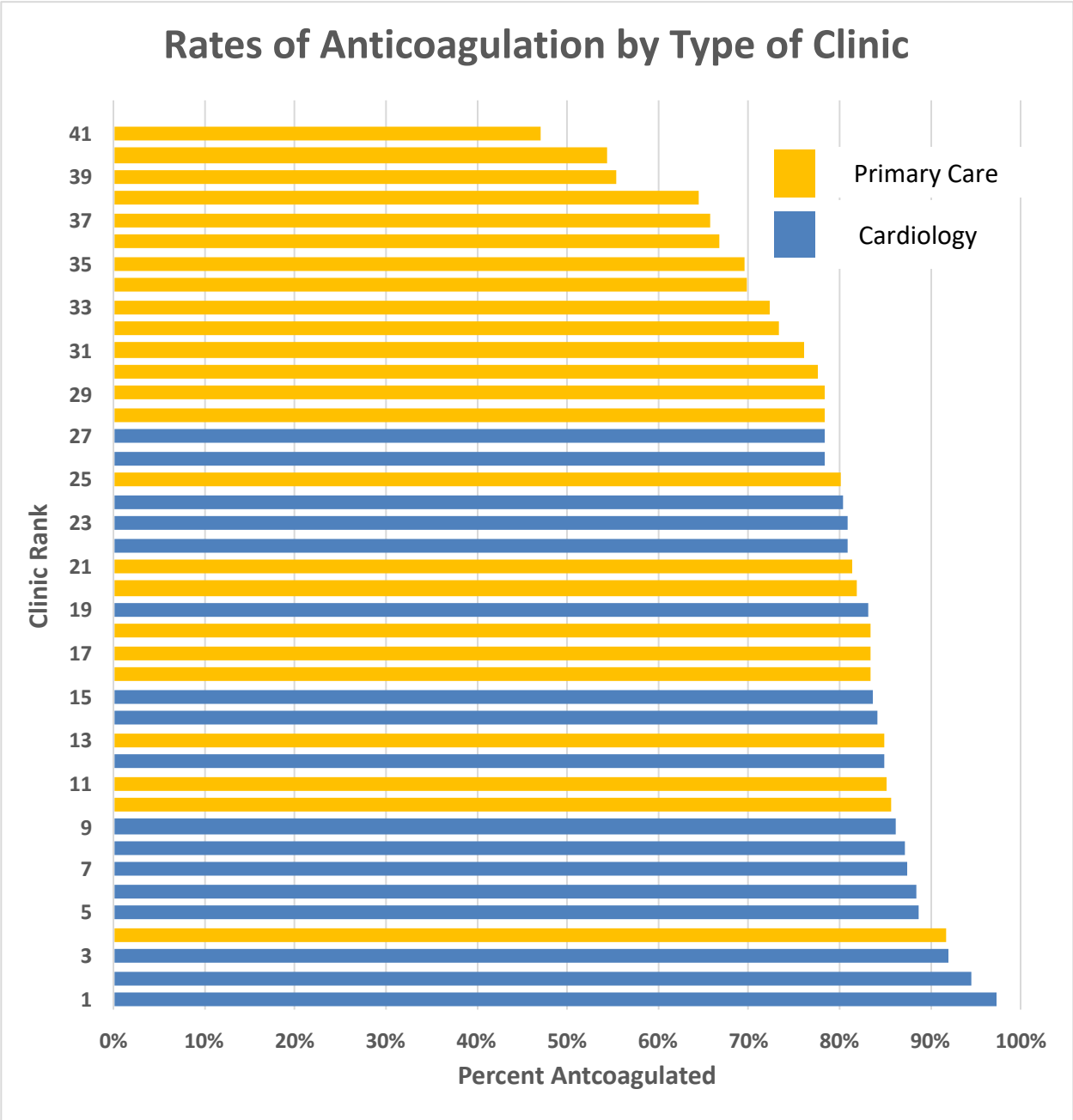


Figure 2. Rates of Anticoagulation by Clinic. Atrial fibrillation patients were analyzed by type of clinic visited (cardiology versus primary care) and clinics were ranked by percent anticoagulated. Cardiology clinics are represented by the blue bars; primary care clinics are represented by yellow bars.

Quality Improvement Report

Interim analysis of QI project to increase pneumococcal vaccine rates in younger immunocompetent adults

Huseyin Berk Degirmenci, MD; Aju Jose, MD; Jorge Avila Zambrano, MD; Guoliang Zheng, MD; Paul Burns, MD; Larry Chin, MD; Michael Hamrock, MD; Claudia Nader, MD

Background: Studies suggested that the incidence of invasive pneumococcal disease can be reduced by 50-80% among immunocompetent adults with the pneumococcal polysaccharide vaccine-23 (PPSV-23). Our aim was to increase overall PPSV-23 administration rate by 50% in eligible younger immunocompetent adults with a specific focus for patients with fewer eligible conditions.

Clinical Setting & Stakeholders: Two primary care offices at Brighton Marine (BM) & Primary care physicians, internal medicine (IM) residents, clinic RNs and MAs.

Quality Improvement Plan (Measures & Outcomes): We reviewed patients who visited BM clinics between 04/01/2019 - 09/15/2019 using Athena Electronic Medical Record (EMR). Eligibility criteria based on CDC guidelines were as follows: Age 19-64 and one or more of the following conditions: chronic heart disease, lung disease or liver disease, smoking, alcoholism, and diabetes. We analyzed the pneumococcal vaccination rate. Influenza vaccination rate collected to get a rough estimate for overall vaccine acceptance. We surveyed IM residents to understand knowledge gaps related to pneumococcal vaccination. Our interventions that took place in 9/2021 were: 1) targeted in-person didactic sessions IM residents and posting of flyers with mnemonics for eligible conditions to workspaces and 2) targeted educational sessions for primary care physicians, RNs, and MAs at BM clinics This interim analysis was performed to ascertain PPSV-23 administration rate by using data of patients who attended BM clinics between 10/01/2021 - 01/31/2022.

Results: Pre-intervention data included 108 patients. 73% (79/108) received Influenza and 36% (39/108) received PPSV-23. 9 patients had ≥3 conditions and 89% (8/9) of them received Influenza and 78% (7/9) of them received PPSV-23. 34 patients had 2 conditions and 70% (24/34) of them received Influenza, and 47% (16/34) received PPSV-23. 65 patients had only one condition and 72% (47/65) of them received Influenza vaccine whereas only 17% (11/65) were given PPSV-23 vaccine. Post-intervention interim analysis data included 115 patients. 75% (87/115) of them received Influenza and 40% (46/115) received PPSV-23. 30% of the patients who received PPSV-23 (14/46) had co-administration of Influenza and PPSV23 vaccine at the same visit. 8 patients had ≥3 conditions and 50% (4/8) received Influenza while only 25% (2/8) received PPSV-23. 17 patients had 2 conditions and 80% (13/17) received Influenza and 55% (9/17) received PPSV-23. 90 patients had only one condition and 76% (68/90) received Influenza and 39% (35/90) received PPSV-23.

Limitations: Small sample size with very low number of patients with ≥3 conditions prevented us from assessing the impact of our intervention in that specific group and overall. Also, COVID-19 pandemic brought extra challenges with public vaccine hesitancy. Furthermore, CDC released updated pneumococcal guidelines in 2/2022, but we hope our QI project that started in 6/2021 will provide helpful insights to future efforts for increasing compliance with PCV-15 and PCV-20.

Conclusions: Even though our primary outcome was not met as the overall PPSV-23 rate failed to reach the target 54% (50% increase goal), we found significant increase in PPSV-23 rates in patients with only one eligible condition (39% vs 17%; p=0.0008). The slight increase in 2 conditions subgroup and non-improvement in ≥3 conditions subgroup was not statistically significant likely due to small sample size (p=0.29 and p=0.09, respectively.

Quality Improvement Report

Interim analysis of QI project to increase pneumococcal vaccine rates in younger immunocompetent adults

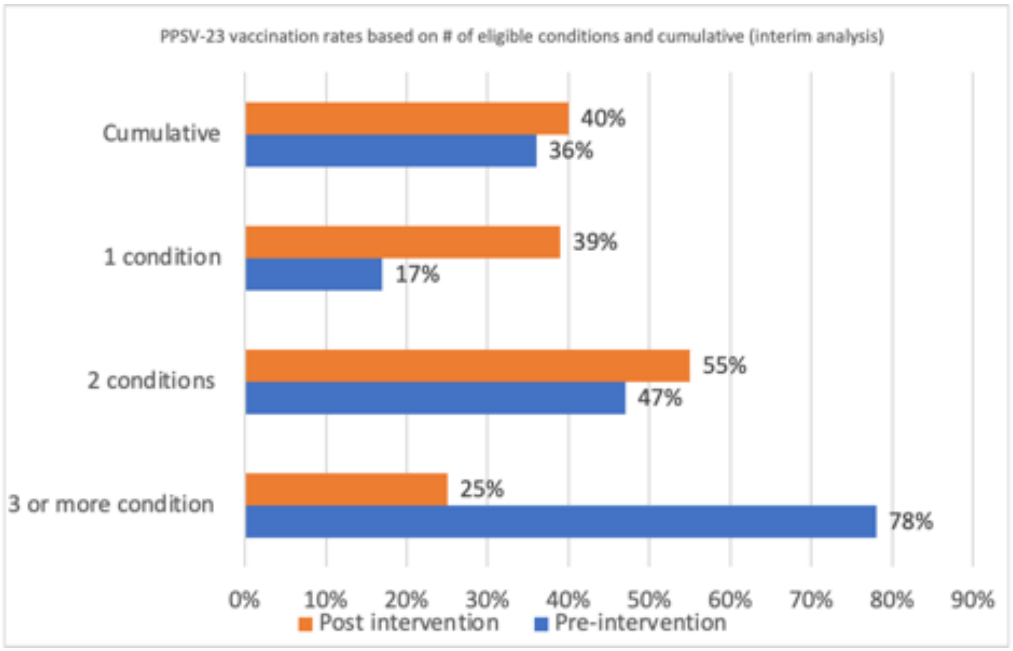


Figure 1. SPSS Statistics used for analysis. P value was set at 0.05 for statistical significance. P values as follows: Cumulative: p= 0.2578; 1 condition: p= 0.0008*; 2 conditions: p= 0.2912; 3 or more conditions: p= 0.094. *Represents statistically significant results.

Quality Improvement Report

Pharmacist-Led Implementation of Insurance-Driven Ticagrelor Prescribing in Patients Post-Percutaneous Coronary Intervention (PCI)

Abigail Hoffman, PharmD; Zi Fang, PharmD, PhD, BCPS, BCCCP; Anouch Matevossian, MD, PhD

Background: Percutaneous coronary intervention (PCI) is the most common cardiac invasive procedure to treat patients with coronary artery disease. In the US, it is estimated that more than one million patients undergo PCI each year. The American College of Cardiology (ACC)/American Heart Association (AHA) guidelines recommend the use of ticagrelor over clopidogrel in patients following PCI. Ticagrelor is available by brand name and not covered by many insurance companies resulting in expensive monthly costs leading to increased use of clopidogrel at our institution. Pharmacists are essential members of the interdisciplinary team and have the unique ability to help ensure patients have safe, effective, and affordable medication options.

Clinical Setting & Stakeholders: This project was implemented at St. Elizabeth's Medical Center (SEMC) for patients on the cardiology service to have a positive impact on patients' financial ability to afford preferred medications for long-term outpatient management. This builds upon an existing counseling service provided by pharmacists for post-PCI patients.

Quality Improvement Plan (Measures & Outcomes): This project involved implementing the role of pharmacists in verifying insurance coverage and patients' ability to afford ticagrelor upon discharge. The project aim is to achieve > 80% of patients being discharged on ticagrelor therapy following post-percutaneous coronary intervention by February 28th, 2022. The outcome measure assessed was the number of patients being discharged on ticagrelor weekly. Process measures included the number of patients being educated by the pharmacist on ticagrelor therapy post-PCI and the number of patients readmitted within 30 days for ischemic complications or thrombosis of the stent. Balancing measures included the average time spent by pharmacists calling the pharmacy, and the average time spent by pharmacists counseling the patient.

Results: All decentralized pharmacists rounding on the cardiology service were educated on this process and provided necessary materials by February 9th, 2022. The percentage of patients being discharged on ticagrelor per week ranged between 50% to 100% with the mean percentage of patients being discharged of 79%. A total of 6 patients (21%) had not been discharged on ticagrelor therapy, cost was identified as the factor. The average time spent by pharmacists to contact patients' preferred outpatient pharmacies was 13 minutes. Pharmacists spent an average of 16 minutes counseling patients to confirm their ability to afford medication therapy and understand the importance of taking the medication.

Limitations: An increase in pharmacists' workload and time required to verify insurance coverage for all eligible patients before anticipated discharge were some challenges provoking additional PDSA cycles. Inability to provide comprehensive coverage resulted in missed opportunities for weekend discharges.

Conclusions: From the implementation of the project until February 28th, 2022, patients were discharged on ticagrelor post PCI 80% of the time. The patients who had not been discharged on ticagrelor had an average monthly cost of $412 and the financial burden was deemed to outweigh the benefit of ticagrelor therapy. Engaging pharmacists in the verification of insurance coverage and confirmation of patients ability to afford their medications resulted in consistent screening of patients and discharge on ticagrelor when cost was not a barrier.

Pharmacist-Led Implementation of Insurance-Driven Ticagrelor Prescribing in Patients Post-Percutaneous Coronary Intervention (PCI) (cont.)

Baseline characteristics	n=28 (%)
Male	21 (75)
Mean age in years (range)	62 (35 – 87)
Hx of Smoking	5 (18)
Hypertension	14 (50)
Hyperlipidemia	12 (43)
Type II Diabetes Mellitus	10 (36)
NSTEMI	12 (43)
STEMI	11 (39)
Unstable Angina	3 (11)

Table 1. The data shown reflects the baseline characteristics for identified eligible patients during the project period.

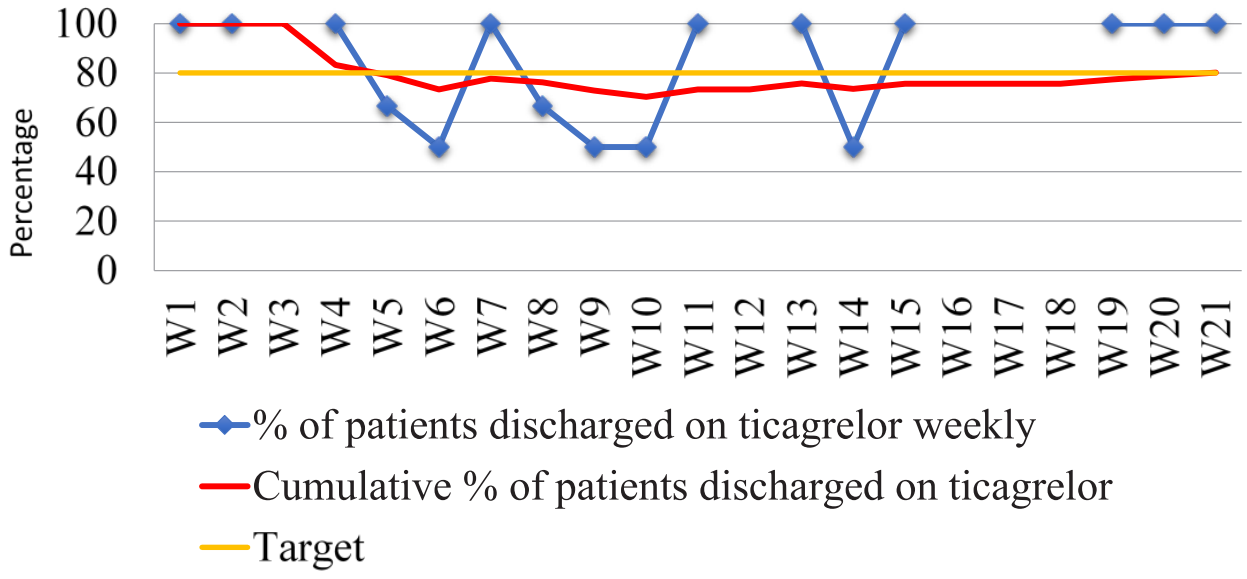


Figure 1. Data shown reflects the weekly percentage of patients who had been discharged on ticagrelor throughout the project period in addition to the cumulative percentage of patients discharged on ticagrelor in comparison to our percentage aim.

Quality Improvement Report

Promoting the use of In-Person interpreters at the St. Elizabeth's Medical Center

Rishi Mamtani, MD; Federico Goldman, BS; Ahmed Mohamed, MD

Background: St. Elizabeth's Medical Center services patients from all walks of life and backgrounds in Massachusetts and beyond. There are patients for whom English may be a second language; data from Allston, Brighton and Fenway area in 2019 demonstrates that 37.5% of population are speakers of a non-English language. Given this, there is a need for these patients to receive interpretation when they are admitted to the hospital, and often In-person interpreters are the preferred modality of communication. Prior to this project, approximately 58% of encounters are with In-person interpreters at St. Elizabeth's. But, for other Steward Massachusetts hospitals, the average use of In-person interpreters is 75%. The objective of this Quality Improvement project is to foster a behavior change whereby In-person interpreters are used more frequently at St. Elizabeth's.

Clinical Setting & Stakeholders:
This quality improvement project was conducted at St. Elizabeth's Medical Center, and the stakeholders are physicians, administration, and patients.

Quality Improvement Plan (Measures & Outcomes):
The intervention was performed in 1/2022 and included (1) conducting conferences for medical residents and nursing staff on how to request In-person interpreters via MySteward Portal, (2) preparing handouts that were placed in every nursing station on how In-person interpreters can be requested, and (3) publishing an article in the St. E's newsletter in 1/2022 enumerating these instructions.

Primary outcome measure for the study was a comparison of the percentage of times In-person interpreters were requested prior to the intervention and after the intervention, in relation to other modes of interpretation, which include Video and Telephonic.

Results: Unfortunately, the data demonstrates that prior to the Intervention, the percentage of use of In-Person interpreters was higher than the post-intervention group.

Limitations: For the Video and Telephonic interpreter cohorts, there are no time logs as to how long patients spent with these interpreters and that these numbers essentially reflect how many times requests for these services was processed. Plus, there are no 24 hour In-person interpreters available. Requests placed after the hours of availability of In-person interpreters are automatically redirected towards Video and Telephonic modes.

Conclusions: Overall, this intervention provided a platform for discussion that there is a gap between the frequency in which In-person interpreters are used at St. Elizabeth's as opposed to other Steward Massachusetts hospitals. Also, this void can be potentially addressed by providing opportunities to have In-person interpreters available for longer hours, so that more patients can be serviced.

Quality Improvement Report

Promoting the use of In-Person interpreters at the St. Elizabeth's Medical Center (cont.)

Language	In-Person Encounters	Video Encounters	Telephonic Encounters	Total Encounters	Percent (%)
Spanish	2947	928	815	4690	62.8
Russian	1980	818	412	3210	61.6
Portuguese	617	309	226	1152	53.6

Table 1. Pre-Intervention Data

Language	In-Person Encounters	Video Encounters	Telephonic Encounters	Total Encounters	Percent (%)
Spanish	1143	518	471	2132	53.6
Russian	1037	560	235	1832	56.6
Portuguese	662	271	408	1341	49.4

Table 2. Post-Intervention Data

Clinical Vignettes

1st Place

A case of pathologically confirmed streptococcal infection causing an IgA vasculitis with associated glomerulonephritis and leukocytoclastic dermal vasculitis

Thomas Pomposelli, MD; Taichi Inoue, MD; Kazuhiro Takeuchi, MD, PhD; Arimi Ishikawa, MD; Akira Shimizu MD, PhD

Introduction: IgA vasculitis is classified as one of the immune complex types of vasculitis. The clinical manifestations of IgA vasculitis are typically triggered by upper respiratory tract infections and present as palpable purpura. Recently, galactose-deficient IgA1 (Gd-IgA1), which is recognized by Rat anti Gd-IgA1 monoclonal IgG antibody KM55, has been found to be deposited in IgA vasculitis in the skin as well as in the kidney. We report a case of streptococcal infection associated IgA vasculitis in skin and kidney. As far as we know, this case is the first report of utilizing immunofluorescence using both NAPlr and Gd-IgA1, which demonstrated pathologically that a streptococcal infection was directly associated with IgA vasculitis in the skin and kidney.

Description of Case: We report an 80-year-old woman who developed bilateral lower extremity purpura and renal impairment with proteinuria a few days after a transient fever (day 0). High levels of both anti-streptolysin-O antibody (ASO) and anti-streptokinase antibody (ASK), as well as low levels of coagulation factor XIII in serum were noted. Dermal biopsy was performed and showed a leukocytoclastic vasculitis with deposition of IgA and C3 in the intradermal small vessels, indicating IgA vasculitis in the skin. After initiation of oral prednisolone the dermal lesions showed significant improvement. However, renal function and proteinuria gradually worsened from day 12. Kidney biopsy was performed on day 29, which demonstrated a necrotizing and crescentic glomerulonephritis with mesangial deposition of IgA and C3. In addition, the deposition of galactose-deficient IgA1 (Gd-IgA1) was positive on glomeruli and intradermal small vessels, indicating that the purpura and glomerulonephritis both shared the same Gd-IgA1 related pathogenesis. In addition, the association between the acute streptococcal infection with the IgA vasculitis was confirmed by the deposition of nephritis-associated plasmin receptor (NAPlr) in glomeruli. The patient was treated with steroid pulse and intravenous cyclophosphamide, in addition to the oral prednisolone treatment. Renal function and proteinuria gradually improved, but did not completely recover, as is typically seen with courses of IgA vasculitis in the elderly. In this case, the streptococcal associated IgA vasculitis was confirmed pathologically by the deposition of both NAPlr and Gd-IgA1 in glomeruli, as well as the intradermal small vessels.

Discussion (Learning Value): In this case, palpable purpura and renal impairment occurred after transient fever, and high ASO and ASK levels in serum led us to the suspicion of IgA vasculitis caused by streptococcal infection. The streptococcal infection associated IgA vasculitis was confirmed pathologically by the deposition of NAPlr in glomeruli, and Gd-IgA1 in glomeruli and intradermal small vessels. These findings might indicate that the development of GN and purpura in IgA vasculitis may share a Gd-IgA1 related pathogenesis. Measurement of serum levels may help detect the severity of a systemic IgA vasculitis. By comparing serum levels of Gd-IgA1 in more cases, there is the possibility of finding a relationship between serum levels and the degree of skin and kidney involvement due to systemic disease. Therefore, clarification of such correlations could be useful for clinical diagnosis or stratifying disease severity.

Clinical Vignettes

2nd Place

Cerebral Venous Sinus Thrombosis in an Adult with Relapsing Minimal Change Disease: A Case Report and Literature Review

Matthias Bergmann, MD; Thanh N. Nguyen, MD; Christine C. Segal, MD; Bertrand L. Jaber, MD, MS

Introduction: Minimal change disease (MCD) is a well-known cause of fulminant nephrotic syndrome (NS) and has been associated with thrombotic complications [1]. Cerebral venous sinus thrombosis (CVST) is another potentially fatal, albeit rare complication. The significant urinary loss of proteins, including antithrombotic factors, likely contributes to a hypercoagulable state, although the exact mechanisms remain unknown [2, 3]. We present the case of a patient with relapsing MCD who was diagnosed with acute CVST complicated by intracranial hemorrhage (ICH) and provide a literature review of the literature of NS-associated CVST, with a focus on the clinical presentation, management, and outcome.

Description of Case: A 51-year-old woman with biopsy-proven MCD in remission previously treated with a course of glucocorticoids presented with acute-onset headache, vomiting, and confusion shortly after a relapse of the NS with abrupt weight gain and generalized edema. Random urine total protein-to-creatinine ratio was 14.7 gm/gm, with a serum albumin of 2.5 gm/dL, and a total cholesterol of 402 mg/dL. She was diagnosed with CVST based on an MRI of the brain (Figure 1), which was further complicated by ICH with midline shift. One month prior to presentation, she had been initiated on an oral combination contraceptive agent for severe menstrual cramps. After initiation of systemic anticoagulation and glucocorticoids, her condition rapidly deteriorated due to increasing intracranial pressure and she died before being able to undergo catheter-based thrombolytic therapy.

Discussion (Learning Value): Our systematic literature review yielded 33 cases of NS-associated CVST, including our case. As shown in Table 1, 54% were men, and mean age was 39 years (range, 18-89). Among reported kidney biopsy results, 14 patients (70%) had MCD as the cause of the NS. Average proteinuria was 9.32 gm/day or gm/gm of creatinine (range, 0.05-24.30), and average serum albumin level was 1.8 gm/dL (range, 0.7-3.6). 22 patients (79%) were not on immunosuppressive therapy at the onset of neurological symptoms. Most reported symptoms were headache (83%), nausea/vomiting (47%), and altered mental status (30%). Five patients (15%) had ICH as a reported complication. Soon after diagnosis of CVST, 20 patients (91%) were initiated on anticoagulation. Five patients (23%) underwent directed catheter-based therapies, including two patients requiring mechanical thrombectomy and three patients undergoing chemical thrombolysis with either urokinase or tissue plasminogen activator. Of 26 patients with reported outcomes, 5 patients (19%) died from the sequelae of the CVST. Three of these cases (60%) had ICH. In conclusion, CVST is a rare complication of the NS [4]. MCD might be related to a higher risk of CVST. Due to the risk of thrombosis in the NS, including CVST, additional prothrombotic triggers, such as use of oral contraceptive agents, should be avoided if possible. Neurological symptoms are often non-specific and the threshold for MRI should be low in patients with prothrombotic states. ICH is a severe complication which may be associated with fatal outcome. However, anticoagulation remains the treatment gold standard and is associated with improved outcome [5].

Cerebral Venous Sinus Thrombosis in an Adult with Relapsing Minimal Change Disease: A Case Report and Literature Review (cont.)

Patient demographic characteristics	
Men (*n* = 28)	54%
Mean age (*n* = 28)	39 years old
Ethnicity (*n* = 6)	
White	50%
Black	17%
Asian	33%
Neurological clinical presentation (*n* = 30)	
Headache	83%
Nausea/vomiting	47%
Confusion/loss of consciousness	30%
Visual changes	23%
Seizure	10%
Diplopia	7%
Other focal neurological deficits	17%
Neurological imaging findings in addition to CVST (*n* = 33)	
Ischemic infarct	9%
Intracranial hemorrhage	15%
Nephrotic syndrome-related characteristics at time of neurological presentation	
Status of nephrotic syndrome (*n* = 25)	
Initial presentation	64%
Relapse	32%
In Remission	4%
Kidney biopsy findings (*n* = 20)	
Minimal change disease	70%
Lupus nephritis (membranous nephropathy and diffuse proliferative glomerulonephritis)	10%
IgM nephropathy	5%
Focal segmental glomerulosclerosis (FSGS)	5%
Amyloidosis	5%
Interstitial nephritis	5%
Mean urinary protein excretion (*n* = 21)	9.32 gm/gm or gm/day
Mean serum albumin (*n* = 25)	1.8 gm/dL
Current use of immunosuppressive therapies (*n* = 28)	21%
Glucocorticoids	14%
Azathioprine	4%
Rituximab	4%
Not reported	4%
Management of CVST (*n* = 22)	
Use of anticoagulation	91%
Parenteral anticoagulation	86%
Unfractionated heparin infusion	45%
Low-molecular-weight heparin	41%
Oral anticoagulation	77%
Use of antiplatelet agents	23%
Use of catheter-based thrombolytic therapy	23%
Chemical thrombolysis	14%
Mechanical thrombectomy	9%
Clinical outcomes	
Residual neurological deficits, excluding death (*n* = 21)	5%
Death (*n* = 26)	19%

The sample sizes provided in parentheses represent the number of evaluable cases for each variable of interest.

Table 1. Characteristics and outcome of 33 patients (including current case report) with nephrotic syndrome-associated cerebral venous sinus thrombosis (CVST)

Cerebral Venous Sinus Thrombosis in an Adult with Relapsing Minimal Change Disease: A Case Report and Literature Review (cont.)0

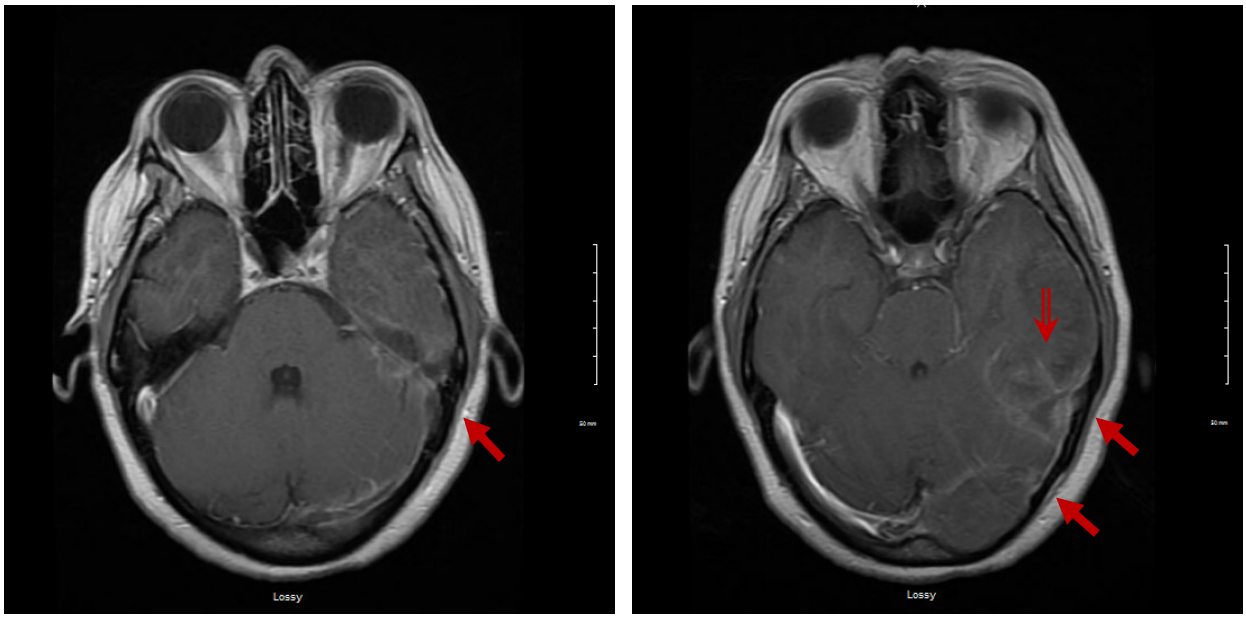


Figure 1. Magnetic resonance imaging (MRI) of the brain without contrast (post axial T1 sequence) showing a filling defect (solid arrow) in the left sigmoid (left) and left transverse (right) dural sinuses, consistent with cerebral venous sinus thrombosis (CVST), and complicated by intracranial hemorrhage (ICH, double-lined arrow) with midline shift (not shown).

Clinical Vignettes

3rd Place

Composite Pheochromocytoma-Ganglioneuroma: two clinical cases presenting to St. Elizabeth's Medical Center

Mayssam El Najjar, MD; Kavya Nalluri, MD; Aysegul Bulut, MD; Ann Sweeney, MD

Introduction: Pheochromocytomas (PCCs) are rare catecholamine-producing neuroendocrine tumors that originate from the chromaffin cells of the adrenal medulla. In 3%-9% of cases, they can be accompanied by other tumors. Ganglioneuromas (GNs) are the most encountered tumor type that occur together with PCC and are termed composite PCC-GN. This entity is very rare with less than 35 cases reported in the literature. Herein, we present two cases of composite PCC-GN seen at St. Elizabeth's Medical Center.

Description of Case: Patient 1 (Pt1) and Patient 2 (Pt2): were 35- and 54-year-old obese females. Pt1 had a history of controlled hypertension, and symptoms of anxiety along with palpitations, diaphoresis and flushing. Pt2 had a history of type 2 diabetes and complained of abdominal pain. Metabolic studies showed elevated total plasma fractionated metanephrines. Metanephrine levels in Pt1 and Pt2 were: 76 and 61pg/ml respectively (normal <57 pg/ml) and Normetaneprines levels were 161 and 116pg/ml respectively (normal <148 pg/ml) which confirmed the diagnosis of pheochromocytoma. Abdominal computed tomography (CT) scans demonstrated right adrenal masses in both cases with Pt1 having a 2.3 x 2.3 x 2.6 cm mass (Figure1) with smooth margins measuring 36 Hounsfield units (HU) on non-contrast (NC) CT imaging with 0% washout on delayed imaging after IV contrast. Pt2 on NCCT had a 4.5 x 3.5 cm right adrenal mass measuring 73 HU and a subsequent abdominal MRI (Figure2) demonstrated the mass to have heterogeneous signal intensity. They both were prepared with pre-operative alpha and beta-blockade and underwent laparoscopic robotic adrenalectomies without complications. Pathological analyses in both cases revealed a tumor composite of pheochromocytoma with a ganglioneuroma component. Pt2 underwent genetic testing which did not reveal any known familial mutations. Surveillance in both patients at 12 months demonstrated no recurrence.

Discussion (Learning Value): The clinical, biochemical, and radiographic presentation of composite tumors is indistinguishable from isolated PCCs. The definitive diagnosis is through histopathological analysis. Histologically the composite tumor is composed of two distinct patterns with PCC showing angular cells with granular, basophilic cytoplasm, arranged in nests or alveoli, surrounded by sustentacular cells while GNs shows ganglion cells in a fibrous stroma. Immunohistochemistry shows the PCCs staining for chromogranin A and synaptophysin while GNs stain for S-100 protein and neurofilament antibody. Most cases described in the literature occur in patients between 40 - 60 years old. Males and females are equally affected. Most PCC-GNs are functional, with increased levels of catecholamines. PCC-GN composite tumors may occur sporadically but have also been described as part of known syndromes such as multiple endocrine neoplasia type 2A (MEN2A) as well as neurofibromatosis type 1 (NF1). Our patients were both females, with Pt1 presenting with classic symptoms of PCC while Pt2 had an incidentally discovered mass. Both patients had elevated plasma metanephrine production and unilateral adrenal involvement. The definitive treatment is complete surgical excision of the tumor which is associated with an excellent prognosis. The probability for recurrence is extremely low though distant metastases have rarely been reported. Therefore, lifetime surveillance is critical.

Clinical Vignettes

Composite Pheochromocytoma-Ganglioneuroma: two clinical cases presenting to St. Elizabeth's Medical Center (cont.)

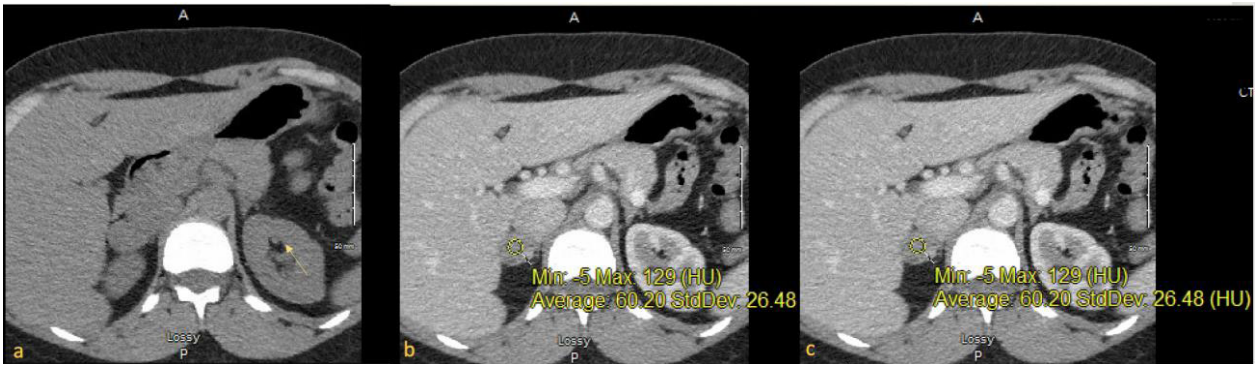


Figure 1. Figure 1a: Adrenal washout computed tomographic study before administration of contrast medium, showing a right adrenal mass. Figure 1b: Adrenal washout computed tomographic study after ad- ministration of contrast medium, showing the right adrenal mass. Figure 1c: Adrenal washout computed tomographic study on the 15 minute delay.

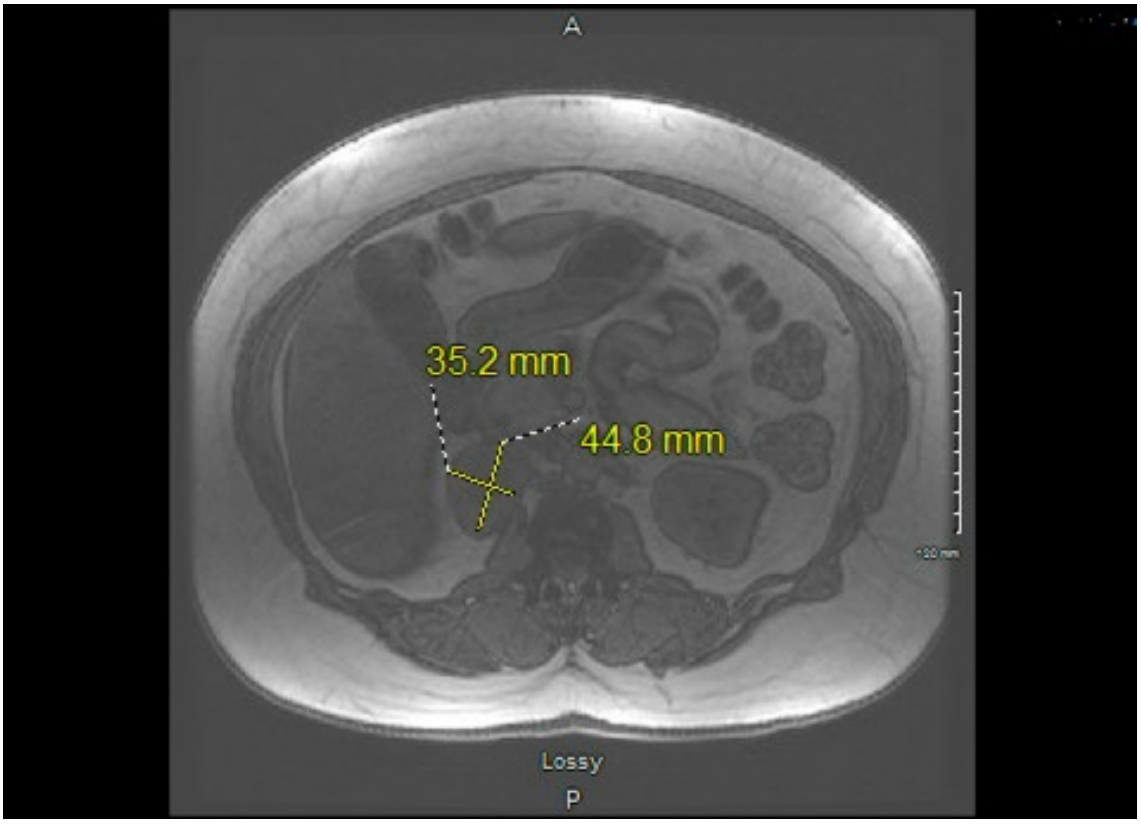


Figure 2. Adrenal MRI showing the 4.5 x 3.5 cm right adrenal mas

Clinical Vignettes

Honorable Mention

Acute on Chronic Bilateral Renal Vein Thrombosis in the Setting of Remission of Class-V Lupus Nephritis: A Case Report and Literature Review

Christopher El Mouhayyar, MD; Bertrand L. Jaber, MD, MS; Vaidyanathapuram S. Balakrishnan, MD

Introduction: Renal vein thrombosis (RVT), defined as the presence of a thrombus in the major renal vein or one of its tributaries, can present acutely or go unnoticed resulting in acute kidney injury or chronic kidney disease.

Description of Case: A 41-year-old man with systemic lupus erythematosus (SLE) and biopsy-proven membranous glomerulonephritis (WHO Class V lupus nephritis) in clinical remission with no evidence of nephrotic range proteinuria presented to the hospital with macroscopic hematuria of 2 days duration and bilateral flank pain. Vital signs were normal and physical examination revealed mild diffuse abdominal tenderness but no costovertebral angle tenderness. At initial presentation, white blood cell count was elevated at 13,000/uL, serum creatinine was 1.4 mg/dL, serum albumin was 4.4 g/dL and the lipid profile was unremarkable. The random urine total protein-to-creatinine ratio was 300 mg/g. A CT-scan of the abdomen and pelvis without intravenous contrast (Figure 1) revealed enlarged kidneys bilaterally, greater on the right, with perinephric edema bilaterally. There were numerous venous collaterals in the perinephric space bilaterally, greater on the right, which appeared to communicate inferiorly to the common femoral veins. There were very narrowed collapsed appearing renal veins bilaterally with a concern for bilateral renal vein thrombosis. This was subsequently followed by a CT angiogram that revealed filling defects within both renal veins, with the distal portion of the left renal vein entering the inferior vena cava being markedly attenuated. The patient was initiated on a continuous infusion of unfractionated heparin. In light of the gross hematuria with clots, a Foley catheter was inserted for continuous bladder irrigation. His hospital course complicated by acute kidney injury (AKI), and the serum creatinine peaked at 1.9 mg/dL in the first 48 hours of hospitalization. An extensive workup for thrombophilia was undertaken. Prothrombin time, partial thromboplastin time, and fibrinogen level were normal. Anti-phospholipid autoantibody titers (specifically, anti-cardiolipin IgA, IgG, and IgM antibody titers, and anti-beta-2 glycoprotein-I IgA, IgG, and IgM antibody titers) as well as rheumatoid factor and anti-Smith antibody titers were undetectable. Lupus anticoagulant screen was negative and prothrombin gene as well as Factor V Leiden mutation were absent. Functional protein S was 86% (normal range, 63-140%), and functional protein C was 72% (normal range, 73%-180%). Anti-thrombin III activity was 86% (normal range, 75-135%). The antinuclear antibodies (ANA) screening test was positive, but the anti-double-stranded DNA antibody titer were undetectable. Levels of complement components C3 and C4 were normal. Screening for antineutrophil cytoplasmic antibodies (ANCA), including anti-myeloperoxidase and anti-proteinase-3 antibody titers were nonreactive. The anti-RNP (ribonucleoproteins) antibody titer was elevated at 3.9 AI (normal value, < 0.9). Throughout the hospital stay, the patient's kidney function recovered, his hematuria resolved, and he was discharged on warfarin therapy (with an INR goal of 2-3).

Discussion (Learning Value):
This case report is unique in its clinical presentation as it had features of both acute and chronic RVT. Patients with chronic bilateral RVT secondary to class V Lupus nephritis may develop an acute on chronic thrombosis despite the primary disease being in remission.

Acute on Chronic Bilateral Renal Vein Thrombosis in the Setting of Remission of Class-V Lupus Nephritis: A Case Report and Literature Review (cont.)

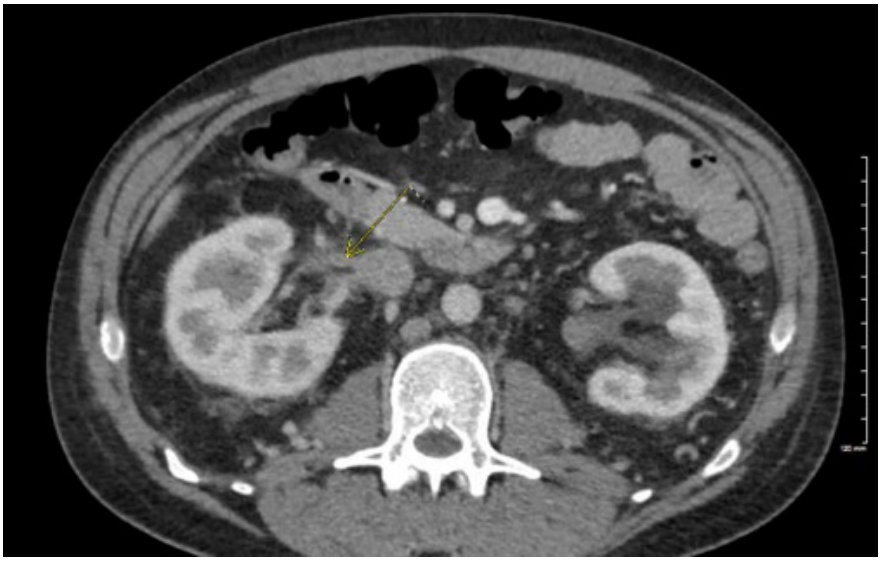


Figure 1. Showing acute on chronic RVT with collaterals.

Clinical Vignettes

Honorable Mention

A Case of Severe Antiphospholipid Syndrome after Trauma

Nur Z Ay, MD; Aju Jose, MD; Alina Wasim, MD; Nana Papyan, MD; Duncan M Kuhn, MD

Introduction: Antiphospholipid syndrome (APS) is an autoimmune disease characterized by thrombosis in the presence of antiphospholipid (aPL) antibodies (1). Catastrophic APS (CAPS) is a severe manifestation presenting with multiple organ thrombosis triggered by infection, surgery, trauma, pregnancy, or malignancy (2). Here we present a patient with a new diagnosis of probable CAPS in the setting of recent trauma.

Description of Case: A 54 year-old female with history of atrial fibrillation not on anticoagulation presented to the emergency department with intractable back and flank pain after a fall. Her vital signs were stable and physical exam showed thoracolumbar spine tenderness. Routine laboratory work showed thrombocytopenia with platelet count of 15,000 cells/mm3. Computer tomographic imaging of the spine, abdomen, and pelvis revealed an unstable compression fracture at T12. On hospital day 3, she developed atrial fibrillation with rapid ventricular response and altered mental status. Neuroimaging showed acute/subacute infarcts in the right frontal and occipital lobes (Figure 1), without evidence of large vessel occlusion. Thrombocytopenia precluded tissue plasminogen activator administration; she was started on aspirin alone. Endotracheal intubation was performed for airway protection. TTE ruled out a cardiac source of embolism. Further CT imaging showed multiple splenic and renal infarcts (Figure 2). Peripheral blood smear revealed many bands, but no schistocytes. Her coagulation profile was notable for an elevated fibrinogen of 811 mg/dl (187-466mg/dl), d-dimer of 2.83 ug/ml (<0.50ug/ml) and an aPTT 46.2 sec (23.9-32.8sec). The lupus anticoagulant was positive based on mixing studies and anti-cardiolipin antibodies were elevated at 53 GPLU/ml (0-14). The ADAMTS-13 activity was within normal limits. Given multiorgan infarcts, onset of symptoms within a week of a precipitating event, and labs highly concerning for CAPS, she was started on treatment with heparin infusion, high-dose steroids, and plasma exchange. Repeat lupus anticoagulant and anticardiolipin antibodies after plasma exchange were undetectable, and neurologic exam returned to normal in the following weeks, except for a paraplegia caused by the compression fracture. She was transitioned to therapeutic Enoxaparin, with a plan to bridge to lifelong Coumadin.

Discussion (Learning Value): CAPS is a life-threatening complication occurring in about 1% of patients with APS, characterized by microthrombosis in multiple organs (3,4). Most recorded cases of CAPS occur in the background of primary APS, SLE or other autoimmune diseases. While thrombocytopenia accompanied by thrombosis should raise the suspicion of CAPS, the diagnosis is often missed or delayed. Due to the high mortality rate of about 50%, systemic complications of CAPS mandate early diagnosis and treatment (4, 5). International consensus statement on classification criteria classifies CAPS as 'definite' and 'probable' (4). Here, we present a case of probable CAPS based on 3 or more organ involvement, development of manifestations in less than a week and the presence of aPL antibodies (6). A biopsy with histopathology showing small vessel occlusion in an affected site would be required to diagnose 'definite' CAPS; unfortunately, this could not be obtained given the acuity of patient's presentation and need to initiate emergent therapy. She was treated with anticoagulation, corticosteroids, and plasma exchange therapy with marked clinical and laboratory improvement.

Clinical Vignettes

Honorable Mention

Recurrent syncopes in a young female with asthma, peripheral neuropathy and diarrhea

Huseyin Berk Degirmenci, MD; Nur Zeynep Ay, MD; Aju Jose, MD; Aysegul Bulut, MD; Sukran Ergin, MD

Introduction: Eosinophilic granulomatosis with polyangiitis (eGPA, formerly known as Churg Strauss Syndrome) is an ANCA associated vasculitis (AAV) characterized by multi-organ involvement with most common presenting features being asthma, sinus symptoms and peripheral neuropathy. Cardiac involvement is a life-threatening manifestation of eGPA and should be suspected in patients with chest pain, palpitations, and presyncope/syncope.

Description of Case: A 24-year-old female of Asian origin with asthma and chronic sinusitis presented with progressive upper and lower extremity numbness/tingling and diarrhea following sinusitis. Vital signs were normal and physical exam revealed widespread neuropathy with paresthesias most prominent at ulnar nerve distribution and bilateral flexion contractures on hands. Laboratory work was pertinent for high inflammatory markers and significant peripheral eosinophilia. Urinalysis showed microscopic hematuria, elevated protein/creatinine ratio and dysmorphic RBCs on urine microscopy. Electromyography (EMG) was negative for demyelinating processes and her symptoms were attributed to mononeuritis multiplex. Broad infectious workup including serologies for rickettsia, strongyloides, filaria and HIV were negative. Autoimmune workup showed positive high titer pANCA (1:640) and anti-MPO antibodies at 349U. Given urine sediment findings with high p-ANCA/anti-MPO, suspicion for AAV with renal involvement prompted urgent kidney biopsy which revealed pauci-immune crescentic necrotizing glomerulonephritis consistent with eGPA. She was subsequently started on steroids. Patient developed several episodes of chest pain and presyncope. Workup was pertinent for sinus tachycardia without hypotension. Troponin-T levels were elevated. CTA-chest was negative for Pulmonary Embolism. Transthoracic echocardiogram (TTE) was unremarkable except for trivial pericardial effusion. She was started on beta blockers and discharged on steroids with plan to initiate rituximab (RTX) as outpatient. However, she had several ED visits due to persistent presyncopal episodes and diarrhea. Orthostatics were normal. Repeat laboratory work revealed elevated troponins despite interval normalization. She underwent cardiac-MRI (CMR) that showed late gadolinium enhancement (LGE) in a patchy distribution consistent with myocarditis suggesting cardiac involvement of eGPA. Her symptoms were attributed to cardiac dysautonomia. Given persistent symptoms with PO steroids, malabsorption was suspected, and she was switched to IV steroids followed by higher dose PO steroids to overcome malabsorption which led to rapid improvement. She also received her first RTX injection before discharge. At two-weeks follow-up, she was free of presyncope, diarrhea, neuropathy along with normalization of inflammatory markers and pANCA/anti-MPO.

Discussion (Learning Value): EGPA is a small-medium vessel vasculitis with multi-organ involvement. Cardiac involvement occurs in 15-60% patients and is the leading cause of mortality (1). Cardiac manifestations include pericarditis, pericardial effusion, heart failure, myocardial infarction, and myocarditis (2). Cardiac dysautonomia can present with presyncope/syncope and inappropriate sinus tachycardia. CMR is the gold standard for detecting myocarditis as gadolinium enhancement has been reported to correlate with endomyocardial biopsy evidence of eosinophilic infiltration (3). Hence, CMR should be obtained when suspicion remains high despite unremarkable TTE. Of note, eosinophilic gastroenteritis with malabsorption and diarrhea is frequently seen in eGPA which might be the culprit for poor response to PO immunosuppressants. Our patient demonstrated excellent response upon switching steroids from PO to IV along with early initiation of RTX. Early recognition of cardiac involvement with prompt initiation of immunosuppression is crucial given high mortality association.

Clinical Vignettes

Honorable Mention

Avoid Death From A Saddle Pulmonary Embolism In A Catatonic Patient: A Case Report

Sabrina Dar, MD; Jason Strauss, MD

Introduction: Catatonia is a syndrome with the inability to move properly, which occurs in psychiatric and non-psychiatric disorders. 10% of acutely ill psychiatric patients in an inpatient psychiatric unit were found to have catatonia. In DSM-5, catatonia is diagnosed as having three or more of the following symptoms: stupor, catalepsy, waxy flexibility, mutism, negativism, posturing, mannerism, stereotypy, agitation (not influenced by external stimuli), grimacing, echolalia, echopraxia. Complications due to immobility include pressure ulcers, muscle contractures, deep vein thrombosis (DVT) and pulmonary embolism (PE). We present the case of a patient who presented with catatonia treated with lorazepam followed by cardiac arrest thought to be secondary to massive pulmonary embolism. We propose that catatonics with undiagnosed DVT being started on a lorazepam challenge that result in increased movement, are at risk of dislodging a venous clot resulting in PE.

Description of Case: A 61-year-old female with a history of bipolar disorder with psychotic features, and multiple episodes of catatonia, hypertension, and hypothyroidism, initially presented to an outside hospital emergency department (ED) with elated mood, and bouts of crying. She was discharged to a Community Respite Unit, where she suddenly became unresponsive. She presented to our ED where she was medically cleared, and the Psychiatry service was consulted for further evaluation. On interview, she was mute and unresponsive. Exam revealed stupor, waxy flexibility, stereotypy, catalepsy, and a positive Geganhalten sign. The patient's son reported multiple deaths in the family over the past year with a most recent death occurring the prior month. He reported she was adherent to her home medications, however, she had been experiencing catatonia on an annual basis. She was given a 2 mg intravenous challenge of lorazepam. Within 15 minutes she said, "I need to use the bathroom. Also, I'm really hungry." She was then started on a scheduled oral dose of lorazepam 2 mg thrice daily. She was admitted to the inpatient psychiatry unit. The following morning, she was found tachypneic with abdominal breathing, a heart rate of 143 beats per minute, O2 saturation rate of 86% on 4 L/min by nasal cannula. She received flumazenil 0.2 mg intravenously for concerns of respiratory depression from benzodiazepine toxicity, as she had received a total of 6 mg in 12 hours. While being transferred to the intensive care unit, she had a PEA arrest and CPR was initiated. She received epinephrine, bicarbonate, normal saline, and amiodarone. There was suspicion of pulmonary embolism, and t-PA was administered empirically. The family was notified, and elected to transition her to comfort care, and she passed shortly thereafter.

Discussion (Learning Value): Catatonia presenting with immobility can result in blood stasis and clots. A severe complication is DVT and PE. Untreated PE has a mortality rate of 30%, and 10% die suddenly. Clinicians often neglect the impact of catatonia secondary to psychiatric disease as a major risk factor for blood stasis and hypercoagulability. Venous thromboembolism prophylaxis with unfractionated or low molecular weight heparin in patients with catatonia, especially prior to administration of lorazepam, can potentially decrease morbidity and mortality, and save lives.

Clinical Vignettes

Honorable Mention

Nocardia Pseudobrasiliensis - A rare cause of multiple brain abscesses in a kidney transplant recipient

Shree Spandana Ghanta, MD; Adhiraj Bhattacharya, MD; Claudia Nader, MD, Rohit Rattan, MD

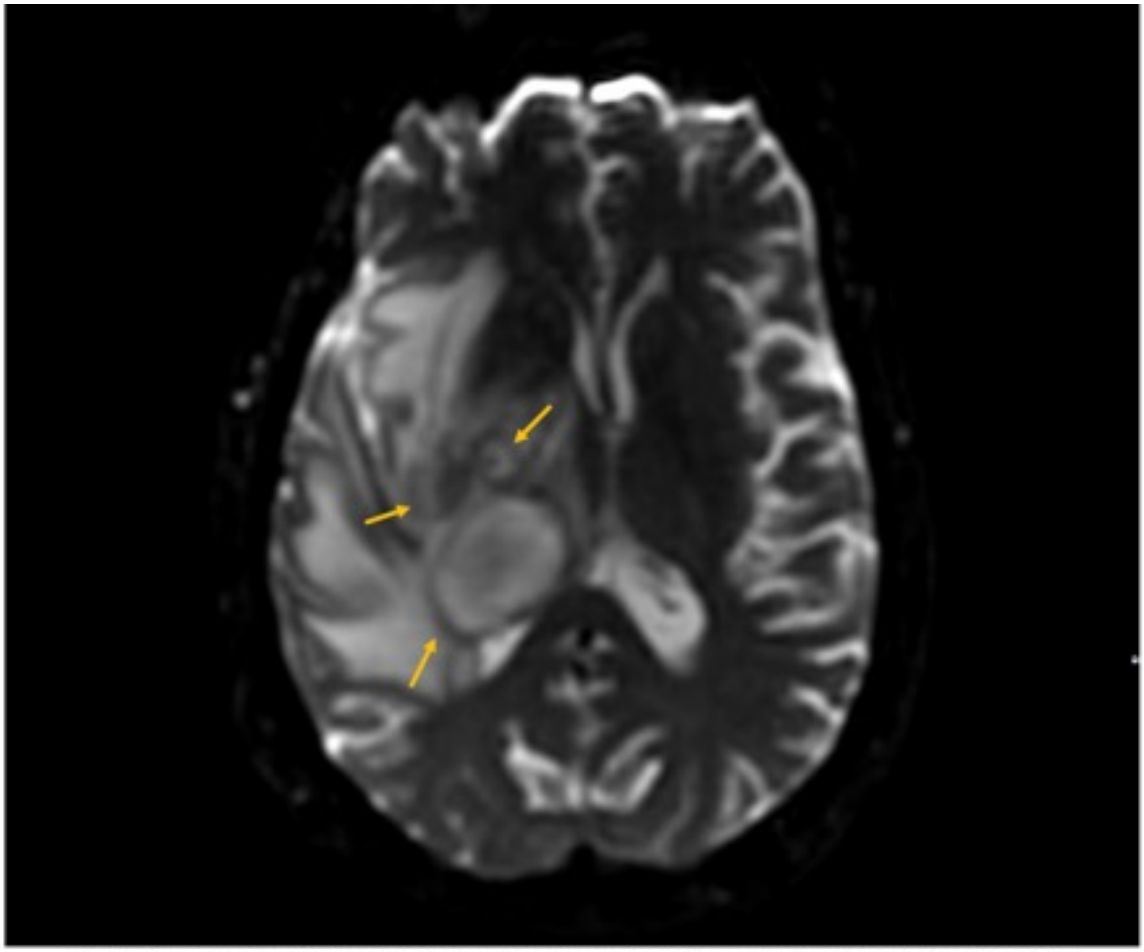
St Elizabeth's Medical Center

Introduction: Nocardia is a gram-positive, partially acid-fast filamentous rod-shaped organism; responsible for opportunistic infections in immunocompromised individuals. Although many subspecies of Nocardia are well-known for generating multisystemic disease, a recently discovered variant known as Nocardia Pseudobrasiliensis has emerged as a novel culprit for invasive nocardiosis. We report a case of multiple brain abscesses due to N. Pseudobrasiliensis. To our knowledge, this is the first reported case of N. Pseudobrasiliensis associated with brain abscesses in a renal transplant patient.

Description of Case: A 57-year-old male recipient of a cadaveric kidney transplant one year prior; currently on immunosuppressive therapy (azathioprine 25mg, tacrolimus 4mg, prednisone 5mg each daily) presented to our hospital with slurred speech and left sided weakness. His physical exam was pertinent for Broca's aphasia, left-sided facial droop, and reduced motor strength in his left extremities. CT head revealed vasogenic edema with suspicion of a space-occupying lesion in the right temporal and temporoparietal junction with 1cm right to left midline shift. Subsequent brain MRI showed multiple cystic lesions, the largest measuring 3.1cm involving the right thalamic and posterior basal ganglia region. He underwent a right-sided craniotomy and evacuation of the right temporal and temporoparietal junction abscess. His home immunosuppressive therapy was stopped. Gram stain showed gram-positive branching, weakly acid-fast filamentous rods, and culture grew Nocardia. He was empirically started on trimethoprim-sulfamethoxazole. However, repeat head CT revealed three new abscesses in the right basal ganglia. Ciprofloxacin was then added empirically. His course was complicated by severe antibiotic-induced thrombocytopenia and neutropenia, which limited antibiotic choice. Platelets were transfused and granulocyte colony stimulating factor (G-CSF) was initiated. Upon patient request, he was transferred to another hospital for further care. When the culture was finalized as N. pseudobrasiliensis antibiotics regimen was changed to moxifloxacin and amikacin based on antibiotic susceptibility results. After the subsequent improvement in blood counts with G-CSF, linezolid was added. He developed transient worsening of mental status due to cerebral edema for which he was initiated on dexamethasone and hypertonic saline. With time, his clinical status improved and repeat head imaging showed a decrease in the size of the abscesses and amelioration in midline shift. Dexamethasone was changed to prednisone. Tacrolimus and azathioprine were added to his regimen. He was discharged to rehab on an antibiotic regimen consisting of Tedizolid, Ciprofloxacin, and Atovaquone for PJP prophylaxis.

Discussion (Learning Value): This is the first description of a case of multiple brain abscess due to N. Pseudobrasiliensis in a kidney transplant patient. Like other species of Nocardia, this new species is responsible for invasive disease, including that of the lung, brain, and skin/soft tissues. Phenotypically, it is shares characteristics with that of N. Brasiliensis, with minute differences in structure, enzymatic activity, and gene sequencing analysis. Treatment can be challenging given variations in drug sensitivities, compared to other types of Nocardia species. Complications from treatment can arise, as seen in our patient, thus making clinical decisions more cumbersome. Recognition of N. Pseudobrasiliensis as an emerging opportunistic pathogen is important in the care of at-risk kidney transplant patients.

Nocardia Pseudobrasiliensis - A rare cause of multiple brain abscesses in a kidney transplant recipient (cont.)



MRI Brain with contrast (T2-weighted image), showing multiple *(arrows)* cystic lesions identified as brain abscesses in the setting of N. Pseudobrasiliensis infection of the central nervous system.

Figure 1.

Clinical Vignettes

An Unusual Presentation of a Cardiac Mass in a Patient With Prior Mitral Valve Repair

Artem Astsaturov, MD; Arvind Agnihotri, MD; Michael T Johnstone, MD

Introduction: Primary cardiac tumors are extremely rare and frequently asymptomatic. Cardiac arrhythmia is an unusual presentation for intracardiac masses.

Description of Case: An overall healthy 53-year-old man with a past medical history significant for severe mitral regurgitation status post mitral valve repair and mitral annuloplasty in December 2020 who was doing well after the successful valve repair until 3 weeks, when he noticed palpitations during exercise. At the same time his Apple Watch alarmed him of an arrhythmia. Further outpatient evaluation with Holter monitor demonstrated a long run (73 beats) of non-sustained ventricular tachycardia. An echocardiogram was obtained and revealed a large mobile echodensity attached to the interventricular septum a few centimeters below the aortic valve annulus. Given the presence of symptoms, the large size and the risk of embolization, the patient was urgently referred to cardiac surgery for excision of the mass. A 2 cm x 1.3 cm firm mass was successfully excised from the interventricular septum and did not appear as a clot or a vegetation. The patient successfully recovered from the operation with rare premature ventricular beats on telemetry. The final pathology demonstrated mostly acellular organized fibrin with a few residual areas of red and white blood cells, attached to ventricular septum.

Discussion (Learning Value):
An intracardiac mass usually represents a thrombus, vegetation, metastatic tumor, and rarely, a primary cardiac tumor. There were no systemic signs of infection or evidence of embolization to suspect a thrombus or vegetation. It is also very unusual for thrombus to form on a smooth wall of interventricular septum. Primary cardiac masses are frequently asymptomatic, or manifest with embolic events, interfering with function of heart valves producing heart failure symptoms. They may also directly invade myocardial tissue causing systolic dysfunction, cardiac arrhythmias, heart block, or pericardial effusion. Left ventricular (LV) tumors may be intramural and present with arrhythmias or a conduction defect. Intracavitary LV tumors present with systemic embolization or outflow obstruction. Differential diagnosis of this mass would include myxoma – the most common primary cardiac mass, majorly originating in the left and right atria. The second most common tumor is papillary fibroelastoma, which is usually pedunculated, frequently attached to heart valves and has high embolization potential. Less common masses are fibromas, lipomas, rhabdomyomas and teratomas.

In our case, the cardiac mass unveiled itself by causing ventricular tachycardia. The arrhythmia was probably a result of direct contact and irritation of a pro-arrhythmogenic area of the LV outflow tract, given the large size and pedunculated structure of the mass. The mass had to be acute/subacute as it was not present at the time of his mitral valve repair 15 months prior. It remains a mystery how the thrombus formed in this particular anatomical location.

Clinical Vignettes

An Unusual Presentation of a Cardiac Mass in a Patient With Prior Mitral Valve Repair (cont.)

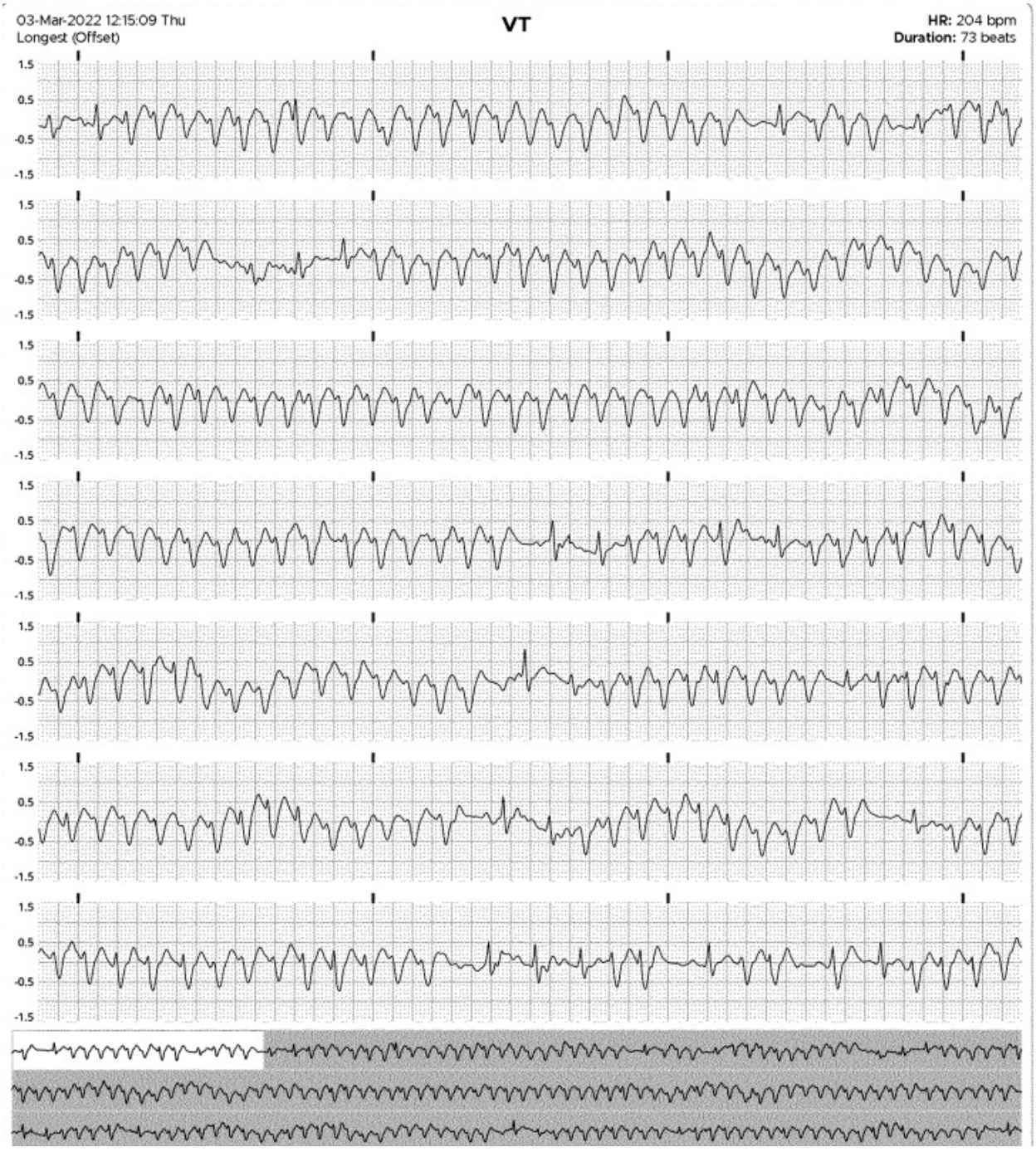


Figure 1. Non-sustained Ventricular Tachycardia on Holter monitor

Clinical Vignettes

An Unusual Presentation of a Cardiac Mass in a Patient With Prior Mitral Valve Repair (cont.)

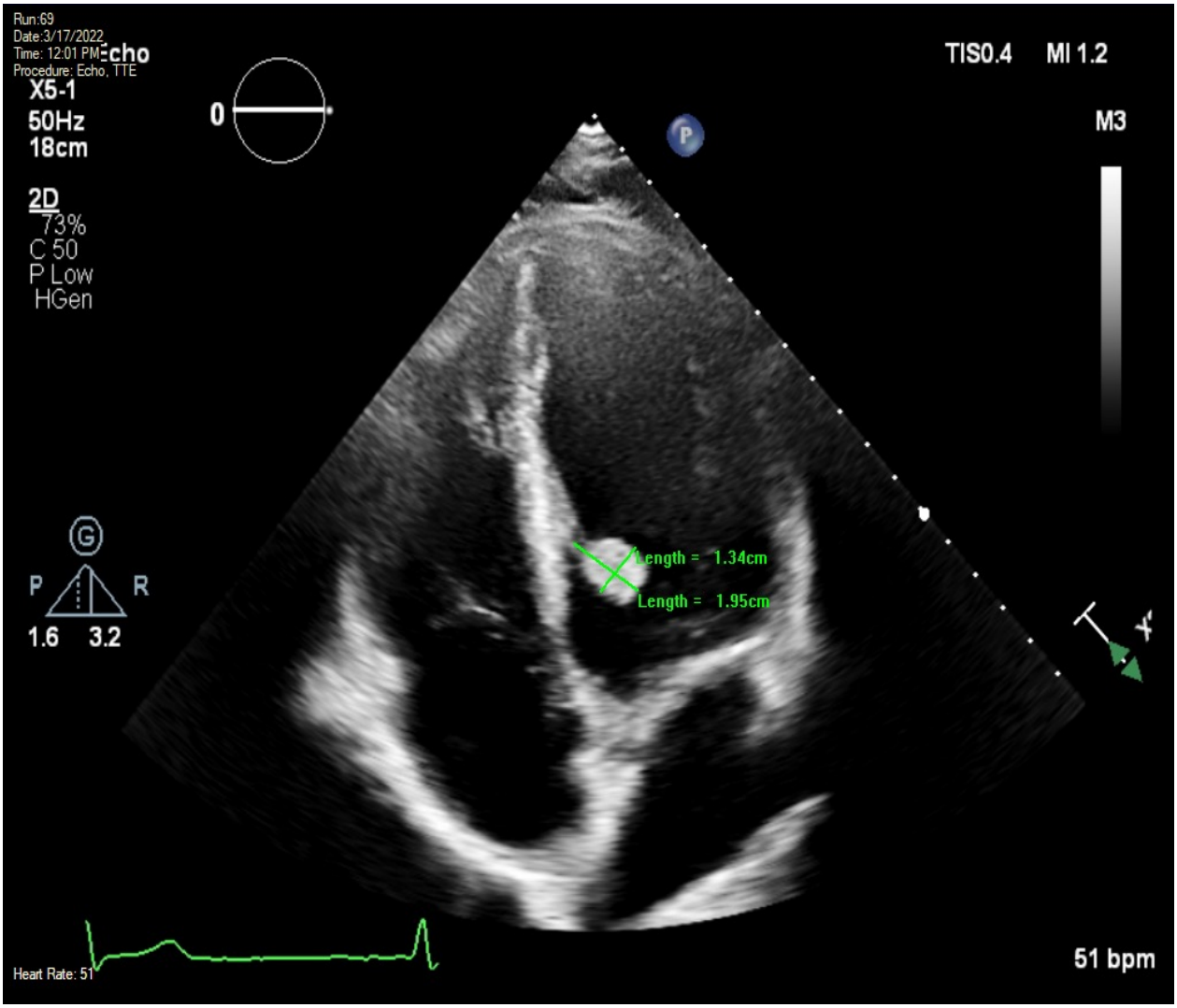


Figure 2. 4-Chamber Echocardiogram Image

Clinical Vignettes

Case Report: Transesophageal Echocardiographic Evaluation and Repair of Massive Pulmonary Artery Aneurysm

Suneel Veerwani, MD; Ina (Zaimi) Schwartz MD, MSc; Usha Vellayappan, MD

Saint Elizabeth's Medical Center, Department of Anesthesiology, Boston, MA

Introduction: Pulmonary artery aneurysms are rare pathology. Its incidence is estimated to be 1 in 14000 based on finding from 109571 postmortem autopsies performed at Mayo Clinic (1). We present a case of a massive pulmonary artery aneurysm, diagnosed in a 54 -year-old male. The aneurysm was surgically repaired with 3 mm Medtronic Freestyle porcine bioprosthesis.

Description of Case: The patient is 54 year male with a PMH of hypertension, smoking, and alcohol use presented to the ED after a near syncopal episode. On admission, physical examination was unremarkable. A chest x-ray showed mediastinal widening, which prompted further evaluation with CT chest. CT findings include marked dilatation of the main pulmonary artery measuring 7.3 cm, right pulmonary artery measuring 4.1 cm, and left pulmonary artery 3.4 cm. Transthoracic echocardiogram shows normal left and right ventricular function, dilated pulmonary artery with moderate to severe pulmonary regurgitation. Left heart catheterization shows no evidence of obstructive coronary artery disease. Intraoperative transesophageal echocardiogram shows gigantic pulmonary artery aneurysm extending into right and left pulmonary artery with moderate to severe pulmonary insufficiency. The surgeon repairs the aneurysm with a 23 mm Medtronic Freestyle porcine bioprosthesis. Post repairs TEE evaluation shows no pulmonary regurgitation without any signs of anastomotic leak. Postoperative CT scan shows post-surgical changes, no leak or pulmonary embolism. The patient was discharged home on the 5th postoperative day.

Discussion (Learning Value):
Pulmonary artery aneurysm is defined as dilation of all three layers of vessel wall > 4 cm (2). The etiological factors for PAA include congenital, acquired, and idiopathic (3). More than 50% of cases are associated with congenital cardiac anomalies. (2) Echocardiogram plays an important role in the evaluation of PAA, focusing on RV, RVOT, and pulmonary valve. Computed tomography confirms the diagnosis providing useful information regarding location, size, the extent of PAA (2). Clinical presentation of patients with PAA remains nonspecific. Some patients remain asymptomatic even with a large PAA diameter > 7 cm (2) whereas others present with chest pain, hoarseness, dyspnea, and syncopal episodes. Bronchial compression by missive PAA can cause cough, cyanosis, bronchiectasis, and pneumonia (2). Dissection of PAA is a rare, but life-threatening complication (2). Our patient presents after a near syncopal episode. He didn't have any chest pain, dyspnea, or cough. Chest X-ray raised suspicion for hilar mass or pulmonary nodule. The presence of PAA was confirmed with computed tomography. There are no guidelines for the treatment of PAA. Most institutions follow the aortic aneurysm guidelines and consider surgical intervention when the main PA diameter is ≥55 mm (4). As our patient had PAA > 70 mm, it was decided to proceed with surgical intervention to avoid feared complications like dissection or rupture.

Case Report: Transesophageal Echocardiographic Evaluation and Repair of Massive Pulmonary Artery Aneurysm (cont.)

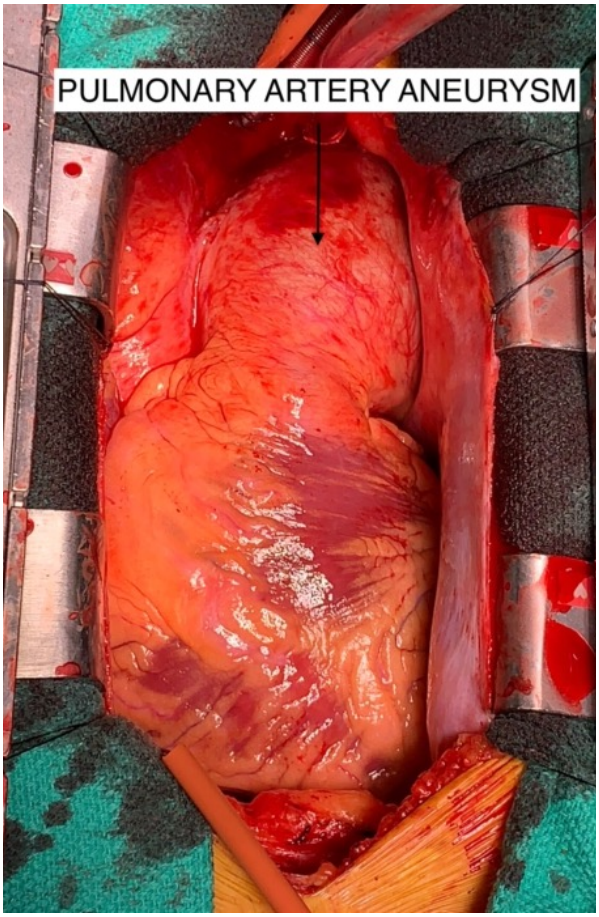


Figure 1. Pulmonary artery aneurysm

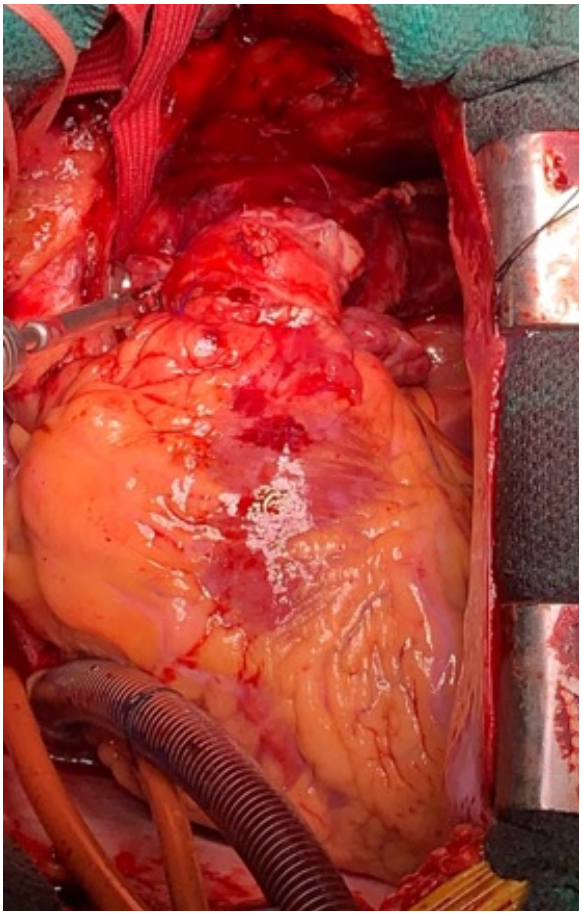


Figure 2. Grafted Pulmonary Artery

Clinical Vignettes

Cocaine-Induced Posterior Reversible Encephalopathy Syndrome (PRES): A Case Series and Review of the Literature

Emeka Agudile, MD, MPH, ScD; Ibrahim Elkhawas, MD; Ramninder Nagra, MD; Hussein Al Jobori, MD

Introduction: Posterior reversible encephalopathy syndrome (PRES) is a neurological disorder distinguished by an array of clinical symptoms and characteristic radiological findings. PRES is characterized by headache, encephalopathy, high blood pressure, visual disturbances, seizures, confusion, focal neurologic deficits, and posterior cerebral white matter edema on neuroimaging.

Description of Case: We present two cases of cocaine-induced PRES. The first case presented with depression, suicidal ideation, confusion, agitation, and hypertension after cocaine use. The second case presented with altered mental status, severe thirst, blindness, hypertension, and acute renal failure following cocaine use. Both patients had pathognomonic neuroimaging findings.

Discussion (Learning Value):

Pathophysiology: Several theories have been proposed to explain the pathophysiologic mechanisms of PRES, including vasogenic, neuropeptide, cytotoxic, and immunogenic theories.

Vasogenic Theory: Failure of the brain's autoregulatory mechanisms in the setting of severe hypertension leads to hyperperfusion, resulting in endothelial disruption and vasogenic edema.

Neuropeptide Theory: Immune- or inflammatory-mediated activation of endothelial cells leads to the release of pro-inflammatory cytokines that causes subsequent vasoconstriction with hypoperfusion and vasogenic edema.

Cytotoxic Theory: Some cytotoxic agents might have direct toxicity on vascular endothelium of the cerebral blood vessels leading to disruption of the blood-brain barrier and capillary leak and axonal swelling.

Immunogenic Theory: endotheliopathy due to T cell activation and cytokine or vasoactive substances like histamine and nitric oxide may also underlie the pathogenesis of PRES.

Clinical Presentation: Typical presentations include acute encephalopathy, rapid onset headache, disorientation, seizures, and visual changes, along with evidence of parieto-occipital vasogenic edema on MRI. However, this presentation can also mimic other neuropsychiatric conditions while manifesting atypical clinical and neuro-radiologic findings.

Diagnosis and Radiological Findings: While the neuroradiographic findings may be evident but subtle on CT scans, non-contrast brain MRI is more sensitive and depict the findings better than CT. Bilateral areas of white matter edema, particularly in the parieto-occipital regions are the typical findings. The characteristic MRI findings of PRES include focal or confluent areas of increased signal on T2-weighted images and Fluid-attenuated inversion recovery (FLAIR) sequence with vasogenic edema in the parieto-occipital and posterior temporal lobes.

Management: Treatment of hypertension with parental agents to lower the blood pressure in 10% to 25% increments of the mean arterial blood pressure is an approach that has been used to achieve complete resolution of both clinical symptoms and neuroimaging abnormalities. Patients with PRES and seizures should be treated with anti-seizure medications except in the setting of eclampsia.

Implications and Public Health Relevance: The prevalence of cocaine-induced PRES may be under-reported since most case series and case reports suggest that PRES is usually benign; patients with cocaine-induced PRES may not present to the hospital. Some cases of cocaine-induced PRES may be missed in the ED given the heterogeneous nature of its clinical presentation and the fact that CT scan, the standard neuroimaging screening protocol in the ED, is less sensitive than MRI. At the same time, anecdotal evidence from poison control centers around the United States reported increasing availability of cocaine with adulterants that potentiate neurologic side effects of cocaine, including PRES.

Cocaine-Induced Posterior Reversible Encephalopathy Syndrome (PRES): A Case Series and Review of the Literatur (cont.)

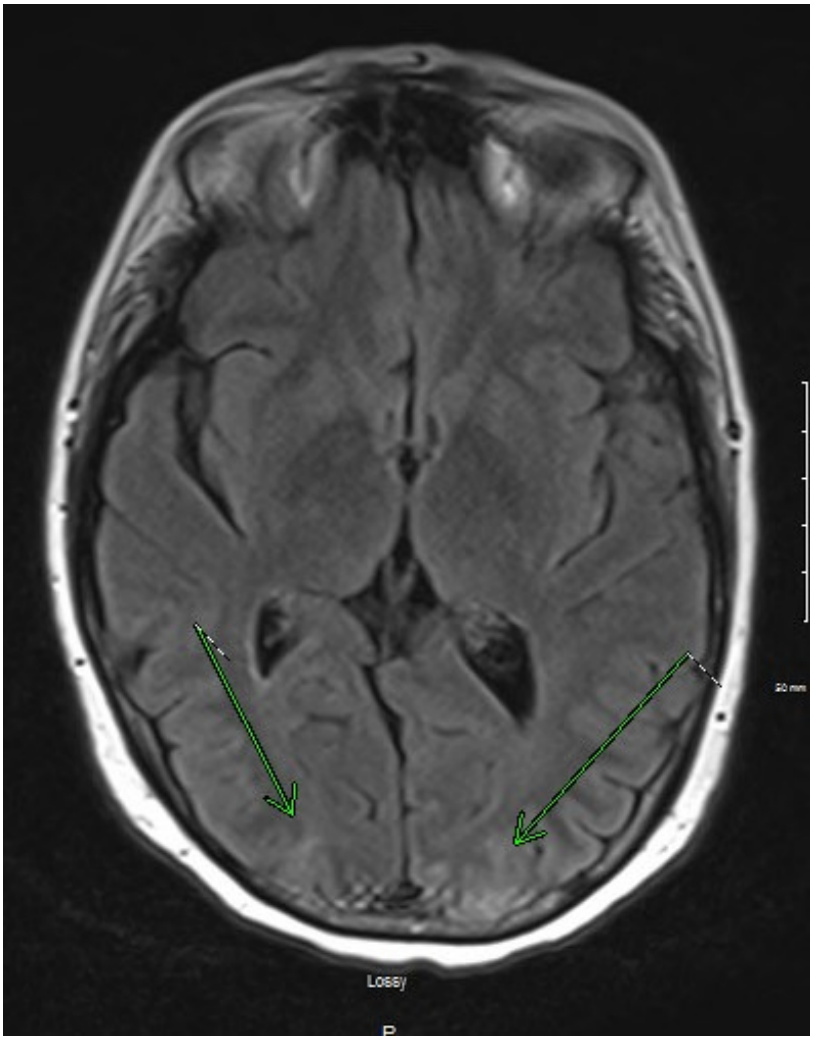


Figure 1. MRI Brain of Patient 1 showing increased signal on T2-weighted images and Fluid-attenuated inversion recovery (FLAIR) sequence with vasogenic edema in the parieto-occipital lobes

Cocaine-Induced Posterior Reversible Encephalopathy Syndrome (PRES): A Case Series and Review of the Literatur (cont.)

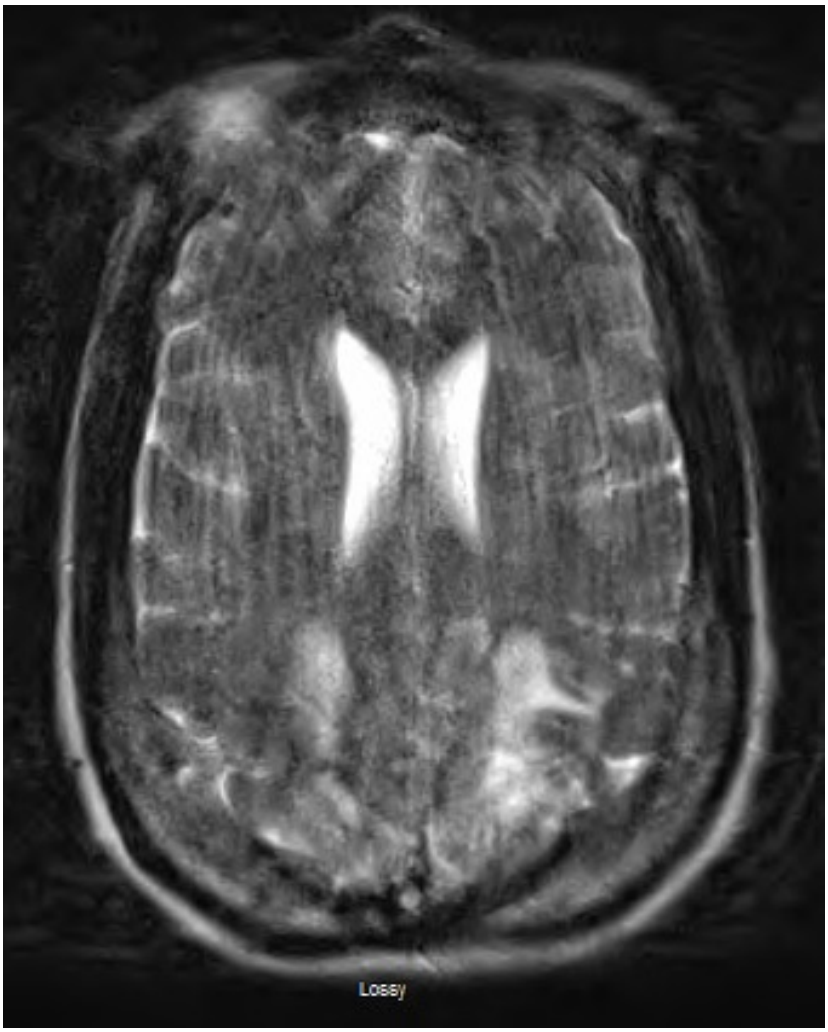


Figure 2. MRI Brain of Patient 2 showing increased signal on T2-weighted images and Fluid-attenuated inversion recovery (FLAIR) sequence with vasogenic edema in the parieto-occipital lobes

Clinical Vignettes

Cutaneous Leukocytoclastic Vasculitis: A Rare Extraintestinal Manifestation of Crohn's Disease

Iyiad Alabdul Razzak, MBBS; Tiago Barroso, MD; Marcel Robles, MD; Butros Fakhoury, MD

Department of Internal Medicine, St. Elizabeth's Medical Center, Brighton MA

Introduction: Cutaneous disorders are the most common extraintestinal manifestations of Crohn's disease (CD). Cutaneous involvement can be either a primary complication of the disease itself or a side effect from its treatment. Erythema nodosum and pyoderma gangrenosum are the most common cutaneous findings of CD, however rarer manifestations have also been described, including leukocytoclastic vasculitis (LCV). Most of these cases were described as a side effect of biologic therapies. Here we report a case of LCV in a CD patient that could not be attributed to biologic treatment or other causes of secondary LCV.

Description of Case: A 28-year-old female with history of CD, celiac disease, and post-partum depression who was admitted after a suicide attempt. Shortly after hospitalization, she developed acute worsening of bilateral lower extremity rash. This rash started three weeks earlier and was limited to both ankles. It was pruritic but not painful and had slowly ascended to lower shins. She had no systemic symptoms other than a transient arthralgias. She was seen at a dermatology clinic ten days earlier where she underwent a skin biopsy that showed LCV and negative immunostaining for immunoglobulins and complements. She denied taking any new medications, and she had no gastrointestinal symptoms. Of note, her CD has been in remission for over two years on weekly subcutaneous adalimumab injections. Her rash remained confined to her ankles and lower shins and was only mildly pruritic. However, on the next morning after admission, she woke up with intense pruritus in her legs around the rash with noticeable extension of the rash to involve her bilateral thighs and lower abdomen. Of note, she missed her weekly adalimumab dose two days prior to this event. Her skin examination revealed multiple pink to purple macules that are palpable but non-tender (Figure1). The rash was more prominent on the ankles and legs but extended to involve bilateral thighs. There were no vesicles or ulcerations. Physical examination was unremarkable otherwise. Laboratory tests showed a mild microcytic anemia (hemoglobin: 10.1 g/dL), a high C-reactive protein (1.74 mg/dL, normal = <0.5 mg/dL), and a high erythrocyte sedimentation rate (68 mm/hr, normal = <20 mm/hr). Extensive work-up for causes of secondary LCV including connective tissue disorders, and common infectious triggers came back negative except for a positive AntiNuclear Antibody (ANA) test. Anti-tumor necrosis factor (TNF) related cutaneous LCV was suspected. However, our patient had worsening symptoms upon missing the adalimumab dose which argued against our suspicion. Hence, we proceeded with administering next week's adalimumab dose which resulted in remission of her rash.

Discussion (Learning Value): LCV is a histologic diagnosis representing a type of small vessel vasculitis. Effect of LCV can be skin-limited (cutaneous LCV) or systemic involving several internal organs. Cutaneous LCV is a rare extraintestinal manifestation of inflammatory bowel disease (IBD) and only a few cases were reported in CD patients. Most of these reports were attributed to anti-TNF agents, suggested by rash disappearance upon anti-TNF cessation. However, our case suggests a possible primary linkage between CD and cutaneous LCV in which case anti-TNF agents might have a therapeutic effect.

Cutaneous Leukocytoclastic Vasculitis: A Rare Extraintestinal Manifestation of Crohn's Disease (cont.)

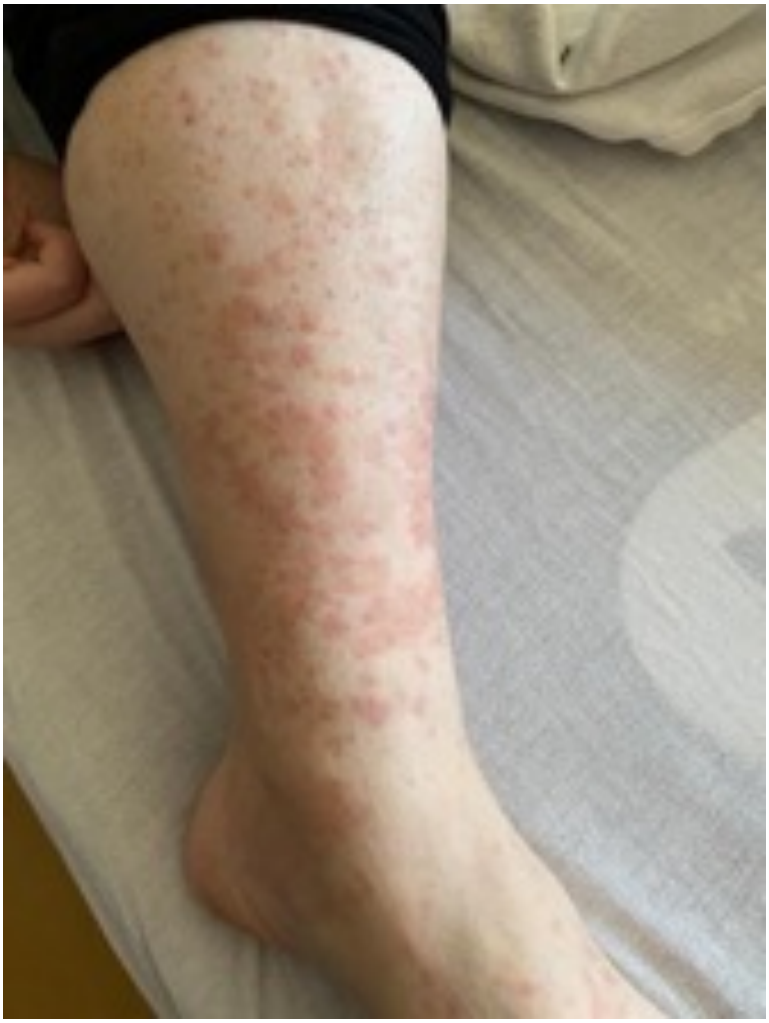


Figure 1.

Clinical Vignettes

Psychiatric presentations and treatment strategies of patient with anti-NMDA encephalitis

Siddhi Bhivandkar, MD; Chelsea Mendonca, MD; Rashad Alikhan, MD; Jason Strauss, MD

Introduction: Anti-N-methyl D-aspartate receptor (NMDAR) encephalitis is an autoimmune condition characterized by neuropsychiatric symptoms, including epileptic seizures, movement disorders, autonomic instability, disturbances of consciousness, paranoia, delusions, and catatonia. Ovarian teratomas and viral infections, typically herpes simplex viruses, have previously been demonstrated to precipitate anti-NMDAR encephalitis, but in many cases, the trigger remains unclear. In this case we discuss the changing psychiatric presentation of a patient with anti-NMDAR encephalitis and her course to diagnosis and psychiatric management strategies.

Description of Case: This patient is a 23-year-old African American, domiciled female with a history of major depression disorder and anxiety, but no psychiatric hospitalizations or suicide attempts, who was admitted to the inpatient psychiatric unit after being brought to the hospital with disorganized and aggressive behavior, requiring multiple restraints. Her urine toxicology screen was negative for any illicit substances. Of note, she had been brought to the ED several times over the past two months for varying neurologic and psychiatric concerns, including new-onset seizures, paresthesia, panic symptoms, and psychosis. The patient was on a spectrum of psychotropic medications and different formulations, including chlorpromazine, haloperidol, olanzapine, and diphenhydramine with poor response, and she was also receiving lorazepam for a catatonic state. During her admission, the patient was found to have an ovarian teratoma, which was resected. Given the constellation of seizures, focal neurologic signs, cognitive impairment, and psychiatric symptoms as well as the finding of an ovarian teratoma, anti-NMDAR encephalitis was considered. She underwent a lumbar puncture and CSF analysis was performed, and she was given 5 days of IVIG, which mildly improved her symptoms. She was started on quetiapine for psychotic symptoms and lorazepam for catatonia. Haloperidol intramuscularly was used to control episodes of agitation. The CSF anti-NMDAR antibody titer was positive confirming the diagnosis of anti-NMDAR encephalitis, and she was started on methylprednisolone 1g IV daily for 5 days while continuing quetiapine and lorazepam, and haloperidol on a prn basis. She displayed worsening psychotic symptoms after starting methylprednisolone and was switched to haloperidol scheduled, and quetiapine was discontinued due to its inefficacy. Her mental status improved, and she was discharged home with a planned follow up in the neurology and psychiatry clinic.

Discussion (Learning Value): Anti-NMDAR encephalitis is a rare yet devastating condition that is often missed in clinical settings. Screening strategies for patients with rapid mental status changes and no psychiatric history should include serum and CSF measurement of anti-NMDAR antibody and imaging studies. This approach may help to identify anti-NMDAR encephalitis masquerading as a psychotic condition. Early diagnosis and treatment of patients with anti-NMDAR encephalitis reduces the duration of neurological impairment and overall improves clinical outcome.

Clinical Vignettes

Septicemia and Oligoarthritis due to Haemophilus Para-influenza

Emeka Agudile, MD, MPH, ScD; Abdul Wasio, MD; Suprav Mishra, MD; Suprav Mishra, MD

Department of Internal Medicine, Steward Carney Hospital

Introduction: Hemophilus Para-influenza is increasingly recognized as an opportunistic pathogen in serious infections such as endocarditis, meningitis, and pneumonia. It is, however, an uncommon pathogen in septicemia, osteomyelitis, and septic arthritis. Immuno-compromised hosts remain particularly susceptible to H. Para-influenza infections despite adequate immunizations.

Description of Case: We present two cases of septicemia and olio-arthritis due to H. Para-influenza. The first case was a middle-aged man with a past medical history of HIV on HAART but with poor compliance, presenting initially with nausea, vomiting, diarrhea, cough, right foot pain, and inability to bear weight on the right leg. He reported migratory diffuse pains in his hands and shoulders a few days later. The second case was a young man, also with a history of HIV and medication non-compliance. He presented with poor oral intake, pain on his left thigh, neck, chest, and left hand, and difficulty with ambulation due to back pain. He also reported diffuse migratory pains on his ankle, wrist, neck, back, and left anterior thigh a few days later.

Discussion (Learning Value):

Microbiology: H. Para-influenza is a pleomorphic Gram-negative coccobacillus with fastidious growth requirements. It requires enriched media, usually containing blood (e.g., chocolate agar). It can be differentiated from other Hemophilus spp. by the requirement for V factor (i.e., NAD, nicotinamide adenine dinucleotide) for growth. It ferments glucose, sucrose, and mannose but not lactose. It is also facultatively anaerobic. It could cause meningitis, septicemia, pneumonia, septic arthritis, otitis media, especially in children and immunosuppressed adults.

Clinical Presentation: The clinical picture may not differ from that seen in cases of septicemia and septic arthritis from other causes such as fever, chills, anorexia, nausea, vomiting, tachycardia, tachypnea, and joint pains with swellings. However, it is of note that both of our patients have migratory and diffuse oligoarthritis.

Diagnosis and Radiological Findings: Work up including CBC, CMP, blood culture, synovial fluid studies results are usually diagnostic. Lab findings are usually similar to the patterns seen in other bacterial causes of septicemia and septic arthritis. Findings may include leukocytosis with neutrophil predominance. Positive blood culture for gram-negative coccobacilli, facultatively anaerobic bacteria, requiring V factor for growth and fermenting glucose, mannose, and sucrose but not lactose is confirmatory for H. Para-influenza septicemia. Arthrocentesis findings of elevated WBC, high PMNs, low glucose, high proteins, and high LDH levels in the setting of H. Parainfluenza septicemia also confirm septic arthritis due to H. Para-influenza.

Management: Any of the antibiotics with activity against beta-lactamase-producing H. Influenza and Para-influenza such as cefuroxime, cefixime, clarithromycin, azithromycin, fluoroquinolones, and trimethoprim-sulfamethoxazole, could be used in the treatment of H. Para-influenza septicemia and septic arthritis depending on the local sensitivity patterns.

Implications and Public Health Relevance: Cases of H. Para-influenza infection may be rising especially among immune-compromised patients. A high index of suspicion is needed for timely diagnosis. Proper culture techniques are required for easy identification, characterization, and antibiotics sensitivity of the offending bacteria. Rapid species identification is needed to diagnose H. Para-influenza septicemia and septic arthritis.

Clinical Vignettes

Acalculous Cholecystitis in a Patient with COVID-19: Possible Direct Viral Involvement

Tiago Barroso Vieira Costa, MD; Butros Fakhoury, MD; Iyiad Alabdul Razzak, MD; Marcel Robles, MD; Dallas Miller, MD

Introduction: Although most patient with COVID-19 present with fever, cough, and shortness of breath, gastrointestinal complaints are common in COVID-19, presenting in one-third of patients. Patients with severe COVID-19 are at high risk for gastrointestinal complications. Among these, cholecystitis, especially acalculous, is a well described, although rare, complication of COVID-19. In this report, we are describing a patient who developed acalculous cholecystitis as a complication of COVID-19 who improved with conservative treatment with antibiotics.

Description of Case: 49-year-old male patient, with medical history of type 2 diabetes, vaccinated for COVID-19, presented with 1-day history of epigastric abdominal pain. He experienced a sudden onset 10/10 cramping epigastric pain that radiated to the back. He did not notice exacerbating or relieving factors. No nausea, vomiting, bowel movements changes, polydipsia, polyphagia, or polyuria were present. When he presented to the emergency department, his temperature was 101 °F, heart rate 116, blood pressure 161/116 mmHg, O2 saturation 95% on room air. Physical exam revealed bilateral diffuse respiratory rhonchi and bibasilar crackles, and diffuse abdominal tenderness. Laboratory showed leukocytosis (11.8), slightly elevated AST, alkaline phosphatase, normal lipase, lactic acid 1.8, D-Dimer 1.06, C-reactive protein 2.9, procalcitonin 0.8, pH 7.36, HCO_3^- 23, and positive SARS-CoV-2 PCR. Abdominal CT scan showed gallbladder thickening, without calculi, indicative of acalculous cholecystitis. No pancreatic fat stranding was identified. He was started on ceftriaxone and metronidazole. Surgery was consulted, but since the patient was improving with antibiotics, he would not need emergent cholecystectomy or percutaneous cholecystostomy, and he would be followed as an outpatient. He had significant improvement, being discharged with cefopoxime and metronidazole.

Discussion (Learning Value): We write about a patient who had acalculous cholecystitis while diagnosed with COVID-19. His diagnosis of acalculous cholecystitis was based on the abdominal CT finding of gallbladder wall thickening, without calculi. CT has similar accuracy to ultrasonography for the diagnosis of acalculous cholecystitis. Acalculous cholecystitis is a consequence of gallbladder stasis and ischemia, causing local inflammation in the gallbladder wall. This is usually seen in patients who are facing other serious conditions, such as stroke, heart attack, sepsis, severe burns, extensive trauma, and patients who are recovering from major surgeries. Long periods of fasting, TPN, and drastic weight loss are risk factors for acalculous cholecystitis. Alternatively, acalculous cholecystitis can also be a direct consequence of primary infections. Some viruses such as CMV, EBV, flavivirus and hepatitis A and B virus are associated with acalculous cholecystitis. Direct viral involvement by SARS-CoV-2 has been theorized as a possible cause for acalculous cholecystitis in patients with COVID-19. Once cholecystitis is established, secondary infection with enteric bacteria is common. Considering that the patient was not critically ill, direct viral involvement seems to be more plausible. Different treatments have been described for patients with acalculous cholecystitis, including percutaneous cholecystostomy, cholecystectomy and medical treatment with antibiotics. For the patient in this report, he was started on antibiotics. Since he was improving, invasive procedures were not warranted, and the patient was discharged home with oral antibiotics.

Clinical Vignettes

Gastrointestinal Angiodysplasia in a Patient with Severe Aortic Stenosis and Chronic Kidney Disease

Tiago Barroso Vieira Costa, MD; Iyiad Alabdul Razzak, MD; Butros Fakhoury, MD; Marcel Robles, MD; Dallas Miller, MD

Introduction: Aberrant blood vessels, also known as angiodysplasia or arteriovenous malformation are a common finding in the gastrointestinal tract. This condition is associated with both occult and severe bleeding, usually more associated with hematemesis or melena. It is most often detected in patients older than 60 years. Some conditions are associated with angiodysplasia such as chronic kidney disease and aortic stenosis. In this report, we describe a patient with chronic kidney disease and severe aortic stenosis, who presented with gastrointestinal bleeding due to small intestine angiodysplasia.

Description of Case: An 87-year-old male patient with history of hypertension, chronic kidney disease stage IV, severe aortic stenosis (for which the patient refused aortic valve replacement), who presented with a syncopal episode associated with melena. When he presented to the emergency department, his hemoglobin was 5.4. He had an upper endoscopy that did not show a source of bleeding. He then had a video capsule endoscopy that was positive for active bleeding angiodysplasias in the jejunum. He was then started on octreotide drip. The following day, he had a balloon enteroscopy showing that the bleeding had stopped with octreotide, not warranting any interventions at that point. His hemoglobin was stable afterwards and he was discharged on subcutaneous octreotide.

Discussion (Learning Value):
Although small intestine angiodysplasia is a common finding, the pathogenesis is still uncertain [A]. However, it seems to be more common with some conditions. Chronic kidney disease is a known condition associated with gastrointestinal angiodysplasias. They are the most common cause of gastrointestinal hemorrhage in this group of patients. The reason for a possible increased prevalence in this population is unknown. Angiodysplasias are more identifiable due to increased risk of bleeding secondary to uremia-induced platelet dysfunction, but it is still unclear if the risk for vascular malformation is in fact increased. Another condition classically associated with gastrointestinal angiodysplasias is aortic stenosis. This association has been called Heyde syndrome. It is thought to be caused by acquired von Willebrand syndrome due to shear stress-induced proteolysis present in aortic stenosis. Some reports have found significant bleeding improvement after aortic valve replacement. However, it is still unclear if the prevalence of angiodysplasias is truly increased with aortic stenosis, or it is just more identifiable due to increased bleeding tendency. This case reports a patient who has two conditions that might be associated with gastrointestinal angiodysplasia and are associated with increased risk of bleeding. Although aortic valve replacement could have been an option for him, he was refusing the procedure. For his acute treatment, he responded significantly well to octreotide, which stopped his bleeding.

Clinical Vignettes

The Case of an Ethically Challenging Pediatric Laceration Abroad

Matthew F. Holt, MD, MPH; Matthew LeMaitre, MD

Introduction: An 11-year-old male presents three hours after falling on his outstretched arm sustaining an approximately 1.5-inch laceration. The wound contained small amounts of dirt and some tiny rocks. The skin was lacerated through the dermis revealing the adipose tissue of the hypodermis. Pressure was applied and the bleeding had already subsided on the initial encounter.

Description of Case:

Day 1. Laceration of the left hand (Figure 1).

1. Should this wound be sewn up or left to heal on its own? Should there be a delayed closure or no closure at all?
    - After the patient's hand was thoroughly rinsed with bottled water, he was taken to a local pediatrician who happened to be hosting a packed-out clinic on Sunday evening at 6pm. This physician has a charity practice in an underserved area and usually gives the orphanage children a discount. The following is a synopsis of the care he was given at the clinic that evening along with the relative questions.
    - The nurse washed the wound and applied betadine solution.
2. Is it still standard of care to use betadine in this manner? Do the most updated recommendations allege that betadine causes a greater risk of worsening tissue inflammation which outweighs the benefit of any sterilization it provides?
    - The physician arrived, and an eye mask was crafted so the child would have a reduced awareness of what was going on. It did not work very well.
    - The nurse and physician attempted to hold the child down while the physician attempted to inject lidocaine proximal and distal to the laceration. They were not successful, and the child pulled away bending the needle.
    - The physician proceeded to smack the boy across the face.
3. Obviously, it was an extreme abuse/malpractice for the physician to smack this boy during treatment. Have you ever witnessed anything like this before and how would/should we respond to something like this?
    - An onlooker stepped in to help. The boy calmed significantly after being smacked across the face, nonetheless the onlooker held the child's legs and arms secure while the physician finished with the lidocaine injections.
    - The physician used a surgical stapler to place approximately 8 staples to close the wound.
4. Is the surgical stapler really the best option for an injury like this?
    - Betadine was reapplied to the wound and bandaged.
    - IM Tetanus Toxoid vaccine and IV Ceftriaxone were administered.
    - The physician prescribed Mefenamic Acid for pain control, and Cefazolin for infection prophylaxis, both of which were dispensed from the in-house pharmacy.
5. Is Mefenamic Acid used very commonly in the USA for pain control in pediatric cases?
6. Did this patient really need antibiotic prophylaxis with Cefazolin?

The follow-up instructions included returning to the clinic every third day for the nurse to redress the wound then removal of the staples at the physician's discretion. The cost for all this including the return visits was approximately 200 INR which equates to around 2.86 USD. Below are pictures showing the progression of healing (Figure 2).

Day 11. Removal of bandaging.

The Case of an Ethically Challenging Pediatric Laceration Abroad (cont.)

Discussion (Learning Value): This is the first description of a case of multiple brain abscess due to N. Pseudobrasiliensis in a kidney transplant patient. Like other species of Nocardia, this new species is responsible for invasive disease, including that of the lung, brain, and skin/soft tissues. Phenotypically, it is shares characteristics with that of N. Brasiliensis, with minute differences in structure, enzymatic activity, and gene sequencing analysis. Treatment can be challenging given variations in drug sensitivities, compared to other types of Nocardia species. Complications from treatment can arise, as seen in our patient, thus making clinical decisions more cumbersome. Recognition of N. Pseudobrasiliensis as an emerging opportunistic pathogen is important in the care of at-risk kidney transplant patients.

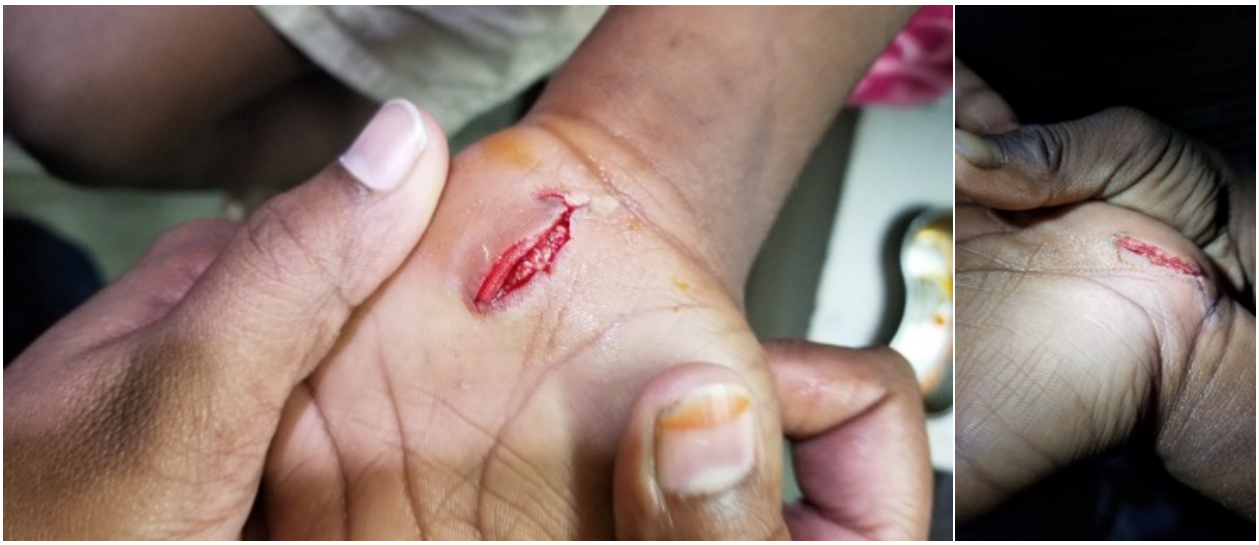


Figure 1.

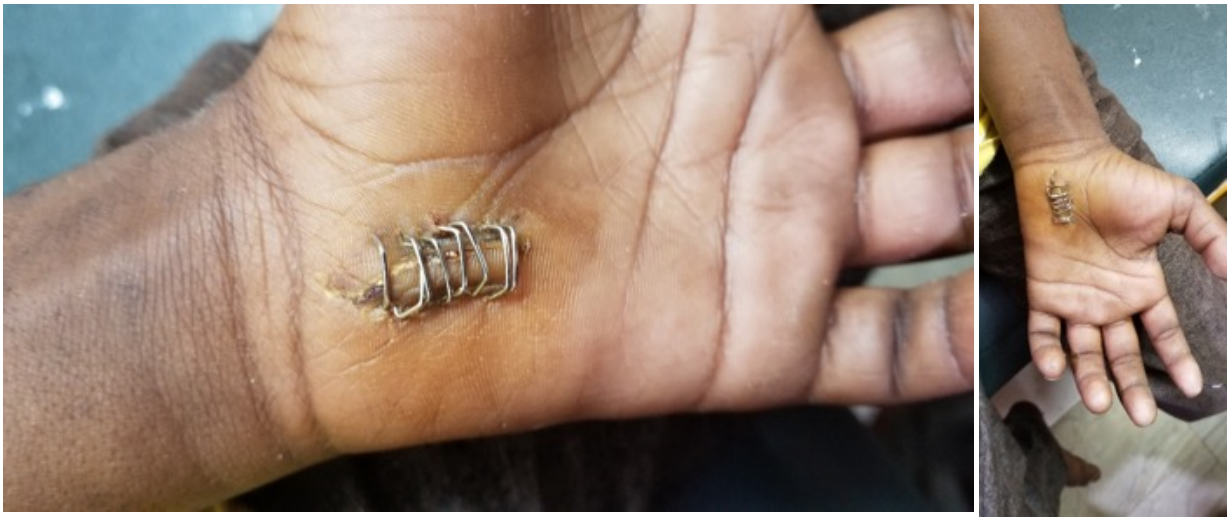


Figure 2.

Clinical Vignettes

Overcoming Failed Delivery of a Self-Expanding Valve During Valve in Valve Transcatheter Aortic Valve Replacement (TAVR)

Bilal Aijaz, MD; Arvind Agnihotri, MD; Joseph P Carrozza Jr., MD

Introduction: Delivering a transcatheter aortic valve across a previously placed surgical prosthesis can be challenging. We describe a difficult case where a self-expanding valve was successfully placed using snare assistance.

Description of Case: A 75-year-old female with surgical aortic valve replacement in 2017, (#19 Carpentier-Edwards Magna Ease bioprosthesthic valve), presented with progressive dyspnea (NYHA Class III). An echocardiogram revealed a peak velocity of 4.1 m/sec, mean gradient of 40mmHg across the aortic valve and a valve area of 0.8cm2, consistent with severe aortic stenosis. Following a heart team evaluation, patient declined repeat surgery and was referred for a valve-in-valve TAVR using a 23mm Evolut Pro+ Valve (Medtronic). Initial attempt to deliver the valve over a pre-shaped Safari wire (Boston Scientific) was unsuccessful due to the angulation of the aortic root and rigidity of the prior bioprosthetic valve annulus, biasing the device to the greater curvature of the aorta. Rotation of the Evolut Pro + delivery system was performed in different quadrants; however, each attempt was unsuccessful. We then attempted delivery over a Lunderquist wire which failed as well. Finally, via the left femoral artery, we advanced a 20-mm X 120cm gooseneck snare placed in the descending aorta. Through an 18 Fr sheath, a 0.035-inch J-wire was advanced and captured in the gooseneck snare. The aortic valve was re-crossed and the 14 Fr Evolut Pro+ 23mm valve and delivery system were advanced through the snare. The snare was cinched down at the nosecone of the Evolut valve, and the unit was advanced to the aortic root (Fig 1). Counter traction was applied to move the valve delivery system towards the inner curvature of aorta, while simultaneously advancing the delivery system. This centralization allowed delivery of the valve across the surgical bioprosthesis. The snare was withdrawn, followed by successful deployment of the Evolut valve (Fig 2).

Discussion (Learning Value): Given lack of directional flexion control, it may be difficult to deliver a self-expanding valve across a previously placed surgical bioprosthetic annulus, particularly in horizontal aortic roots. A goose neck snare allowed coaxial alignment of the self-expanding valve, facilitating delivery. Future design iteration may improve delivery and obviate the need for such maneuvers.

Overcoming Failed Delivery of a Self-Expanding Valve During Valve in Valve Transcatheter Aortic Valve Replacement (TAVR) (cont.)

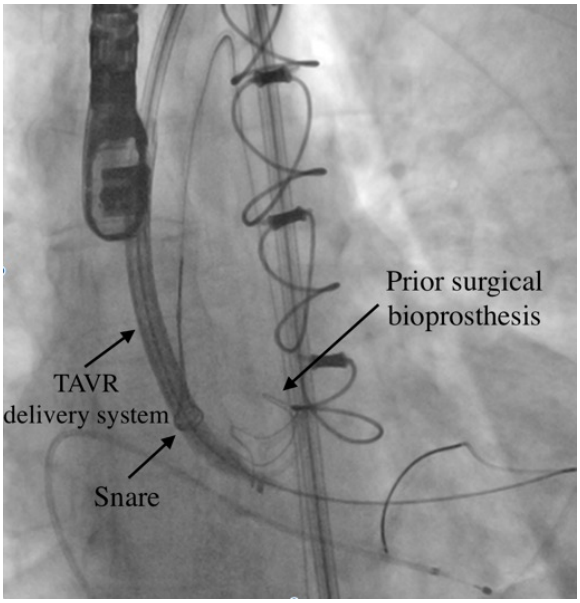


Figure 1.

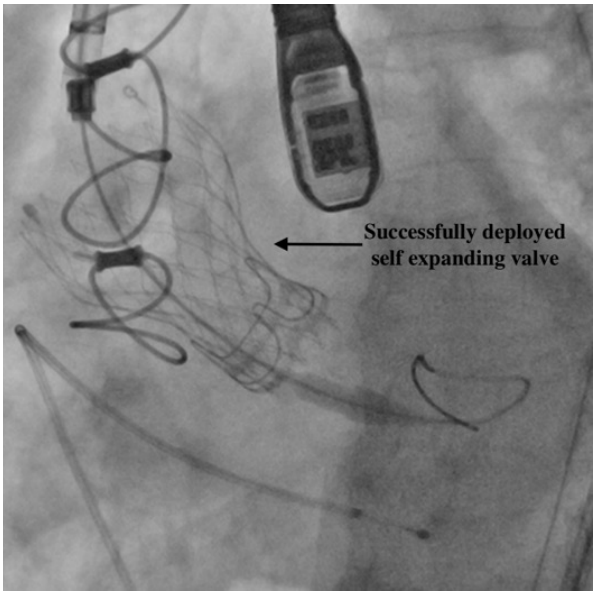


Figure 2.

Clinical Vignettes

Ketamine treatment for Treatment-Resistant Depression

Rashad Alikhan, MD; Michael Thrasivoulos, MD; Siddhi Bhivandkar, MD; Chelsea Mendonsa; MD, Jason Strauss, MD

Introduction: Treatment-Resistant Depression (TRD) is a debilitating disorder associated with significant psychological impairment affecting social and occupational outcomes. Approximately 30% of all depressed patients may be classified as having refractory depression. TRD is defined as the failure of two different antidepressant trials lasting four weeks at the maximum recommended dose [1]. Moving past catecholamine and serotonin models for depression, NMDA glutamate receptors in mood modulation have been the focus for the past decade. Ketamine is a noncompetitive antagonist of NMDA receptors and has been shown to be effective in TRD [1].

Description of Case: Mr. Q is a 21-year-old Caucasian, domiciled male with reported history of MDD, anxiety, one psychiatric hospitalization, and no suicide attempts who has been followed in our outpatient psychiatric clinic for one year. He has been struggling with severe depression and anxiety since middle school. His primary symptoms consist of negative self-deprecating thoughts, emptiness, worthlessness and suicidal thoughts. After relocating from the Midwest to New England for employment, Mr. Q felt that his symptoms were becoming more severe. His family history is notable for depression and suicide. He had multiple failed medication trials including: fluoxetine, bupropion, escitalopram, sertraline, buspirone, and quetiapine.

Upon being seen in our clinic, Mr. Q has been on therapeutic doses of lamotrigine and venlafaxine with little benefit. After a year on this medication regimen, his suicidal thoughts were becoming more frequent, intense, and more difficult to ignore.

As Mr. Q demonstrated multiple failed trials of high dose anti-depressants, the decision was made with patient to explore other options for his treatment resistant depression. He was accepted into a ketamine clinic treatment program in another facility. While intake for this program was being completed, his lamotrigine was tapered and then discontinued as this medication has been found to reduce the intended effects of the ketamine treatment.

Mr. Q began an 8-week IV ketamine treatment program. Initially, he denied any beneficial or notable effects of the ketamine for the first two weeks. It was only after his fifth session that he began to endorse a positive change in his mood. After his sixth week of treatment, Mr. Q began to notice that the thoughts of wanting to end his life, the thoughts of his own death, and sense of worthlessness had dissipated considerably.

Discussion (Learning Value): While the effects of ketamine treatment are often significant, it is still unclear how long they will last. Mr. Q completed treatment one month ago and appears to still be benefiting from the effects of this 8-week program. However, it is still unclear if these effects will wax or wane with various other factors and stressors. Maintenance doses may potentially be required if patient begins to experience a return of these symptoms.

Clinical Vignettes

Double Trouble: Two Cases of Spontaneous Right Ventricular Thrombi Seen in Two Patients With COVID-19 Pneumonia Treated with Barticinib

Roop Dutta; Michael Johnstone

Introduction: Right ventricular thrombus is rare phenomenon and is usually found in association with a pulmonary embolism. The vast majority of these right ventricular thrombi are "in-transit" and/or originating as a deep venous thrombosis. Coronavirus disease-2019 (COVID-19) is strongly associated with a hypercoagulable state leading to venous thromboembolism, including the development of right ventricular (RV) thrombus formation. The majority of these case reports are thrombus-in-transit with one report describing a single spontaneously formed right ventricle thrombus. No report to date has described the presence of multiple right ventricular in situ thrombi attached to the RV structures. Baricitinib is a Janus kinase inhibitor which has been recently shown, in combination with remdesivir, to improving COVID-19 recovery time when compared to COVID-19 patients treated with remdesivir alone. However, Baricitinib has been shown to be associated with a higher frequency of venous thromboembolism. We report here two cases of COVID-19 patients treated with Baricitinib who developed multiple in situ right ventricular thrombi attached to the RV structures.

Description of Case: Case 1: A 39-year-old male with non-insulin dependent diabetes mellitus, hyperlipidemia, and obstructive sleep apnea who presented with acute hypoxic respiratory failure and diagnosed with COVID-19 pneumonia treated with remdesvir, baricitinib, and dexamethasone. His course was complicated by severe ARDS s/p tracheostomy and PEG tube placement, bilateral pneumothorax requiring chest tube placement, ventilator-associated pneumonia, and methicillin-sensitive staphylococcus aureus bacteremia post a 4-week course of antibiotics, atrial fibrillation, and gastric ulcers. Six weeks into his course, a transesophageal echocardiogram was done showing two right ventricular thrombi, attached to the chordae. These thrombi persisted 6 weeks later despite IV heparin and apixaban as seen on subsequent echos. Case 2: A 64 year old male with hypertension and hyperlipidemia who presented with acute hypoxic respiratory failure secondary to COVID-19 pneumonia was treated with remdesivir, baricitnib, and dexamethasone. His course was complicated by ARDS with prolonged ventilation, septic shock, acute renal failure requiring continuous vino-venous hemofiltration. A transthoracic echocardiogram revealed two thrombi attached to the chordae of the right ventricle.

Discussion (Learning Value): These two cases demonstrate the presence of in situ right ventricular thrombi attached to chordal structures in the setting of COVID-19 infected patients treated with remdesivir, dexamethasone, and baricitinib. The hyperinflammatory and hypercoagulable response from COVID-19 in not solely responsible for this as the pro-thrombotic response to COVID-19 has been extensively documented over the prior two years with no report of spontaneous formation of several right ventricular thrombus. A probable cause is baricitinib, already associated with VTE, being a risk factor for the development of right ventricular thrombi. This is of clinical importance as right ventricular thrombus is associated with pulmonary embolism and increased morbidity and mortality.

Double Trouble: Two Cases of Spontaneous Right Ventricular Thrombi Seen in Two Patients With COVID-19 Pneumonia Treated with Barticinib (cont.)

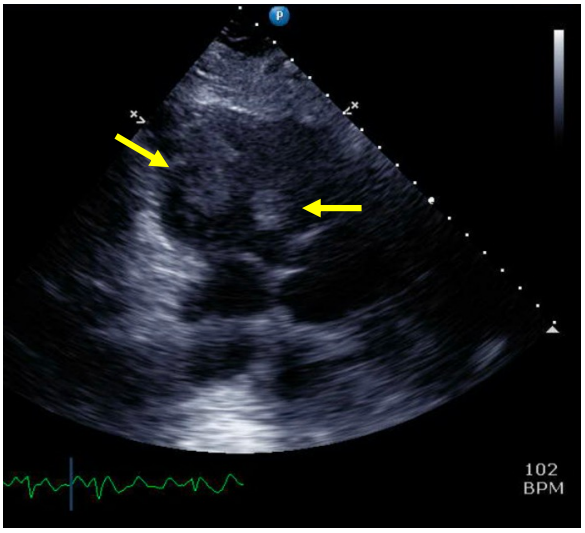


Figure 1. Several Right Ventricular Thrombi Seen on Transthoracic Echocardiogram. This TTE was from Case 2 above and shows two distinct thrombi in the right ventricular (highlighted by the yellow arrows), closesly associated with the chordae papillae of the tricuspid valve. These were highly mobile.

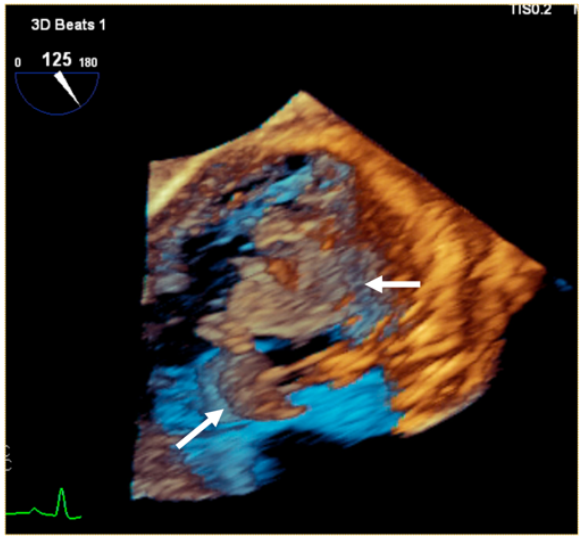


Figure 2. Transeseophageal Echocardiogram with 3D-imaging of the Right Ventricle. Two mobile thrombi are seen in the right ventricle (white arrows). Three-dimmensional imaging assists in showing these echodensities are not attached to the right ventricular wall, amking vegetation and myxoma less likely.

Clinical Vignettes

Sphenopalatine Ganglion Block Relieves Chronic Abdominal Wall Pain

Danielle Levin, MD; Frederic Gerges, MD; Olusola Akenroye, MD; Bishoy Michaels, DO; Joseph James, DO; Martin Acquadro, MD, DMD

Introduction: Chronic abdominal wall pain is a poorly recognized, debilitating, clinical problem that is often difficult to treat. Few clinical trials are available in regards to management of this condition. Injection of local anesthesia in combination with steroids provides relief for some patients, and when pain persists despite treatment, neurectomy is an option. We report the first case of a transnasal sphenopalatine ganglion block that repeatedly provided greater than 80% pain relief for a patient suffering from intractable chronic abdominal wall pain.

Description of Case: A 28-year-old female with past medical history of Crohn's disease and asthma presented with intractable chronic abdominal wall pain after several abdominal surgeries. The patient reported 1.5 years of "very severe," constant, left upper quadrant abdominal pain that she described as throbbing, stabbing, sharp, cramping, gnawing, aching, and pulling. She rated the pain as 9/10 on the Numeric Rating Scale. The pain would improve slightly with ice/heat and lying down and would get significantly worse with walking, standing, and climbing stairs. The pain would interfere with that patient's ability to work, socialize with friends, participate in recreation/hobbies, perform household chores and physical exercise, have sexual relations, and sleep. The patient reported frequently feeling anxious, discouraged, and depressed because of the pain. Multiple x-rays, MRIs, CT scans, and Emergency Department visits did not demonstrable any pathologic abnormality. The patient has tried physical therapy, occupational therapy, muscle relaxants, selective serotonin reuptake inhibitors, transcutaneous electrical nerve stimulation, trigger point injections with steroids, transversus abdominis plane block, and surgery to help manage the pain, all with minimal relief. Considering that the sphenopalatine ganglion block (SPGB) has previously been shown to relieve pain of various etiologies, we offered this treatment option to this patient. During the procedure, the patient was positioned supine and hemondynamics were monitored with a non-invasive blood pressure cuff and pulse oximeter. Long cotton-tips were soaked in viscous Lidocaine 2% and were advanced, a-traumatically, into each nasal sinus until gentle resistance was met, and left in place for a total of 15 minutes. This process was repeated two more times, for a total of 45 minutes. The cotton-tip applicators were removed, intact, and the patient was monitored for an additional ten minutes before being discharged home. After the first SPGB session, the patient, for the first time, had 80% pain relief that lasted for three weeks and had significant improvement in her daily function. Since then, the patient has been receiving this block monthly (for a total of five times now) and each time experiencing the same effect, with sometimes even more than 80% pain relief. The patient reports that this is the only treatment that has provided her significant benefit.

Discussion (Learning Value): Chronic Abdominal Wall Pain is often difficult to manage with physical/occupational therapy, analgesic medications, and invasive procedures. This case report demonstrates that the lidocaine sphenopalatine ganglion block could be a simple, safe, non-expensive, and non-invasive treatment option for those affected by chronic abdominal wall pain.

Sphenopalatine Ganglion Block Relieves Chronic Abdominal Wall Pain (cont.)

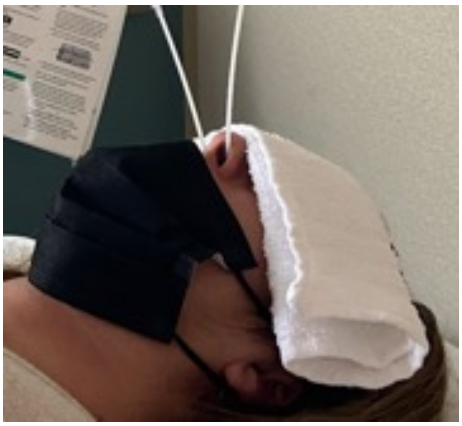


Figure 1. The patient receiving the transnasal sphenopalatine ganglion block via the cotton-tip applicators.

Clinical Vignettes

Lidocaine Drops through the Sphenopalatine Ganglion Block Relieves Lower Extremity Complex Regional Pain Syndrome

Danielle Levin, MD; Frederic Gerges, MD; Olusola Akenroye, MD; Joseph James, DO; Bishoy Michaels, DO; Martin Acquadro, MD, DMD

Introduction: Complex regional pain syndrome is a debilitating, neuropathic pain disorder that is often difficult to treat. Various pharmacological medications, spinal blocks, intravenous lidocaine infusions, physical therapy, and spinal cord stimulators have been utilized with not guaranteed effectiveness. Currently, no gold standard therapy exists1. We report the first case of a transnasal sphenopalatine ganglion block with lidocaine drops that provided five days of 100% pain relief for a patient suffering from lower extremity complex regional pain syndrome.

Description of Case: A 48-year-old male with hypertension and sleep apnea suffered a work-related accident that led to a right ankle reconstruction surgery approximately 10 years prior. Since then, this individual had been experiencing hair loss, discoloration, and allodynia in his right foot. He described the pain as moderate to severe in intensity, causing functional limitation in his life with significant interference with his ability to do activities of daily life including household chores, yard work, and shopping, as well as affecting his sleep and mood. Through the years, the patient had been managed with a multidisciplinary regimen consisting of spinal blocks, physical therapy, spinal cord stimulator, buprenorphine transdermal patches, gabapentin, oxcarbazepine, and monthly intravenous lidocaine infusions. Unfortunately, with this treatment regimen, the patient was never pain free. After the intravenous lidocaine infusions, he would report partial pain relief, which would last at most 2.5 weeks. Even though the intravenous lidocaine infusions were providing some relief, the patient was unable to continue receiving these infusions secondary to insurance difficulties. Considering that the sphenopalatine ganglion block (SPGB) has previously been shown to relieve pain of various etiologies, we offered this treatment option to this patient using SEMC created SPGB applicators and protocol. During the procedure, a total of 3.25ml of lidocaine 4% were administered in the right nostril in divided doses, and a total of 1.75ml of lidocaine 4% were administered in the left nostril in divided doses.The patient was followed up one month later. He reported that for the first time since his initial injury, he was 100% pain free for 5 days post the SPGB treatment. The patient's right foot pain started to gradually return after the 5 days, but he felt that the pain that returned was significantly less than his original pain. When asked whether he had any other effects from the treatment, the patient reported that since the SPGB treatment, his arthritic knee pain also significantly improved.

Discussion (Learning Value): Complex regional pain syndrome is often difficult to manage with physical/occupational therapy, analgesic medications, intravenous infusions, and other invasive procedures. This case report demonstrates that the lidocaine sphenopalatine ganglion block could be a simple, safe, non-expensive, and non-invasive treatment option for those affected by lower extremity complex regional pain syndrome.

Clinical Vignettes

Lidocaine Drops through the Sphenopalatine Ganglion Block Relieves Lower Extremity Complex Regional Pain Syndrome

Figure 1. The patient receiving the transnasal sphenopalatine ganglion block via the cotton-tip applicators. Verbal and written informed consent was provided by the patient for publication of this image.

Clinical Vignettes

Chronic Pain After Abdominal Surgeries Relieved with Monthly Intravenous Lidocaine Infusions

Travis Schaefer, DO; Danielle Levin, MD; Bishoy Michaels DO; Frederic Gerges, MD; Martin Acquadro, MD

Introduction: Chronic post-surgical pain can be debilitating and affects 15-30% of abdominal surgery patients . Many of these patients have abdominal pain refractory to multimodal analgesic techniques such as cognitive therapy, acupuncture, gabapentin, NSAIDs, and tricyclic antidepressants. Intravenous (IV) lidocaine has been studied extensively for neuropathic pain, but limited research is available about chronic abdominal pain. Diagnosis differential is broad, and pain may arise from genitourinary, gynecological, gastrointestinal, and musculoskeletal etiologies. Given the difficulty in diagnosing and treating abdominal pain, it often becomes expensive and time-consuming for the patient. Furthermore, the literature suggests a prevalence of 8%-54% related to upper abdominal symptoms. Although IV lidocaine is studied extensively for neuropathic pain, limited research pertains to chronic abdominal pain. The medically challenging report aims to describe what we believe is the first report of a patient suffering from chronic abdominal pain after having multiple abdominal surgeries treated with monthly intravenous lidocaine infusions.

Description of Case: This patient is a 30-year-old female who has chronic abdominal pain after having multiple abdominal surgeries. The patient has received greater than 50% pain relief, typically lasting three to four weeks in duration after each infusion. The patient has tolerated the lidocaine infusions well. Other significant past medical history includes fibromyalgia, chronic migraines, Ehlers-Danlos syndrome complicated by autonomic hyperreflexia, and pseudoaneurysm formations involving vertebral and right internal carotid arteries secondary to whiplash from a car accident. She previously failed physical therapy, stretching, heat, ice, and rest therapy. With the patient's infusions, the patient's pain medications include pregabalin and aspirin. The patient has been receiving monthly 250 mg IV lidocaine infusions at the pain management clinic for the past seven months. No adverse events were documented while the patient was receiving infusions.

Discussion (Learning Value): We want to describe what we believe is the first report of a 30-year-old female suffering from chronic refractory abdominal pain status post multiple abdominal surgeries treated with monthly IV lidocaine infusions. The use of IV lidocaine to treat acute and chronic abdominal pain is limited in the literature. Localized subcutaneous lidocaine can treat chronic abdominal wall pain caused by impingement of nerve branches in the abdominal wall, including intercostal nerves, ilioinguinal nerves, and iliohypogastric nerves. Known as anterior cutaneous nerve entrapment syndrome, Rajoriya showed that a localized subcutaneous injection of lidocaine with steroids could provide long-term relief in 95% of patients at two weeks. This patient underwent abdominal surgeries that resulted in chronic abdominal pain. Furthermore, the patient is taking pregabalin, suggesting a neuropathic component. The pain relief from lidocaine suggests a therapeutic use specifically for patient status-post abdominal surgery with recurrent chronic abdominal pain. The success of the IV lidocaine may add additional treatment options without daily medication use due to the high safety profile and low invasiveness of the treatment. The use of IV lidocaine to treat chronic pain does present challenges, including visits to a pain clinic, close supervision of vitals, and receiving monthly injections with intravenous placement. However, given the patient's minimal risk and significant benefit, this may provide a viable option to treat this challenging condition. More extensive studies are needed to evaluate the treatment's ideal frequency, dosage, and efficacy.

Acknowledgments

Founder of Research Day

Bertrand Jaber, MD, MS, Chair	Department of Medicine

Research Day Hosting Department

Jason Strauss, MD, Committee Chair, Chair, Interim Program Director	Department of Psychiatry
Sabrina Dar, MD, Committee Co-chair, Chief Psychiatry Resident, PGY-4 Resident	Department of Psychiatry
Siddhi Bhivandkar, MD, PGY-3 Resident	Department of Psychiatry
Rashad Alikhan, MD, Chief Psychiatry Resident, PGY-3 Resident	Department of Psychiatry
Helder Yoshii, MD, PGY-2 Resident	Department of Psychiatry
Alexandra Corrigan, MD, PGY-2 Resident	Department of Psychiatry
Kamil Dar, MD, PGY-1 Resident	Department of Psychiatry

External Judges Panel (for Original Investigations)

Yoav Golan, MD, MS, FIDSA	Tufts Clinical Translational Science Institute
David J. Greenblatt, MD	Tufts Clinical Translational Science Institute

Internal Judges Panel (for Quality Improvement Reports)

Helen Kyomen, MD	Department of Psychiatry
Michael Schoor, MD	Department of Anesthesia, Critical Care & Pain Management
Ruth Schulman, MD	Department of Medicine

Internal Judges Panel (for Clinical Vignettes)

Stephen Pinals, MD	Department of Psychiatry
Ahmed Mohamed, MD	Department of Medicine
Lindsey Arnold, Pharm.D, BCPS, Director	Department of Pharmacy
Mark Conrad, MD	Department of Surgery

Keynote Speaker

Daniel Z. Press, MD	Department of Behavioral Neurology, Harvard Medical School

Exhibitors

Megan Cashman, Manager	Investigational Review Board
Cheryl Evans, Quality & Safety Liaison Manager	Graduate Medical Education

Website Design and Maintenance

Siddhi Bhivandkar, MD, PGY-3 Resident	Department of Psychiatry
Guoliang (Josh) Zheng, MD, PGY-2 Resident	Department of Medicine

Prize Money Donation

Medical Staff and Hospital Administration

Budget

Diane Giacalone, Director	Graduate Medical Education
Cheryl Evans, Quality & Safety Liaison Manager	Graduate Medical Education

Advertising and Marketing

Kelly Katapodis, Director	Marketing & Community Engagement