RUTGERS
Robert Wood Johnson Medical School

2022
13th Annual
Surgical
Resident
Research Day

May 18th, 2022

8:00-10:30 AM

HISTORY

The first Robert Wood Johnson Medical School Surgery Resident Research Day was in 2009. It was founded by Geoffrey D. Young, M.D.,Ph.D. (resident) who believed that research was an important part of being a good surgeon, with the help of faculty member, Nell Maloney Patel, M.D. Dr. Maloney Patel brought many ideas for the Resident Research Day from her own residency program, where this was also an annual tradition. With the support of the Department of Surgery Chair, Stephen F. Lowry, M.D., Resident Research Day has become an annual showcase for the wonderful research and scholarship that occurs in the program.

JUDGES:

2009 – David August, MD and Stephen Lowry, MD

2010 – James Goydos, MD and Vincente Gracias, MD

2011 - Darren Carpizo, MD and Henry Hsia, MD

2012 - Peter Scholz, MD

2013 - Ramsey Foty, PhD

2014 - Siobhan Corbett, MD

2015 - Edmund Lattime, PhD

2016 – Matthew Lissauer, MD

2017 – Richard Agag, MD and Thomas Bauer, MD

2018 – H. Richard Alexander, MD and Yi-Horng Lee, MD

2019 – Ronald Pelletier, MD

2021 – Stanley Trooskin, MD

2022 –Haejin In, MD

PREVIOUS WINNERS:

1ST Annual Resident Research Day (2009)

Best Podium Clinical Presentation – **Nora Cheung, M.D.**
Best Clinical Poster Presentation – **C. Aitor Macias, M.D.**
Best Podium Basic Science Presentation – **Colin Failey, M.D.**
Best Basic Science Poster Presentation – **Eric Chang, M.D.**

2nd Annual Resident Research Day (2010)

Best Podium Clinical Presentation – **Dana Yip, M.D.**
Best Clinical Poster Presentation – **Georg Herlitz, M.D., J.D.**
Best Podium Basic Science Presentation – **Deepak Malhotra, M.D.**
Best Basic Science Poster Presentation – **Maithao Le, M.D., Ph.D.**

3rd Annual Resident Research Day (2011)

Best Podium Clinical Presentation – **Victoriya Chernyavsky, M.D.**
Best Clinical Poster Presentation – **Beth-Ann Shanker, M.D.**
Best Podium Basic Science Presentation – **Irina Bernescu, M.D.**

4th Annual Resident Research Day (2012)

Best Podium Clinical Presentation – **Kris Bagdasarian, M.D.**
Best Poster Presentation – **Robin Lee, M.D.**

5th Annual Resident Research Day (2013)

Best Podium Clinical Presentation – **Negar Salehomoum, M.D.**
Best Podium Basic Science Presentation – **Sumana Narayanan, M.D.**
Best Poster Presentation – **Dena Arumugam, M.D.**

6th Annual Resident Research Day (2014)

Best Podium Clinical Presentation – **Izak Faiena, M.D.**
Best Clinical Poster Presentation – **Jessica Zaman, M.D**
Best Podium Basic Science Presentation – **Joshua Honeyman, M.D.**
Best Basic Science Poster Presentation – **Neal Patel, M.D.**

7th Annual Resident Research Day (2015)

Best Podium Clinical Presentation – **Oliver Eng, M.D.**
Best Podium Basic Science Presentation – **Ashley Tai Tsang, M.D.**
Best Basic Science Poster Presentation – **Jessica Crystal, M.D.**

8th Annual Resident Research Day (2016)

Best Podium Clinical Presentation – **R. Nick Hernandez, M.D.**
Best Clinical Poster Presentation – **Parth Kiran Modi, M.D.**
Best Basic Science Poster Presentation – **Jessica Crystal, M.D.**
Best Podium Basic Science Presentation – **Christopher Sejong Han, M.D.**
Best Basic Science Poster Presentation – **Kristen Danielle Donohue, M.D.**

9th Annual Resident Research Day (2017)

Best Podium Clinical Presentation – **Elizabeth J. Lilley, M.D., M.P.H.**
Best Clinical Poster Presentation – **Renee L. Arlow, M.D.**
Best Podium Basic Science Presentation – **Monica D. Chow, M.D.**
Best Basic Science Poster Presentation – **Eyone Jones, M.D.**

10th Annual Resident Research Day (2018)

Best Podium Clinical Presentation – **Rachel E. NeMoyer, M.D.**
Best Clinical Poster Presentation – **Saeed Tarabichi, M.D.**
Best Podium Basic Science Presentation – **Monica D. Chow, M.D.**
Best Basic Science Poster Presentation – **Anthony I. Squillaro, M.D.**

11th Annual Resident Research Day (2019)

Best Podium Presentation – **Zach Brown, M.D.**
Best Poster Presentation – **William Burns, M.D. & David You. M.D.**

12th Annual Resident Research Day (2021)

Best Podium Basic Science Presentation – **Laurence Diggs, M.D.**
Best Basic Science Poster Presentation – **Alexander Rossi, M.D.**
Best Podium Clinical Presentation **– Joshua Chao, M.D.**
Best Clinical Poster Presentation – **David You, M.D.**

13th Annual Resident Research Day (2022)

Best Podium Basic Science Presentation – **Praveen Chatani, M.D.**
Best Basic Science Poster Presentation – **Russel Pepe, M.D.**
Best Podium Clinical Presentation **– Priya Patel, M.D.**
Best Clinical Poster Presentation – **Krish Dewan, M.D**.

SCHEDULE OF EVENTS

8:00AM – 9:30AM PRESENTATIONS

Alexander Manzella: National Trends of Endocrine Surgery Operations Influenced by the COVID-19 Pandemic

Priya B. Patel: Symptom status affects outcomes after transcarotid artery revascularization, carotid artery endarterectomy, and transfemoral carotid artery stenting in female patients

Laurence P. Diggs: Platelets control liver tumor growth through P2Y12 dependent CD40L release

Praveen D. Chatani: High-efficiency capture of anti-tumor neoantigen-reactive T cell receptors from tumor digest

Louis F. Chai: Regional delivery of anti-PD-1 agent for colorectal liver metastases improves therapeutic index and anti-tumor activity

Joshua C. Chao: The Effect of Socioeconomic Status: Patients in the Lowest Quartile of Income May Be Subject to Worse Outcomes Following Major Cardiac Surgery

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Abstract Title: National Trends of Endocrine Surgery Operations Influenced by the COVID-19 Pandemic

Authors:
Alexander J. Manzella, MD
Amanda M. Laird, MD
Henry Pitt, MD
Toni Beninato, MD, MS

Affiliations:
Rutgers Robert Wood Johnson School of Medicine, Cancer Institute of New Jersey

Introduction: The COVID-19 pandemic has impacted the US healthcare system, causing resource scarcity. During the early months of the pandemic, elective surgeries were halted in many regions. Endocrine operations, comprised primarily of thyroid, parathyroid, and adrenal operations, are predominantly elective and may have been affected by these policies. We therefore aim to determine whether the COVID-19 pandemic influenced the number of endocrine operations.

Methods: The Vizient database was utilized to determine quarterly case volume from Quarter 1 2019 through Quarter 2 2021 by searching for ICD10 codes for thyroid, parathyroid, and adrenal procedures. Pearson's chi squared test was performed to determine changes by age, sex, race, insurance status, and diagnosis before and during the pandemic.

Results: Data from 515 hospitals were analyzed. Operative volume decreased at the beginning of 2020, consistent with the onset of the COVID-19 pandemic. Thyroid operations decreased by 35% from an average of 1,966/quarter during 2019 to a low of 1,286/quarter during 2020. Parathyroid operations decreased by 49% from an average of 596/quarter to a low of 303/quarter. Adrenal operations decreased by 18% from an average of 672/quarter to a low of 549/quarter. Endocrine operations subsequently increased from their nadir in the middle of 2020. Thyroid operations returned to 1602/quarter, 81% of their pre-pandemic average, parathyroid operations to an average of 481, 81% of pre-pandemic, and adrenal operations to an average of 622, 93% of pre-pandemic, with none of the case volumes reaching pre-COVID-19 levels by the middle of 2021 (Figure 1). The percentage of operations performed for thyroid cancer did not change during the pandemic (18% to 17%, p=0.159).
Additionally, patients who underwent endocrine operations were similar with respect to age, sex, and race both before and during the pandemic. There was a decrease in patients undergoing thyroid surgery with private insurance (32.6% to 31.0%) and an increase in patients with Medicaid (19.3% to 20.9%, p=.047) after Quarter 1 2020.

There were no changes in insurance status for those undergoing parathyroid or adrenal operations.

Conclusions: The COVID-19 pandemic led to a decrease in the number of endocrine operations in academic and university-affiliated health systems that has not yet returned to pre-pandemic levels. The proportion of surgeries performed for cancer remained stable, as did patient demographics, and there was a shift in insurance coverage resulting in fewer privately insured patients and more Medicaid patients undergoing thyroid surgery. Further studies are needed to see how this decrease in operations will affect clinical outcomes of patients with endocrine surgical disease.

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Abstract Title: Symptom status affects outcomes after transcarotid artery revascularization, carotid artery endarterectomy, and transfemoral carotid artery stenting in female patients

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Objective: Female patients derive less benefit from some common vascular procedures compared with male patients. Recent studies have shown comparable perioperative outcomes after transcarotid artery revascularization (TCAR) and carotid endarterectomy (CEA) for carotid artery stenosis, and improved outcomes following TCAR compared with transfemoral carotid artery stenting (tfCAS). To examine whether these benefits extend to female patients, we compared the effect of carotid revascularization technique (TCAR, CEA, or tfCAS) on in- hospital outcomes in female patients.

Method: We identified all patients within the VQI who underwent TCAR, CEA, or tfCAS for atherosclerotic disease between 2016-2021. Our primary outcome of interest

was a composite of in-hospital stroke/death. Patients were stratified by symptom status. Propensity scores were then calculated using demographics, comorbidities, carotid symptom status, anatomic characteristics, and preoperative medication use. Inverse probability weighted logistic regression was used to compare outcomes in TCAR vs CEA and TCAR vs tfCAS.

Results: A total of 22,619 TCAR, 96,882 CEA, and 20,814 tfCAS patients were identified. Female patients underwent 8262 TCAR, 38040 CEA, and 7436 tfCAS, among which 30%, 37%, and 38% were symptomatic, respectively. Among symptomatic TCAR and CEA patients, TCAR had comparable in-hospital stroke/death (TCAR 2.3% vs CEA 2.2%; OR .75; 95%CI[.45-1.3]; P=.280), stroke (OR .72 [.41-1.3]), and death (OR 1.4 [.62-3.1]) (Table 1). Among asymptomatic patients, TCAR was associated with higher odds of in-hospital stroke/death (1.5% vs 1.0%; OR 2.1 [1.2-3.9]; P=.014), but not stroke (OR 1.9 [.95-3.8]), or death (OR 1.4 [.62-3.1]).
Among symptomatic TCAR and tfCAS patients, TCAR was associated with lower risk of in- hospital stroke/death (TCAR 2.1% vs tfCAS 4.8%; OR .42 [.28-.63]; P<.001), stroke (OR .51 [.32-.81]), and death (OR .27 [.15-.51]) (Table 2). However, among asymptomatic TCAR and tfCAS patients, there was no difference in stroke/death (1.5% vs 2.0%; OR .74 [.53-1.0]; P=.362), stroke (OR .75 [.52-1.1]), or death (OR .84 [.45-1.6]).

Conclusions: In this subgroup analysis of female patients, symptom status affected in-hospital stroke/death rates among carotid artery revascularization technique. In female patients with symptomatic disease, CEA and TCAR had comparable outcomes, whereas CEA had lower stroke/death rates compared with TCAR in asymptomatic patients. Therefore, CEA and TCAR can safely be used in symptomatic female patients, while CEA may be preferred in asymptomatic female patients.

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Abstract Title: Platelets control liver tumor growth through P2Y12 dependent CD40L release

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Abstract:

The clinical association between aspirin use and reduced risk of hepatocellular carcinoma (HCC) suggests that platelets promote HCC growth. Non-alcoholic fatty liver disease (NAFLD), an important risk for HCC, causes platelet activation. In contrast, we demonstrate enhanced HCC growth after blocking platelet function using P2Y12 antagonists or platelet depletion in multiple murine NAFLD models, revealing platelets' anti-tumor function. Platelet-derived CD40L was increased in NAFLD and exerted an CD40 and $CD8^+$ T cell-dependent anti-tumor function. Furthermore, P2Y12 was found to regulate platelet CD40L release and anti-tumor function in NAFLD, which was dissociated from anti-platelet treatments and could not be blocked by aspirin. Together, our study revealed that platelets can inhibit HCC through P2Y12-mediated CD40L release, a finding with potential implications for NAFLD patients.

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Abstract Title: High-efficiency capture of anti-tumor neoantigen-reactive T cell receptors from tumor digest

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Background: As cellular immunotherapies utilizing genetically engineered T cells become a more significant focus of clinical investigation, identification of patient-specific neoantigen-reactive T cell receptors (TCRs) in a practical and efficient manner is a top priority. Using high- dimensional single-cell analysis, we recently identified a common gene expression signature in anti-tumor, neoantigen-reactive tumor-infiltrating lymphocytes (TIL) from patients with metastatic cancer, which included high gene expression of cell-surface markers of exhaustion [1]. Furthermore, analyses of intra-tumoral T cell populations have shown that neoantigen- specific TIL are enriched in subsets defined by cell-surface markers of exhaustion, likely secondary to oligoclonal expansion that occurs upon tumor antigen recognition *in vivo* [2-5]. In this study we describe an efficient method to prospectively capture and reconstruct neoantigen- reactive T cell receptors from tumor digest based on co-expression of CD39, PD-1, and TIGIT.

Methods: We evaluated the ability of PD-1^{+}, CD39^{+}, and TIGIT^{+} TIL (TIL^{TP}) to enrich for neoantigen- reactivity by sorting, sequencing, and reconstructing high-frequency TCR □ /□ pairs from tumor digest in 5 patients with metastatic epithelial cancers. We then tested the ability of PD-1/CD39/TIGIT co-expressing TILs to sustain reactivity to patient-specific tumor neoantigens following *in vitro* expansion under similar conditions to our current clinical trial protocols (Fig. 1).

Results: We prospectively reconstructed TIL^{TP} TCRs to identify additional novel TCRs, with 35% of prospectively screened TCRs being neoantigen- or tumor-reactive. Including both previously known and newly predicted TCRs, TIL^{TP} demonstrated enrichment for neoantigen-reactivity in 4 of 5 patients, with a median of at least 26.8% of sequenced TIL^{TP} cells being neoantigen-reactive (range: 11.9 – 88.4%). TIL^{TP} TCR isolation demonstrated a high degree of correlation with single-cell transcriptomic approaches to identification of neoantigen-reactive TCRs, though TIL^{TP} TCRs represent a more cost-effective and widely available approach compared to those utilizing more advanced technologies. However, despite their substantial enrichment for neoantigen-reactive TCR clonotypes, the majority of TIL^{TP} populations failed to demonstrate neoantigen-reactivity following *in vitro* expansion and exhibited loss of neoantigen-reactive clones as well as functional impairment.

Conclusions: TIL^{TP} serve as a highly efficient and reliable source of tumor-reactive TCRs. While direct utilization of these TIL^{TP} as a source for cellular therapy presents significant challenges, sorting for TIL^{TP} offers a streamlined approach using readily available and affordable technology to identify neoantigen-reactive TCRs that may be used to design TCR engineered cellular immunotherapies.

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Abstract Title: Regional delivery of anti-PD-1 agent for colorectal liver metastases improves therapeutic index and anti-tumor activity

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Background: Checkpoint inhibitors (CPI) have transformed therapy for some solid tumors such as melanoma and non-small cell lung cancer. Metastatic liver tumors have presented challenges with the use of CPI, with only limited success. We speculate that systemic delivery (SD) of CPI results in insufficient intrahepatic activity, while patients experience immune-related adverse events (irAE). Herein, we test the hypothesis that regional delivery (RD) of CPI can improve delivery to the liver and minimize systemic exposure.

Results: Using MC38-hCEA-luc cells to generate colorectal cancer liver metastases (CRCLM), we confirmed that there were high levels of PD-L1 expression on the tumor cells and liver myeloid-derived suppressor cells (L-MDSC). *In vitro* suppression assay confirmed that CPI treatment improved the performance of anti-CD3/CD28 stimulated T cells in the presence of tumor, which was concentration dependent with or without L-MDSC. *In vivo,* the minimal efficacious dose via tail vein (TV) SD at PTD7 was 3.0 mg/kg compared to PBS control ($p = 0.01$), which was equivalent to a 10-fold lower dose given via RD using the portal vein (PV, 0.3 mg/kg, $p = 0.53$). This was corroborated by Western blot analysis of tumor lysates demonstrating significantly less PD-1 protein expression in the 3.0 mg/kg PV vs. 3.0 mg/kg TV cohorts ($p < 0.05$),

confirming increased PD-1inhibition via RD. Furthermore, we detected 6.7-fold lower circulating CPI antibody levels in the serum using the 0.3 mg/kg RD treatment compared to the 3.0 mg/kg SD cohort ($p < 0.001$) thereby decreasing systemic exposure without increasing liver toxicity.

Conclusion: RD of an anti-PD-1 CPI therapy for CRCLM may improve the therapeutic index by reducing the total dose required and limiting the systemic exposure that could lead to irAEs. These advantages could lead lower costs of treatment with CPI due to improved tolerability, increasing the potential uses of CPI for metastatic liver tumors.

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Abstract Title: The Effect of Socioeconomic Status: Patients in the Lowest Quartile of Income May Be Subject to Worse Outcomes Following Major Cardiac Surgery

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ABSTRACT

Objective: Racial disparities in cardiac surgery are well documented, but the role of socioeconomic status (SES), independent of race and other factors, remains to be fully explored. This study's purpose is to investigate the effect of low SES on patient outcomes following cardiac surgery.

Methods: Nationally-weighted data of adult patients undergoing coronary artery bypass grafting (CABG), surgical aortic valve replacement (SAVR), mitral valve repair (MVRR), or MV replacement (MVRT) were obtained from the 2010-2015 National Inpatient Sample. Patient and hospital characteristics, including charges, and outcomes of patients in the lowest quartile of income by zip code (low SESP) and highest (high SESP) were

compared, per procedure. Multivariable analysis was used to determine effects of SES on outcomes, primary being in-hospital mortality (death).

Results: Number of procedures in low v. high SESP: CABG (30,799 v. 23,645), SAVR (12,239 v. 15,159), MVRR (2,832 v. 3,846), MVRT (3,470 v. 3,185). Low SESP were generally younger, female, non-white, on Medicaid/Medicare, with more comorbidities. While Low SESP incurred lower hospital charges, they occupied rural hospitals at a higher percentage. Except in SAVR, low SESP more likely sought care in Southern hospitals. In CABG, SAVR, and MVRR, low SESP had higher rates of death and longer lengths of stay (LOS). Low SESP experienced more acute pulmonary failure, but less bleeding. When significant, low SESP more likely sustained acute kidney injury. [Figure 1] After risk adjustment, cardiac surgery in low SESP was associated with increased odds of death in CABG (adjusted odds ratio (aOR) 1.44 [1.21-1.72]), SAVR (aOR 1.54 [1.24-1.92]), and MVRT (aOR 1.68 [1.15-2.47]), with no difference in MVRR (aOR 1.17 [0.84-1.66]). For all procedures, higher odds of death were associated with increased age and more comorbidities, but not race.

Conclusion: Cardiac surgery outcomes in low SESP appear worse, with longer LOS, but charges are lower across the board. Low SESP's race was not predictive of mortality. These results suggest that a more nuanced understanding of the interplay between SES and outcomes may be needed to provide low SESP with optimal care.

Additional Abstracts 2022
Abstract submitted, but not presented

Chris Amro

i. A Comparison of Outcomes After Abdominoperineal Resection: A Retrospective Study of Primary vs. Flap Closure

Fernando D. Arias

i. Association or Coincidence? Acute Appendicitis Following Colonoscopy with Cecal Polypectomy
ii. Profiling Gingivoperiosteoplasty (GPP): A Cross-Sectional Analysis Using a Nationally Validated Pediatric Surgery Database

Anthony Azzolini

i. Evaluation of the Credibility and Credentials of Social Media Reconstructive Plastic Surgery Influencers on Twitter

Christopher G. Bargoud

i. Compliance of Prone Positioning in Non-Intubated COVID-19 Patients
ii. Tissue plasminogen activator concentration and its Effect on Blood Clot Composition, Mechanics, Structure, and Clinical Outcomes in Trauma
iii. Delayed presentation of a pneumatic nail gun injury to the right ventricle without circulatory compromise

Jigesh Baxi

i. Short-term and Intermediate Outcomes of Cardiogenic Shock and Cardiac Arrest Patients Supported by Venoarterial Extracorporeal Membrane Oxygenation

Louis F. Chai

i. Sterile dehiscence of bioprosthetic aortic valve with acute cardiogenic shock rescued with Valve-in-Valve TAVR
ii. Late presentation of atrial septal defect with anomalous pulmonary venous return resulting in Eisenmenger's Syndrome
iii. Activating chimeric receptor on IL-15 armored NK cells to improve in vitro and in vivo tumor response within the liver following regional delivery

Joshua C. Chao

i. Utilizing Frailty as a Part of a Combined Risk Scoring Model to Predict In-Hospital Mortality Following Coronary Artery Bypass Graft Surgery

Jennie K. Choe

i. NCT02962063: Evaluation of the immune microenvironment of esophageal adenocarcinoma following induction chemoradiotherapy with durvalumab
ii. Safety, efficacy, and tolerability of immune checkpoint inhibitors in the treatment of hepatocellular carcinoma
iii. Tumor and tumor-associated macrophage programmed death-ligand 1 expression is associated with adjuvant chemotherapy benefit in lung adenocarcinoma

Abhishek A. Desai

i. Artificially intelligent facial feature quantification after facial filler injection
ii. Breast flap neurotization after autologous free flap breast reconstruction: a prospective trial
iii. Characterizing morbidity and mortality after aesthetic abdominal surgery: a nationwide analysis
iv. Preoperative computed tomography morphological features associated with hernia formation
v. Text analysis and other hedonometrics: understanding the social media conversation about plastic surgery

Krish C. Dewan

i. Opioid Use Disorder Increases Readmissions After Cardiac Surgery: A Call to Action

Laurence P. Diggs

i. *Pneumatosis Intestinalis: To Treat or not to treat?*

John L. Dutton

i. *Creation of a simple, algorithmic Universal Identifier for Longitudinal Patient Tracking in a Cleft Lip and Palate Surgical NGO*
ii. *The Global Essential Surgery Project: Results of a Health System Strengthening Project in Rural Nicaragua to Increase Access and Capacity of Essential Surgery*
iii. *Perceptions of Surgery in Nicaragua: Key Insights for Community Engagement to Surgical Service Utilization*
iv. *Empowering Healthcare Leaders in LMICs: Lessons from a Leadership Development Series in Madagascar*

Olanrewaju Eletta

i. Development of imaging guided pancreas transplant anticoagulation protocol
ii. Utility Of Porcine Kidneys In Transplantation Model For Training General Surgery Residents

Omar Elfanagely

i. Evaluation of the Credibility and Credentials of Social Media Reconstructive Plastic Surgery Influencers on Twitter

Stephanie N. Gregory

i. *Malignant Peritoneal Mesothelioma Literature Review: Past, Present, and Future*
ii. *Review of Traumatic Duodenal Injuries: Etiology, Diagnosis, and Management*
iii. *Using an Ex-vivo Human Tumor Platform to Perform Dynamic Live Tumor Imaging*
iv. *Use of a Novel Ex Vivo Tumor Perfusion Model to Interrogate a TGF-B/PD-L1 Inhibitor*

Karan Grover

i. Delayed Gastric Leak Six Years After Sleeve Gastrectomy

Stephen A. Iacono

i. Delayed Cardiac Tamponade Following Gunshot Wound to the Chest
ii. *Applying to Surgical Residency in Wake of COVID-19: A survey of Fourth Year Medical Students in an Early COVID-19 Hot zone*
iii. *Resident Education and Operative Volume in the Time of COVID-19*

Sivaveera Kandasamy

i. Short-term and Intermediate Outcomes of Cardiogenic Shock and Cardiac Arrest Patients Supported by Venoarterial Extracorporeal Membrane Oxygenation

Susheian Kelly

i. HER2 Positive Mucinous Carcinoma of the Breast-A SEER Population Based Analysis

Marin Kheng

i. Changes in trauma epidemiology during the height of the Covid-19 pandemic in urban Guatemala

Hanna E. Labiner

i. *SIRT3 Deletion Increases inflammation and Mortality in Sepsis*
ii. *Social Vulnerability Subtheme Analysis Improves Perioperative Risk Stratification in Hepatopancreatic Surgery*

iii. *SIRT1 Deletion Increases Mortality in Sepsis*
iv. *Virtual Recruitment in Surgical Residency Programs*
v. *Impact of care fragmentation on the outcomes of patients receiving neoadjuvant and adjuvant therapy for pancreatic adenocarcinoma*
vi. *Longevity Pathways in Stress Resistance: Targeting NAD+ and Sirtuins to Treat the Pathophysiology of Hemorrhagic Shock*

Jenna Lee
i. *Recurrent Sigmoid Volvulus in a Female Marathon Runner*

Alexander J. Manzella
i. *COVID-19 Influence on Patients with Esophageal, Gastric, and Colorectal Malignancies: The Effect of Screening Disruption*
ii. *Did COVID-19 Disrupt Neoadjuvant Therapy or Surgery for Patients with Pancreatic and Hepatic Malignancies?*
iii. *Association of Medicaid Expansion of the Affordable Care Act with Access to Surgery for Benign Endocrine Surgical Disease*
iv. *The Impact of Surgical Boot Camp on Medical Students Regarding Confidence and Imposter Syndrome: Are they the same?*

Kelly A. McGovern
i. Advanced Directives in the Pediatric Surgery Population – Implications, Current Proceedings, and Future Directions

Priya B. Patel
i. Thoracic aortic aneurysm sac remodeling after TEVAR affects late outcomes after repair

Russel J. Pepe
i. Gut microbial shifts indicate melanoma presence and bacterial interactions in a murine model

Vijay Putatunda
i. Intrahepatic Cholangiocarcinoma: How Do Hepatectomy Outcomes Compare to Liver Metastases and Hepatocellular Carcinoma?

Amanda Radisic
i. AAST Multicenter Study: Does Angioembolization Improve Survival for Severe Hepatic Injuries?

Alexander Rossi
i. Association Between Hereditary Lobular Breast Cancer Due to CDH1 Variants and Gastric Cancer Risk

Michael T. Scott
i. Implementing a training program to improve feedback in a surgical residency

Brianna L. Slatnick
i. Trends in Surgical Patents Held by Surgeons from 1993 to 2018

Paul Truche
i. Global, regional, and national estimates of surgical volume for 189 countries from 2010 to 2019: A modelled longitudinal approach to the surgical volume world development indicator

Lindsay E. Volk

i. Timing of Mortality after Coronary Artery Bypass Grafting (CABG) Did Not Change with the Adoption of the STS 30-day Post-Procedure Mortality Hospital Performance Benchmark

David Walls

i. Development of imaging guided pancreas transplant anticoagulation protocol
ii. Utility Of Porcine Kidneys In Transplantation Model For Training General Surgery Residents

David J. You

i. Endoscopic Sleeve Gastroplasty Requiring Conversion to Partial Gastrectomy with Paraesophageal Hernia Repair

Abstract Title: A Comparison of Outcomes After Abdominoperineal Resection: A Retrospective Study of Primary vs. Flap Closure

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Background: Abdominoperineal resection (APR) result in large perineal defects, which often are fraught with wound healing complications. Perineal reconstruction via flaps has been utilized in an effort to mitigate these morbidities. However, the clinical efficacy in comparison to primary closure is limited in the literature. The authors therefore sought to compare outcomes and cost for patients undergoing APR with and without flap closure.

Hypothesis: We hypothesize that patients undergoing abdominoperitoneal resection with flap closure would derive no benefit in terms of postoperative complications relative to those patients who received primary closure.

Methods: A retrospective cohort study on all patients who underwent an abdominoperitoneal resection at our institution between March 2010 and November 2020 were identified. Patient demographics, clinical and operative characteristics, surgical outcomes, and cost data were analyzed using descriptive statistics, chi-square, and Krus-Wallis between patients who underwent primary closure (PC) vs. flap closure (FC).

Results: A total of 101 patients were identified (primary closure, n=71; flap closure, n=30). Median participant age and BMI were 68 ± 20 and 27.1 (± 5.9) kg/m^2. The majority of patients received neoadjuvant radiotherapy or chemotherapy (75.2%). Node positive disease was seen in 26.7% of the patients, with local invasion (T3 or T4) seen in 50.5%. Poorly differentiated tumors made up 13.9% of specimens. The FC cohort had longer operative times ($p<0.001$); and trended towards higher rates of dehiscence (10%), re- admission (26.7%), and reoperations (13.3%). No differences were seen with respect to clinicopathologic characteristics and cost ($p>0.05$) between the two cohorts.

Limitations: The limitations of this study include the nonrandomized and retrospective evaluation**.**

Conclusions: Patients with flap reconstruction displayed longer operative time, without a reduction in wound complication. These results are important when counseling patients for surgery.

Abstract Title: Association or Coincidence? Acute Appendicitis Following Colonoscopy with Cecal Polypectomy

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Introduction: Acute appendicitis is a common medical problem in the United States resulting in hospital admission with definitive care being appendectomy. Appendicitis immediately post-colonoscopy is a rare complication that has been reported in the past. Despite the increase in the usage of colonoscopy annually, the incidence of post colonoscopy appendicitis (PCA) remains rare[3,4].

Case Presentation: A 70-year-old female presented to the Emergency Department (ED) with a 36 hour history of right lower quadrant abdominal pain, nausea, and anorexia. ~48 hours prior she had undergone routine colonoscopy and esophagogastroduodenoscopy (EGD) without immediate complications. Surgical history was significant for C5-6 anterior cervical decompression and fusion (ACDF) and a L3-4/L4-5 laminectomy. Medical history was significant for transverse myelitis, hypertension, and hypothyroidism. At colonoscopy, there were 3 sessile polyps in the transverse colon, ascending colon, and cecum ranging from 1-3 mm, removed using jumbo cold forceps (Figure 1). Her labs upon presentation were significant for leukocytosis to 18,200 with 90.4% left shift and mild hypokalemia to 3.2. Lactate on admission was high-normal at 2.0. A computed tomography (CT) of the abdomen and pelvis confirmed the diagnosis of acute appendicitis without evidence of perforation or abscess (Figure 2). She was admitted, started on IV antibiotics, and taken to the operating room (OR) for laparoscopic appendectomy. Intraoperatively, the appendix was suppurative throughout and perforated at its mid-portion without evidence of abscess. The appendix was removed using an endoGIA stapler with healthy tissue extending onto the cecal base. Postop day 1, the patient was discharged home in stable condition. Pathology of the colonic polyps revealed fragments of tubular adenoma and pathology of the appendiceal specimen revealed acute gangrenous appendicitis with perforation.

Discussion/Conclusion: Despite the increase in the usage of colonoscopy annually, the incidence of post colonoscopy appendicitis (PCA) remains rare. To our knowledge, only 53 cases of acute appendicitis following colonoscopy have been reported in the literature, but it appears that in cases of cecal polypectomy near the base of the appendix, the risk for developing this rare complication is likely increased. As a general surgeon, it is exceedingly important to be aware of this rare entity and have a high index of suspicion particularly in patients who develop right lower quadrant abdominal pain within 24-48 hours following colonoscopy and those who have undergone polypectomy at the cecum near the appendiceal orifice. Communication with our gastroenterology colleagues can assist in timely diagnosis and treatment.

Abstract Title: Profiling Gingivoperiosteoplasty (GPP): A Cross-Sectional Analysis Using a Nationally Validated Pediatric Surgery Database

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Purpose: In experienced hands, GPP can: avoid secondary alveolar bone graft in over 50% of patients[1], close the nasolabial fistula[2], and prevent inferior descent of the premaxilla in patients with a bilateral cleft[3]. GPP can be an effective method of alveolar cleft repair in as high as 72% of patients[4], obviating the need for secondary bone grafting[5]. Currently, there are no large scale studies reporting on national trends and short term outcomes of GPP. In our study, we investigate national trends in GPP, demographics of children undergoing GPP, short term surgical outcomes, and operative time with addition of GPP when compared to cleft lip repair alone.

Materials & Methods: Retrospective cohort study of the ACS NSQIP-Pediatric database from 2014 to 2019. Patients between 2 months and 18 months of age undergoing any initial cleft lip repair, with or without GPP, were selected via relevant CPT® codes. Patient demographics, comorbidities, 30-day readmissions and post-operative complications are assessed.

Results: From 2014 to 2019, a total of 6,269 patients were identified, of which 6.67% underwent GPP (n = 418). Patients undergoing GPP were significantly older with an average age of 9 months compared to 5 months in the non-GPP group ($p < 0.001$). Co-morbidities were similar amongst both cohorts, although patients undergoing GPP were more likely to have a higher ASA class ($p = 0.006$), cardiac risk factors ($p = 0.012$) and syndromic diagnosis ($p < 0.001$). There were no differences in 30-day short term surgical outcomes. GPP was associated with increased operative time by ~25 minutes when compared to cleft lip repair alone ($p < 0.001$).

Conclusions: GPP was not associated with increased 30-day postoperative complications, readmission, reoperation, or total length of hospital stay, and was associated with an increased operative time of 25 minutes. Children undergoing GPP were significantly older in age and were more likely to have a higher ASA class/cardiac risk factors. There were no significant trends in utilization of GPP.

Abstract Title: Compliance of Prone Positioning in Non-Intubated COVID-19 Patients

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Background: Prone positioning in non-intubated patients with respiratory compromise has been shown to improve oxygenation in those with and without COVID-19, but compliance involving awake proning regimens remains unclear. Our aim was to determine the compliance of patients undergoing a nursing-driven proning protocol and outcomes related to it.

Design, Setting, and Participants: A single-center, observational, before-after, clinical study of 184 patients with a positive polymerase chain reaction (PCR) test for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), admitted to the same hospital ward within Rutgers Robert Wood Johnson University Hospital over a period of four weeks from April 20, 2020 to May 11, 2020, during the height of the pandemic.

Methods: Two weeks of control patients were compared with two subsequent weeks when a nursing-driven proning protocol was implemented. Proning vitals, duration, position, patient compliance, and outcomes were documented and obtained from the electronic medical record.

Results: There were 514 proning episodes in the 92-patient prone group over the 2-week period. Of these episodes, 74% adhered to the >2 hours per session and 47% adhered to the >2 sessions per day recommendations. More proning episodes occurred at shorter time intervals. Mean proning episodes per patient were 6.0 ± 6.1. Only 57% of these episodes were truly proned and 43% were in lateral decubitus position. Vital signs were unchanged with proning. There was no difference in ICU upgrade (21 patients vs. 22, p=0.427), ICU length of stay (3 days [IQR 3,7] vs. 7 [7,16], p=0.117), intubation requirement (14 patients vs 19, p=0.339), or in-hospital mortality (20 (21.7%) vs 16 (17.4%), p=0.460) between groups.

Conclusion: Prone positioning in non-intubated COVID-19 patients on a general ward is feasible, but compliance with true prone positioning and length of proning was poor. There was no improvement in oxygenation or outcomes in self-proning COVID-19 patients which we attributed to proning compliance challenges.

Abstract Title: Tissue plasminogen activator concentration and its Effect on Blood Clot Composition, Mechanics, Structure, and Clinical Outcomes in Trauma

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Objective: The specific mechanism(s) by which hemorrhage and concomitant acidosis and hypothermia result in trauma-induced coagulopathy (TIC) remain unresolved. Clot strength has been observed to decrease in patients with TIC. Elucidation of the mechanisms by which clot strength is impaired in TIC may inform novel approaches to hemostasis.

Design, Setting, and Participants
This is a prospective cohort study which is taking place at a Level 1 Trauma Center in Central New Jersey. Patients >18 years old who met criteria for the highest level of trauma activation were prospectively included in the study. Patients on systemic anticoagulation or antiplatelets were excluded. To date, 41 patients have been included, 28 patients have been excluded leaving 13 patients actively accrued in the study

Methods: Upon arrival to the trauma bay, a blood sample in a sodium citrate tube was drawn from each patient prior to receiving any treatment. Plasma was extracted from these samples and various biochemical and biomechanical tests were performed. These results were correlated with clinical data was extracted from the electronic medical record.

Results: The majority of patients sustained stab wounds followed by MVC, and pedestrian struck. Median ISS was 16 (25-75% IQR 8-32) for the cohort. Preliminary results suggest an association between higher injury severity score and decreased clot strength and density, as well as lower serum fibrinogen concentration.

Future Work: The next steps include accruing more patients and completing remaining tests, including tPA concentration. We plan to establish multi-center collaboration with NJMS for additional high acuity trauma patients. Final results may assist in future development of therapeutics based on the further understanding of TIC.

Abstract Title: Delayed presentation of a pneumatic nail gun injury to the right ventricle without circulatory compromise

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Abstract:

Delayed presentation of penetrating cardiac injuries is exceedingly rare due to the observed near 100% pre-hospital mortality. We describe a case of a patient who presented for evaluation nearly 24 hours after sustained a self-inflicted pneumatic nail gun injury to the right ventricular outflow tract. Remarkably, the patient had no evidence of hemodynamic compromise. This case highlights the importance of maintaining a high index of suspicion for cardiac injury with penetrating trauma to the cardiac box regardless of presenting signs and symptoms, and the value of adhering to advanced trauma life support principles.

Abstract Title: Sterile dehiscence of bioprosthetic aortic valve with acute cardiogenic shock rescued with Valve-in-Valve TAVR

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Background: Bioprosthetic aortic valve (BPAV) dysfunction is common and may be due to structural deterioration or infective endocarditis (IE). Depending on etiology, valve in valve TAVR (ViV-TAVR) may be an option for high-risk patients with symptomatic BPAV dysfunction.

Case: An 87-year-old male with prior BPAV presented in cardiogenic shock. Transesophageal echocardiogram (TEE) showed flailed BPAV leaflets with torrential regurgitation and a filamentous strand attached to a flailed leaflet. This raised the issue of potential IE. An erythrocyte sedimentation rate was normal and he underwent ViV-TAVR without complication and immediate clinical improvement.

Decision-making: Our decision to proceed with emergency ViV-TAVR was based on TEE and inflammatory mediator assessment. TEE is the preferred modality to evaluate BPAV dysfunction. The key decision was to differentiate between structural deterioration with failed prosthetic leaflets and superimposed fibrin strands or IE related leaflet destruction with vegetation, leaks or dehiscence. Structural BPAV failure can be managed with ViV-TAVR, but IE requires re-do surgical aortic valve replacement (SAVR). With negative inflammatory markers and the absence of clinical or radiographic findings, IE was less likely and the patient safely underwent ViV-TAVR.

Conclusion: The incidence of redo SAVR is rising however some patients are too frail for surgery. ViV-TAVR for acute BVAV dysfunction is a safe alternative once IE is excluded.

Abstract Title: Late presentation of atrial septal defect with anomalous pulmonary venous return resulting in Eisenmenger's Syndrome

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Background: Atrial septal defects (ASD) are the most common congenital heart diseases (CHD) in adults. Clinically apparent defects are detected early and managed based on severity. Advanced pulmonary hypertension (pHTN) is a contraindication to repair as it would hasten cardiopulmonary deterioration. These cases are rarely reported given the chronicity required to develop changes.

Case: A 69-year-old male presented with worsening dyspnea. Pre-operative echocardiography identified a large ASD with anomalous pulmonary venous return (APRV), resulting in surgical referral. Intraoperative transesophageal echocardiography (TEE) revealed significant pHTN and Eisenmenger's syndrome with fixed reversal of flow through the ASD, precluding repair (Figure). A pHTN specialist will manage the patient medically with potential referral for heart and lung transplant.

Decision-making: Our decision to operate was based on the symptomatic nature of his CHD. However, whether surgical repair depended on TEE findings. In finding complete reversal of flow and pHTN, we elected not to operate given the inevitable progression to right heart failure. The patient would be best served with medical management and prolonging the need for organ transplant.

Conclusion: ASDs are best treated when diagnosed early. Those that are found late are unique and require interdisciplinary management to limit morbidity and mortality. With the growing field of adult CHD, management of these rare cases will continue to be optimized.

Abstract Title: Activating chimeric receptor on IL-15 armored NK cells to improve *in vitro* and *in vivo* tumor response within the liver following regional delivery

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Background: Colorectal cancer liver metastases (CRCLM) are a major source of morbidity and mortality. Historically, curative therapy has been limited to surgical resection, but only a small fraction of patients are eligible. Cellular immunotherapy has shown promise in hematologic cancers, but challenges to solid tumor therapy remain, including lymphocyte trafficking, elevated interstitial fluid pressures, and immunosuppression. Regional intravascular infusion is a non-surgical, minimally invasive procedure commonly used in liver cancer to deliver therapeutics, which can be augmented by Pressure Enabled Drug Delivery (PEDD). We hypothesized that utilizing established regional delivery strategies to administer natural killer (NK) cells engineered to express a natural killer group 2, member D (NKG2D) activating chimeric receptor and membrane bound IL-15 (CAR NKG2D cells) could increase anti-tumor activity against liver cancer.

Methods: In vitro cytotoxicity of CAR NKG2D NK cells was determined in co-culture systems. CRCLM-bearing NSG mice were treated with either CAR NKG2D, non-transduced NK cells (NT-NK), or vehicle via portal vein (PV) for regional PEDD or tail vein (TV) for systemic delivery (SD). Tumor burden was measured via tumor bioluminescence. Mann-Whitney tests were performed for statistical comparisons. Correlation of NKG2D ligand expression in tissue and serum was measured by CODEX and Luminex.

Results: Multiple NKG2D ligands are highly expressed in hepatocellular and colorectal carcinoma cell lines (HCC and CRC respectively). As such, these cells lines are highly susceptible to NKG2D-mediated cytotoxicity. CAR NKG2D NK cells were 3- to 4-fold more potent *in vitro* than NT-NK cells against multiple HCC and CRC cell lines, including those bearing Ras pathway mutations. Using a mouse model of locoregional delivery under high pressure (10 mL/minute), we show that significant tumor reduction ($p < 0.05$) is only achieved when CAR NKG2D NK cells, but not vehicle or NT-NK cells, were delivered via PV and not via TV. Recovery of CAR NKG2D NK cells in hepatic tissues was on average 2-fold higher after administration via PV than that observed after TV delivery ($p = 0.0001$). PV delivery of NT-NK cells did not result in appreciable liver engraftment or tumor growth inhibition.

Conclusions: CAR NKG2D NK cells demonstrate enhanced *in vitro* and *in vivo* cytotoxicity against CRC and HCC cell lines. Significant tumor control using regional delivery in initial studies support continued clinical development. NKX101 is an investigational agent comprised of CAR NKG2D NK cells being evaluated in a phase 1 clinical study for treatment of relapsed/refractory acute myeloid leukemia or higher risk myelodysplastic syndrome. Studies are ongoing to understand NKX101 kinetics, role of delivery pressure, and activity in combination in preclinical models of CRCLM.

Abstract Title: Utilizing Frailty as a Part of a Combined Risk Scoring Model to Predict In-Hospital Mortality Following Coronary Artery Bypass Graft Surgery

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Purpose: The Society for Thoracic Surgeons (STS) Risk-Score is an accepted risk- estimation tool for 30-day mortality following coronary artery bypass grafting (CABG). Frailty has recently been highlighted as a predictor of in-hospital mortality. We hypothesized that a combined risk-index incorporating both STS and Frailty-scores will better predict in-hospital mortality after CABG.

Methods: Patients undergoing CABG at a large academic center, between April 2018 and December 2019 were studied. The Essential Frailty Toolset (EFT), a 5-point frailty assessment, was used to determine frailty status. The population was divided into frail (EFT: 3-5) versus non-frail (EFT: 0-2). Preoperative characteristics and perioperative outcomes were compared. In-hospital mortality was assessed in frail and non-frail patients stratified by STS risk-groups (Low <4%, Intermediate 4-8% and High >8%). Receiver Operating Characteristic (ROC) curves were used to compare the predictive capacity of either EFT or STS risk-scoring alone versus a combination of both regarding in-hospital mortality.

Results: A total of 740 patients were included in this study, 132 (17.8%) were frail and 608 (82.2%) were non-frail. Frail patients were older (70.5 [63.3-79.8] vs. 66.5 [58.0-73.0] years, $p<0.001$), with higher STS risk scores (2.48 [1.39-5.24] vs. 0.92 [0.53-1.69], $p<0.001$) and lower ejection fractions (50% [38-58] vs. 57% [45-64], $p<0.001$). In-hospital mortality was higher among all frail patients compared to all non-frail patients (3.82% vs 1.15%, $p=0.05$). Figure 1 depicts mortality rates among frail and non-frail patients, stratified by STS risk groups. On ROC curve analysis, a combination of frailty scores and STS risk groups better predicted in-hospital mortality (AUC= 0.780) than frailty score (AUC=0.754) or STS risk groups (AUC=0.711) alone.

Conclusion: Utilizing a combination of both EFT scores and STS risk scores better predicts in-hospital mortality than either scoring system alone. Including EFT scores in the commonly used STS risk calculator may improve risk prediction and provide improved guidance in operative decisions.

Abstract Title: NCT02962063: Evaluation of the immune microenvironment of esophageal adenocarcinoma following induction chemoradiotherapy with durvalumab

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Background: Immunotherapy in the adjuvant setting has been demonstrated to have survival benefit among patients with locally advanced esophageal cancer (CheckMate 577; Moehler M NEJM 2021). However, immunotherapy as neoadjuvant treatment has not yet been studied, and little is known regarding which patients may benefit. In a phase Ib/II study, we investigated the safety and efficacy of neoadjuvant durvalumab (a monoclonal antibody against programmed death ligand-1) in combination with PET-adjudicated chemoradiation for locally advanced esophageal adenocarcinoma. Approximately half of patients had near-complete (>99%) pathologic response.

Objectives:
- To evaluate the immune microenvironment of residual tumor following treatment with durvalumab and chemoradiation.
- To identify potential correlates of near-complete response by comparing the immune microenvironment of specimens that exhibited ≥90% vs. <90% pathologic response to treatment.

Patients and methods: Multiplex immunofluorescence staining was performed on resected esophageal adenocarcinoma specimens that exhibited ≥90% (n=16) or <90% pathologic response (n=8) to neoadjuvant treatment. High power fields (HPFs) that encompassed the entire fibroinflammatory region of residual tumor were selected and scanned. Using InForm software, an algorithm was developed to recognize and quantify the number of tumor cells (pancytokeratin+), helper T cells (CD4+), cytotoxic T cells (CD8+), and macrophages (CD68+/CD163+) in each HPF. PD-1+ T cells and PD-L1+ macrophages were quantified using separate algorithms.

Results: When ratios of median cell counts per HPF were compared, specimens that exhibited ≥90% pathologic response demonstrated increased ratio of tumor-infiltrating lymphocytes (TIL) to tumor-associated macrophages (TAM; 0.53 vs. 0.31; p=0.016). They also had lower proportions of PD-1+ CD8 T cells (0.0012 vs. 0.090; p=0.0086) and PD-1+ CD4 T cells (0.0082 vs. 0.042; p=0.082). The proportion of PD-L1+ macrophages was also low (0.0010 vs. 0.0039; p=0.19).

Conclusions: Following neoadjuvant treatment with durvalumab and chemoradiation, the immune microenvironment of specimens that exhibited ≥90% pathologic response was characterized by a) high TIL to TAM ratio, b) low proportion of PD-1+ CD8 T cells, c) trend toward low proportion of PD-1+ CD4 T cells, and d) trend toward low proportion of PD-L1+ macrophages.

Abstract Title: Safety, efficacy, and tolerability of immune checkpoint inhibitors in the treatment of hepatocellular carcinoma

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Abstract:

Hepatocellular carcinoma (HCC) is a major cause of mortality worldwide with an increasing incidence due to escalating rates of obesity and non-alcoholic fatty liver disease. Unfortunately, a majority of patients with HCC present with advanced disease. The immune checkpoint inhibitor atezolizumab, a PD-L1 inhibitor, in combination with bevacizumab, anti-VEGF, has become the new standard of care for patients with advanced HCC after demonstrating improved overall and progression free survival over sorafenib. In this review, we discuss the evolving role of immune checkpoint inhibitors in the treatment of HCC and their safety, efficacy, and tolerability.

Abstract Title: Tumor and tumor-associated macrophage programmed death-ligand 1 expression is associated with adjuvant chemotherapy benefit in lung adenocarcinoma

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Introduction: Patients with stage II to III lung adenocarcinomas are treated with adjuvant chemotherapy (ACT) to target the premetastatic niche that persists after curative-intent resection. We hypothesized that the premetastatic niche is a scion of resected lung tumor microenvironment and that analysis of tumor microenvironment can stratify survival benefit from ACT.

Methods: Using tumor and tumoral stroma from 475 treatment-naive patients with stage II to III lung adenocarcinomas, we constructed a tissue microarray and performed multiplex immunofluorescent staining for immune markers (programmed death-ligand 1 [PD-L1], tumor-associated macrophages [TAMs], and myeloid-derived suppressor cells) and derived myeloid-lymphoid ratio. The association between immune markers and survival was evaluated using Cox models adjusted for pathologic stage.

Results: Patients with high PD-L1 expression on TAMs or tumor cells in resected tumors had improved survival with ACT (TAMs: hazard ratio [HR] = 1.79, 95% confidence interval [CI]: 1.12-2.85; tumor cells: HR = 3.02, 95% CI: 1.69-5.40). Among patients with high PD-L1 expression on TAMs alone or TAMs and tumor cells, ACT survival benefit is pronounced with high myeloid-lymphoid ratio (TAMs: HR = 3.87, 95% CI: 1.79-8.37; TAMs and tumor cells: HR = 2.19, 95% CI: 1.02-4.71) or with high stromal myeloid-derived suppressor cell ratio (TAMs: HR = 2.53, 95% CI: 1.29-4.96; TAMs and tumor cells: HR = 3.21, 95% CI: 1.23-8.35). Patients with low or no PD-L1 expression on TAMs or tumor cells had no survival benefit from ACT.

Conclusions: Our observation that PD-L1 expression on TAMs or tumor cells is associated with improved survival with ACT provides rationale for prospective investigation and developing chemoimmunotherapy strategies for patients with lung adenocarcinoma.

Abstract Title: Artificially intelligent facial feature quantification after facial filler injection

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ABSTRACT

Purpose: Applications of Artificial Intelligence (AI) are becoming increasingly ubiquitous in surgery. Commercially available AI facial analysis systems can be used to assess aesthetic treatments such as facelift or facial feminization surgery. We hypothesize these algorithms may additionally be useful in the assessment of facial dermal filler injections. The purposes of this study are to determine how cosmetic filler injection impacts AI-estimated age, and to determine if this change correlates with patient-reported perception of aging.

Methods: Women aged 40-65 were recruited and injected with Restylane® dermal fillers in a standardized fashion. Patients were photographed using the Vectra® M3 3D Imaging device and administered the FACE-Q^{TM} quality-of-life questionnaire at five time-points: before injection, immediately post-intervention, 2-weeks, 4-weeks, and 12-weeks post-injection. Age estimation was performed using two commercially available AI algorithms: AWS Rekognition API and Azure Face API. *t*-tests were used for analysis of continuous variables.

Results: Fillers were administered to 69 women. Neither AWS nor Azure showed a statistically significant change in age estimation within 90 days following intervention (Figure 1). Patient-reported perception of aging also did not significantly change post-injection (Figure 1). At 90 days following injection, both AWS ($p = -0.65$) and Azure ($p = -0.39$) age estimations were correlated with the patient's perception of aging ($p<0.05$).

Conclusion: Treatment with facial fillers did not change AI-estimated age nor patient-reported perception of aging throughout the 90 days post-injection. Over the long-term, there is a correlation between AI-estimated age and patient-reported perception of aging. "Aging" may not be the most discerning metric to study facial filler outcomes, inviting future investigation. Plastic surgeons need to be aware of how commercially available AI algorithms analyze their treatments in order to interface with patients who can and will use this technology themselves.

Abstract Title: Breast flap neurotization after autologous free flap breast reconstruction: a prospective trial

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ABSTRACT

Purpose: Restoration of breast sensation is an important factor to consider following autologous breast reconstruction (ABR). Flap neurotization may result in improved sensation after ABR, but current literature regarding both patient-reported outcomes and quantitative sensation after neurotization is inadequate and heterogenous. We present a prospective trial investigating the long-term outcomes of flap neurotization regarding breast sensation.

Methods: 115 patients (n = 193 flaps) were prospectively evaluated for breast sensation and quality-of-life 1-5 years after ABR. This included 65 neurotized patients (n=113 neurotized breast flaps) and 50 non-neurotized patients (n=80 non-neurotized breast flaps). Evaluation consisted of the validated patient-reported questionnaire (BREAST-Q), a sensation-specific patient-reported questionnaire, and pressure-specified sensation testing at 9 locations on the breast using the AcroVal pressure-specified sensory device. Continuous variables were compared using independent *t*-tests. Categorical variables were compared using chi-squared analyses.

Results: Neurotized patients reported significantly higher levels of both psychological and sexual wellbeing as compared to non-neurotized patients ($0.02<p<0.04$). While there was a significant difference in quantitative sensation between neurotized and non-neurotized patients at only one of 9 testing sites at 1 year after ABR, this effect was more pronounced among patients evaluated 2-5 years after ABR: neurotized patients were significantly more sensate at 4 of 9 testing locations on the breast ($0.011<p<0.039$) within this group.

Conclusion: Breast sensation affects the daily lives of breast reconstruction patients and is an important long-term outcome to consider following ABR. Neurotization after ABR is associated with improved pressure-sensitive sensation as well as improved psychological and sexual wellbeing in the long-term, but neurotization alone does not appear to restore protective sensation.

Abstract Title: Characterizing morbidity and mortality after aesthetic abdominal surgery: a nationwide analysis

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ABSTRACT

Background: Abdominoplasty is among the most common aesthetic surgeries performed in the US and is increasing in popularity each year. The procedure, however, is thought to be associated with a relatively high complication rate, with reported mortality as high as one in 3,281 when combined with liposuction. We sought to combine nationwide administrative databases and assess modern rates of major morbidity and mortality after aesthetic abdominal surgery.

Methods: Adult patients (>15 years old) undergoing cosmetic abdominoplasty or panniculectomy were identified using State Ambulatory Surgery Databases from four states over 10 years (Florida ['07-'17], New York ['08-'16], Maryland ['14-'16], and Wisconsin ['14-'16]) using 1) ICD diagnosis codes for cosmetic surgery and 2) CPT procedure codes for cosmetic abdominoplasty or panniculectomy. Patients who underwent a significant concurrent procedure were excluded. Concurrent liposuction, filler injection, or umbilical hernia repair was permitted. The primary outcome was death or need for unplanned medical care within 90 days after surgery. Continuous variables were compared using *t*-tests and categorical variables were compared using chi-squared analyses.

Results: 6,139 patients met inclusion criteria. The average patient was 44 years old (IQR 37-52), female (93.48%), and Caucasian (54.89%). One patient (0.02%) died in the peri-operative period on post-operative day 2; cause of death was prescription opioid overdose, aspiration pneumonitis and subsequent cardiac arrest. 8.39% of patients (n = 515) required unplanned medical care within 90 days after abdominoplasty, of which 84.08% (n = 433) required a re-operation for management. The median cost per patient for this care was $6,845 (IQR $1,393-21,820). African American/Black and Hispanic patients were significantly more likely to require unplanned medical care as compared to Caucasian patients ($p = 0.013$). There was no significant difference in complication rates between patients who did and did not concurrently undergo liposuction.

Conclusion: Aesthetic abdominal surgery is associated with a low risk of morbidity and mortality, most of which can be managed in the outpatient setting. Abdominoplasty remains associated with a relatively high rate of VTE as compared to other outpatient aesthetic procedures, likely due to inadequate risk stratification. Concurrent liposuction at the time of abdominoplasty or panniculectomy is not associated with an increased risk of complications, including bleeding or VTE.

Abstract Title: Preoperative computed tomography morphological features associated with hernia formation

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ABSTRACT

Objective: To investigate key morphometric features identifiable on routine preoperative computed tomography (CT) imaging indicative of incisional hernia (IH) formation following abdominal surgery.

Summary of Background Data: IH is a pervasive surgical disease that impacts all surgical disciplines operating in the abdominopelvic region and affecting 13% of patients undergoing abdominal surgery. Despite the significant costs and disability associated with IH, there is an incomplete understanding of the pathophysiology of hernia.

Methods: A cohort of patients (n=21,501) that underwent colorectal surgery was identified, and clinical data and demographics were extracted, with a primary outcome of IH. Two datasets of case-control matched pairs were created for feature measurement, classification, and testing. Morphometric linear and volumetric measurements were extracted as features from anonymized preoperative abdominopelvic CT scans. Multivariate Pearson testing was performed to assess correlations among features. Each feature's ability to discriminate between classes was evaluated using two-sided paired t-testing. A support vector machine was implemented to determine the predictive accuracy of the features individually and in combination.

Results: 212 patients were analyzed (106 matched pairs). Of 117 features measured, 21 features were capable of discriminating between IH and non-IH patients. These features are categorized into three key pathophysiologic domains: 1) structural widening of the rectus complex, 2) increased visceral volume, 3) atrophy of abdominopelvic skeletal muscle. Individual prediction accuracy ranged from 0.69-0.78 for the top 3 features among 117.

Conclusions: Three morphometric domains identifiable on routine preoperative CT imaging were associated with hernia: widening of the rectus complex, increased visceral volume, and body wall skeletal muscle atrophy. This work highlights an innovative pathophysiologic mechanism for IH formation hallmarked by increased intra-abdominal pressure and compromise of the rectus complex and abdominopelvic skeletal musculature.

Abstract Title: Text analysis and other hedonometrics: understanding the social media conversation about plastic surgery

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ABSTRACT

PURPOSE: Social media platforms continue to host the majority of public Internet discourse regarding plastic surgery. We sought to establish methods to systematically capture and study social media posts
across all relevant platforms and explore a variety of methods to hedonometrically evaluate available data.

METHODS: The Twitter Academic Research API was queried for all available tweets relating to "facelift surgery" since the founding of Twitter in March 2006 until March 2022. CrowdTangle software was used to query for all publicly available Facebook and Instagram posts relating to "facelift surgery" between September 2008/July 2012 respectively and March 2022. Generalizable regular-expression based methods were developed to control for intentional search optimization by users and identify truly relevant posts. A normalized user-response-based sentiment value was derived for Facebook posts. Quantitative sentiment analysis was performed using the Quantitative Discourse Analysis Package (QDAP). Bigram correlations were performed to identify relationships between words and provide context for tokenized sentiment analysis.

RESULTS: A total of 88,027 tweets, 55,269 Facebook posts, and 37,319 Instagram posts relating to "facelift surgery" were identified. While the majority of posts were initially made to Twitter until late 2019, the majority of posts are now on Facebook and Instagram. QDAP-based quantitative sentiment analysis demonstrated no statistically significant change in sentiment over time for any platform despite bigram augmentation, though Facebook and Instagram posts were assessed to be more positive than Twitter posts overall ($p < 0.01$). Normalized user-response-based sentiment of Facebook posts has continuously increased since the introduction of the user response feature.

CONCLUSION: The emergence of large-scale data acquisition tools and robust text analysis packages enables the plastic surgery community to deeply analyze the public conversation about procedures offered by plastic surgeons and other cosmetic medical providers. Dictionary-based sentiment analysis reveals the differing underlying purposes these social media platforms server for their users. Analysis using foundation models may provide deeper contextual understanding and improve sentiment analysis about plastic surgery and its outcomes.

Abstract Title: Opioid Use Disorder Increases Readmissions After Cardiac Surgery: A Call to Action

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Background: Due to the opioid epidemic, more cardiac surgery patients present with opioid use disorder (OUD). A better understanding of national readmissions among these patients is necessary to improve outcomes and optimize resource utilization. We sought to examine the effect of OUD on readmission after cardiac surgery.

Methods: Of 555,394 cardiac surgery patients from 2016-2017 in the Nationwide Readmissions Database, 6,082 (1.1%) presented with OUD. These patients were analyzed at 30, 90, and 180 days post-discharge. OUD and non-OUD patients were propensity-score matched for patientand procedure-level characteristics. Kaplan-Meier curves were compared using the log- rank test.

Results: First-time readmissions were significantly higher among those with OUD (30-day 19.7% vs 15.7%, p=0.04; 90-day 31.8% vs 24.2%, p<0.0001; 180-day 42.3% vs 30.6%, p<0.0001). There was a trend toward higher reoperation by 180 days with 90% of these being isolated valve surgery. By 180-days, significantly more OUD patients had 3+ readmissions (7.8% vs 4.5%) compared to non-OUD patients. Yet, only 2.4% of OUD patients received any counseling or treatment for substance abuse during the index admission. The most common readmitting diagnosis was infection (55% vs 41%; p<0.0001) including endocarditis, prosthetic infections, and skin/subcutaneous infections. Respiratory failure, opioid overdose, and acute pain were also more common among those with OUD.

Conclusions: Cardiac surgery patients with OUD are subject to multiple readmissions but are rarely provided adequate addiction management during their index admission. Greater emphasis on multidisciplinary management is necessary to limit costs and morbidity associated with readmission/reoperation

Abstract Title: Pneumatosis Intestinalis: To Treat or not to treat?

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Abstract:

Pneumatosis intestinalis (PI) is an uncommon but clinically significant finding that is defined as the presence of gas within the bowel wall often detected on radiographic imaging. The presence of PI does not reflect one single underlying pathology, but a gamut ranging from intestinal ischemia to benign causes. Thus, treatment strategies lie along a spectrum from observation with or without medical management, to operative intervention. We present a case of incidentally identified extensive PI seen on preoperative radiographic imaging in a 91-year-old male with altered mental status admitted for emergent meningioma resection. Vital signs and physical examination were unremarkable while laboratory studies revealed a leukocytosis. Exploratory laparoscopy revealed extensive benign PI attributed to corticosteroid therapy for intra-cranial hypertension secondary to the meningioma. The patient subsequently underwent successful meningioma resection without any gastrointestinal sequelae. This case highlights the role of minimally invasive surgery in evaluating uncertain cases of extensive PI.

Abstract Title: Creation of a simple, algorithmic Universal Identifier for Longitudinal Patient Tracking in a Cleft Lip and Palate Surgical NGO

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Introduction: Surgical non-governmental organizations (s-NGOs) have historically focused on service delivery to underserved populations through short-term surgical programs (STSPs). Traditionally, local health systems have lacked the ability to provide on-going services after STSPs and the technology to easily enable longitudinal patient tracking in low resource environments has not been available. Operation Smile, a cleft lip and palate s-NGO, has prioritized efforts to increase local capacity to sustainably provide on-going healthcare needs of patients that require life-long services, such as patients with cleft lip and/or palate (CLP). This created a need for a patient tracking solution.

Purpose:
- Create a unique identifier (UID) for all patients receiving services from Operation Smile
- Create the UID using information that patients can easily recall, to allow straightforward access of past data
- Test and validate UID creation and implementation during STSPs

Methods: Evaluation of our UID algorithm was performed on a retrospective database of 33,174 patients with CLP from 30 countries screened during STSPs between January 2010 to December 2020. Numerical and character combinations of patient identifiers were assessed for percentage of overlap. Overlap was defined as having an identical UID for two or more different patients. We defined a successful UID as one that attained an overlap percentage of <2% within the database. During STSP field testing, each UID was converted to a QR code and placed on all patient charts. QR codes are then recognized through Optical Mark Recognition (OMR) software, thus allowing all patient specific data to be collected, recognized, and appropriately stored on a HIPAA compliant cloud database (Power BI, Microsoft 2021).

Results: The final UID consisted of a patient's gender (m/f), DOB (number format: ddmmyy), country of birth (first 3 letters) and the first 2 letters of their forename and surname. This combination of characters achieved an overlap of 0.02% (7/33,174). All collected patient data was visualized through the patient database with individual countries able to additionally visualize country level statistics from each patient cohort during their surgical programs.

Conclusion: Our UID algorithm is one solution for longitudinal patient tracking that was successfully modeled and is currently in use globally for Operation Smile. Additionally, our integrated system, with the UID functioning as a foundational component, allows for automated generation of country level, patient population insights to improve the quality of care we deliver to our patients around the world.

Abstract Title: The Global Essential Surgery Project: Results of a Health System Strengthening Project in Rural Nicaragua to Increase Access and Capacity of Essential Surgery

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Introduction: From 2017 to 2021, Operation Smile and the UBS Optimus Foundation partnered with the Nicaragua Ministry of Health to develop and implement the Global Essential Surgery project. A 4-S Health Care Delivery Framework (Staff, Stuff, Space and Systems) identified areas for surgical system engagement in a resource constrained Northeast Atlantic Region of Nicaragua. Implemented activities aimed to improve the region's capacity to provide quality, surgical care for its surrounding communities.

Methods: System focus areas included community outreach/education, hospital based/surgical infrastructure upgrades, equipment, supplies availability and clinical provider education/exchanges. System level data was collected via standardized tools that included hospital assessments, patient surveys, provider surveys, and monthly surgical reports from each hospital within the region. Additional Key Performance Indicators were collected to monitor overall program impact (Figure 1).

Results: From 2017-2021, regional surgical volume increased from 2,725/100k to 4,224/100k population. Pediatric surgical volume increased from 1.4% to 9.2% of total annual operative output. From 2019-2021, the Safe Surgical Checklist was performed in >94% of total operative cases, leading to a 16% reduction in post-operative complications. Provider satisfaction improved by 4.8% and patient satisfaction ended at >98%.

Conclusion: The Global Essential Surgery project provides a roadmap and shows how cost-effective, targeted investments and interventions can yield high impact results, especially in remote and underserved settings. This should encourage health policy leaders to invest in similar programs as part of their national health strategies to achieve the goals proposed by the Lancet Commission in Global Surgery, ahead of their 2030 target.

Abstract Title: Perceptions of Surgery in Nicaragua: Key Insights for Community Engagement to Surgical Service Utilization

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Intro: Government-run hospitals often serve as the final point of care for surgical services in LMICs. Additional levels of care, such as health posts, farther upstream may offer valuable insights into how the public interacts with and perceives surgical services within the health system. Operation Smile, an international nonprofit organization engaging in surgical cleft lip and/or palate (CLP) care, is conducting research to assess factors that may prevent individuals or specific patient populations, such as patients with CLP, from seeking definitive surgical treatment.

Aims:
- Assess qualitative and quantitative information regarding demographic, structural and behavioral barriers to surgical care
- Assess the perception of surgery across 3 municipalities in a single region of Nicaragua

Methods: Operation Smile team members distributed and performed 1,132 surveys and interviews within the Siuna (382), Bonanza (372), and Rosita (378) municipalities of the Las Minas region of Nicaragua. Survey data was analyzed to determine how associations between level of first interaction (e.g., health post, hospital) may affect an individual's perception of surgery.

Results: The 3 municipalities were statistically different in age distribution, geographical distribution (urban vs. rural), and education level ($p < 0.05$). Individuals who reported previously presenting to a health post were significantly more likely to report a positive perception of surgery compared to those who had not visited a health post (OR=1.4, p=0.02). This finding remained significant after adjustment for education, age, geographical distribution, and municipality. In comparison, having previously visited a hospital had no significant effect on perception of surgery.

Conclusion: This is the first documented, large-scale analysis of how the first level of healthcare exposure may significantly impact an individual's perception of surgery. This data can and has provided insight for targeted community level engagement at lower levels of the health system for the purpose of increasing community awareness and confidence in surgical services available for patients with CLP.

Abstract Title: Empowering Healthcare Leaders in LMICs: Lessons from a Leadership Development Series in Madagascar

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Introduction: As investment in surgical healthcare in low and middle-income countries (LMICs) increases, local clinical leaders, namely surgeons, are expected to successfully manage growing teams – oftentimes even without formal leadership or system-based practice training. The World Children's Initiative, in collaboration with Operation Smile and Centre Hospitalier de Reference Regionale (CHRR) in Madagascar, created the Leadership Development Series (LDS) to address this often-overlooked capacity building training gap.

Methods: LDS was composed of 7 sessions, delivered to 14 participants via hybrid virtual (zoom) and in-person training at CHRR between February and August 2021. Individual session feedback was collected via an anonymous 9 question likert-scale survey. Overall course impact was evaluated via the EvaluLEAD method with a 103 likert-scale and qualitative question survey focused on individual experiences at the individual, team/organization, and community levels.

Results: 8 (57%) of participants were female and 6 (43%) were male. 10/14 (71%) of participants were Chief/Major of their respective clinical services, and 2 were surgeons. According to evaluations, LDS provided most impact per participant at the personal level (2.84/4), compared to the organization level (2.03/4) and community level (1.11/4). Upon conclusion of LDS, participants implemented 5 new hospital-based QI projects, 4 participants added new leadership roles, and 8 were actively applying course takeaways within their clinical teams.

Conclusion: LDS proved that through a combination of local and international partnership and the hybrid education model, a diverse group of hospital leaders at a regional hospital in Madagascar could acquire valuable skills necessary to lead both within their teams and within their hospitals.

Abstract Title: Development of imaging guided pancreas transplant anticoagulation protocol

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Background: Early graft loss most often occurs due to venous or arterial thrombosis. While many centers routinely anticoagulate, practice patterns vary. Early splenic vein thrombus is more common than once thought yet it does not always correlate with graft loss. We hypothesized this may represent one of the earliest identifiable events in the development of graft thrombosis and our anticoagulation pathway is based on this finding.

Methods: Our protocol was applied to consecutive simultaneous kidney and pancreas transplants (SPKT) from 01/2019 to 07/2021. The trigger to anticoagulate was based on a splenic vein thrombus >50% length or any portal/arterial thrombus (Figure 1). Indication U/S was performed if there was any clinical change. To remove interobserver variation the ultrasounds were verified by a single, senior interventional radiologist. Data are presented as medians with standard deviations.

Results: 24 SPKT were enrolled over the study period. Donors were all deceased donors aged-28.5±10.8, KDPI- 22±2 and BMI-26.5±4.3. Recipients were aged45.9±11.6, BMI-26.1±3.7 and 54.2%(13/24) were type 1 diabetics. Average cold ischemia time was 11.9±3.5 hours. Baseline thromboelastography was available in 54.2%(13/24) and average coagulation index (a mathematically derived assessment of coagulability using R time, K time, alpha angle and maximal amplitude) was always hypocoagulable at -9.84±7.1. Although 17%(4/24) had thrombotic events (including one arterial thrombosis) there were no graft losses due to thrombosis (Figure 2). Two patients required washouts for hematoma evacuation, but there were no interventions for thrombectomy.

Abstract Title: Utility Of Porcine Kidneys In Transplantation Model For Training General Surgery Residents

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Introduction: We sought to increase the opportunities for general surgery residents to hone their vascular anastomosis skills. Accordingly, we created a kidney transplant model using porcine kidneys to simulate the anastomotic experience during their renal transplant rotation.

Methods: Porcine kidneys were procured en-bloc with the vena cava and abdominal aorta. These were dissected preserving the hilar structures and aorta. A model was set up using boxes to mimic operating in the iliac fossa. The aorta and a Penrose drain were used as recipient arteries and veins respectively to which the renal vessels were anastomosed. General surgery residents participated in the simulation; filling out pre and post-simulation surveys to elicit comfort levels with the procedure on a scale from 0 (not comfortable) to 100 (very comfortable) as well as perceived usefulness as a tool to improve resident training in renal transplantation. PGY 1 and 2 participants were classified as junior, others as senior residents and an attending transplant surgeon proctored the session.

Results: The pre-simulation survey had 22 respondents at varying levels of training,19 of whom completed the post-simulation survey. 100% of respondents (19 of 19) found the model useful for training, learning to assist, and learning steps of renal transplantation. Juniors compared to seniors started with a lower comfort level at creating (8 vs 59 P = 0.017) and assisting anastomosis (40 vs 75 P= 0.049). Following the simulation, comfort levels for Junior residents significantly improved with performing the vascular anastomosis (8 vs 44 p= 0.014). Both seniors and juniors trended towards an increased comfort level assisting post-simulation. (Table 1)

Conclusions: We demonstrated that surgery residents at varying levels of training regarded the use of porcine tissue for renovascular anastomosis simulation as a useful tool. Performing the simulation early on in training may help prepare residents for their vascular or transplant experience.

Abstract Title: Evaluation of the Credibility and Credentials of Social Media Reconstructive Plastic Surgery Influencers on Twitter

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Background: The distribution of medical content on social media platforms is steadily increasing. Social media influencers possess large audiences and are frequently viewed as authority; however, their credibility is often unchecked. We aimed to analyze and compare the most and least influential accounts on Twitter within the field of reconstructive plastic surgery.

Methods: Twitter influence scores for accounts associated with reconstructive plastic surgery were collected using Cronycle software. The accounts associated with the top and bottom quartile accounts were linked to individual names, and crossed-checked for advanced degrees, specialty, occupation, practice setting, location, practice type, gender, race, h-index, number of publications, number of citations, NIH funding, industry funding, fellowship, years on Twitter, and faculty position.

Results: A total 107 Twitter users were identified. Of those, the top (n=26) and bottom (n=24) quartile were included in the study. Overall, the majority were US based (80%) male (60%) private practice (54%) surgeons (82%). Organizations made up 18% of all influencers. Median *h*-index was 15. Compared to the bottom cohort, top influencers were statistically significantly ($p<0.05$) more likely to have an advanced degree and work in an academic setting. There were no statistical differences between cohorts regarding gender, occupation, location, race, years on Twitter, fellowship training, faculty position, *h*-index, industry funding, and NIH funding. All physician influencers were board certified.

Conclusion: Multiple distinguishing characteristics exist between the most and least influential reconstructive plastic surgery Twitter accounts. Individuals in the top quartile of influence on Twitter trended towards higher metrics of academic success, but only differed statistically based on faculty position and presence of advanced degree. As social media continues to expand as a source of information for patients, this study provides some reassurance to the quality and merit of content disseminated by influencers of Twitter on reconstructive plastic surgery.

Abstract Title: Malignant Peritoneal Mesothelioma Literature Review: Past, Present, and Future

Authors:
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Andrew M. Blakely

Background and Objective: Malignant peritoneal mesothelioma (MPM) is an insidious neoplasm that arises from the mesothelial lining of the abdominal cavity. Historically, outcomes of MPM were dismal, as MPM is relatively resistant to cytotoxic chemotherapy. However, with advances in technology and improved understanding of tumor pathophysiology, treatments for MPM have produced encouraging 5-year survival. The standard of care for patients with resectable disease remains cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (CRS-HIPEC). Patients with inoperable MPM can be offered several systemic treatments, including chemotherapy, immune checkpoint inhibitors, or investigational treatments. Our objective is to provide an overview of our current knowledge concerning MPM and latest advances in treatment.

Methods: Narrative overview of the literature published in English from database origin until January 31, 2022 relating to MPM was searched in PubMed database, Google Scholar, and ClinicalTrials.gov.

Key Content and Findings: CRS-HIPEC has offered improved survival for surgical candidates, however outcomes for inoperable MPM remains dismal. With advancements in technology and better understanding of underlying MPM biology, new treatment approaches are arising and imperative.

Conclusions: MPM is a rare and lethal disease of the peritoneum. CRS-HIPEC remains the standard of care for resectable disease. In 2022, several clinical trials are available for patients with MPM offering future advances in therapy and further understanding of this rare disease process.

Abstract Title: Review of Traumatic Duodenal Injuries: Etiology, Diagnosis, and Management

Authors:
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Abstract:

Traumatic duodenal injuries are rare and often challenging to diagnose and treat. Management of these injuries remains controversial and continues to evolve. Here, we performed a review of the literature and guidelines for the diagnosis and management of traumatic duodenal injuries.A common recommendation in more recent literature is primary, tension-free repair of duodenal injuries when possible if surgical repair is necessary. Conversely, if duodenal injuries are unamenable to primary repair, more complex procedures such as Roux-en-Y duodenojejunostomy or pancreaticoduodenectomy may be necessary. Regardless of injury grade or type of surgical repair, the literature continues to support wide extraluminal drainage. Over time, the management of complex duodenal injuries has evolved to favor simple primary repair whenever possible. According to recent studies, more complex procedures are associated with higher rates of post-operative complications and should be reserved for severe injuries when primary repair is not possible.

Abstract Title: Using an Ex-vivo Human Tumor Platform to Perform Dynamic Live Tumor Imaging

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Introduction: The ability to accurately predict how a patient's tumor will respond to therapy will allow for the optimization of truly personalized cancer care. To this end, our lab produced a novel translational platform, the SMART System (Surgically-resected Mesothelium ContAining UnalteRed Tumor Microenvironment) that faithfully recapitulates tumor biology by preserving the innate structure, cell-cell interactions, and normal human physiology to mirror in vivo biology, albeit in an ex vivo environment amenable to detailed interrogation including advanced imaging techniques and live imaging, in particular.

Methods: A clinically indicated diagnostic laparoscopy is performed and tumor-bearing peritoneum is procured from the patient. Tissue is affixed to specialized 3D-printed platforms and maintained in the SMART system. The system accommodates the application of drug(s) in the perfusate and subsequent interrogations by live cell imaging. A customized 3D-printed imaging adaptor, made from autoclavable photopolymer resin and mounted on a microscope stage incubator, is used to perform imaging.

Results: Prolonged live cell imaging on tumor-bearing peritoneum for up to twelve hours is performed on patients with gastric cancer peritoneal carcinomatosis and mesothelioma. Fluorophore-conjugated anti-CD44 and anti-CD45 antibodies are used to highlight tumor cells and immune cells respectively. Using astage incubator and optimized gas mixer for O2 and CO2 delivery, we demonstrate good tissuepreservation and stable immune cell mobility for up to twelve hours. Tumor-infiltrating immune cells are tracked over time and both immune cell mobility and immune-tumor cell ratio are quantified prior to and post IL-2 administration. IL-2 stimulation in our system leads to enhanced immune cell mobility which is quantified using an image analysis software.

Conclusions: We developed an ex-vivo human perfusion system that allows us to perform dynamic prolonged live cell imaging on various tumor samples.

Abstract Title: Use of a Novel *Ex Vivo* Tumor Perfusion Model to Interrogate a TGF-B/PD-L1 Inhibitor

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Abstract: The majority of culture models (e.g. patient-derived xenografts and 2D cell culture) provide a simplified system in which to study biological mechanisms and drug efficacy. Unfortunately, over 90% of drugs with efficacy *in vitro* fail in clinical trials, likely due to the lack of extracellular matrix or stromal cell components in existing *in vitro* culture models. In order to maintain the complexity of live human tissue, the SMART system (Surgically-resected Mesothelium contAining unalteRed Tumor microenvironment) was created. After surgical resection, tumor-bearing peritoneum is tied onto platforms, which are subsequently placed into an *ex-vivo* circuit for 48 hours of perfusion with the patient's own plasma. Drugs are easily added to the system to observe tissue response to the drug. One such drug is M7824, currently in clinical trials for a variety of solid tumors like pancreatic and colorectal. M7824 is a first-in-class bifunctional PD-L1 inhibitor and TGF-β trap, which results in activation of CD8+ T cells and natural killer cells as well as a decrease in inflammatory markers, including TGF-β. M7824 was given to three patients in a clinical setting and their tissue was subsequently tested in the SMART system. One patient responded clinically and further demonstrated increased immune activation and decreased inflammation in the SMART system compared to non-responders. This highlights the translational 'triage' capacity of the SMART system; if patient peritoneum in the SMART system shows increased immune activation and decreased inflammation consistent with the M7824 mechanism, the patient is a contender to receive M7824 in clinic

Abstract Title: Delayed Gastric Leak Six Years After Sleeve Gastrectomy

Authors:
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Background / Introduction: Laparoscopic sleeve gastrectomy (LSG) has been widely accepted as an effective surgical treatment for morbid obesity and comorbidities resolution. The restrictive narrowing through stapled excision of the greater curvature of the stomach combined with the metabolic alterations to the ghrelin pathway are thought to be the primary mechanisms driving weight loss. Staple line gastric leaks (GL), understood to be one of the most serious and dangerous complications of LSG, has on incidence rate reported as high as 7.3%. A "late" presenting GL has been defined as 10 or more days after the index operation.

Objective / Methods: This case report details the clinical presentation of a 45-year-old woman who developed a staple line leak six years after a sleeve gastrectomy and evaluates similar case reports. Keywords used to identify eligible case reports including "sleeve gastrectomy, gastric leak, staple line leak, late, delayed" were inputted into the Pubmed database. Two investigators systematically reviewed results and selected articles describing the patients who had the sleeve gastrectomy for obesity surgery and presented with a gastric leak at least 1 year after their operation.

Results: The patient was initially presented as a 39-year-old female smoker, BMI 43, with a history of hypertension for a laparoscopic sleeve gastrectomy. She was discharged after an uncomplicated postoperative course. Six years post-LSG, the patient presented with left upper quadrant abdominal pain, nausea, leukocytosis (WBC 11.5 × 10^9/L), anemia (Hb 11 g/dL, Hct 33.9%), and elevated CRP (17.71 mg/L). A CT scan with oral contrast confirmed a gastric leak at the proximal portion of the staple line. She was treated with bowel rest, long-term TPN, and antibiotics. Two other case reports described delayed gastric leaks. Both patients had a BMI >40 and had achieved a BMI of <30 after obesity surgery. One patient presented 16 months after a band to sleeve, while the second presented 18 months after a primary sleeve gastrectomy. We surmise that delayed leaks occur because of a distal obstructive process which causes dilation and ischemic necrosis of the mechanically weakest portion of the staple line: the GE junction.

Conclusion: Delayed gastric leak (greater than 1 year) from sleeve gastrectomy is a rarely reported complication. This case report, in which we describe a patient who presented 6 years after a sleeve gastrectomy with a gastric leak, underscores the necessity of long term follow up in patients undergoing obesity surgery.

Abstract Title: Delayed Cardiac Tamponade Following Gunshot Wound to the Chest

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Abstract:

Penetrating injuries are most recognized for the direct tissue damage which is typically evident on physical examination. Secondary injuries resulting from kinetic energy transfer in the case of gunshot wounds, often referred to as “blast injuries”, may affect tissues distant to the primary ballistic trajectory and are often occult. We present a case of delayed cardiac tamponade resulting from secondary blast injury from a gunshot wound. The patient sustained a thoraco-abdominal gunshot wound with entry adjacent to the cardiac box. An Advanced Trauma Life Support (ATLS) guided assessment revealed intra-abdominal injuries necessitating operative intervention without evidence of cardiac injury. On post-operative day four, the patient developed chest pain, tachycardia, and shortness of breath. Imaging revealed a large pericardial effusion with cardiac tamponade. Emergent exploration revealed hemopericardium secondary to a bleeding epicardial hematoma without evidence of pericardial violation. Clinicians must maintain a high clinical suspicion for occult, indirect blast injuries which may be life-threatening.

Abstract Title: Applying to Surgical Residency in Wake of COVID-19: A survey of Fourth Year Medical Students in an Early COVID-19 Hot zone

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Objective: The COVID 19 pandemic halted third- and fourth-year student participation in clinical activities. Senior medical students rely on clinical exposure for education and career planning. The suspension of clinical duties inhibited student ability to complete other activities essential for application to surgical residency. We surveyed the fourth-year medical students at our institution to better understand the effects of the COVID-19 pandemic on their applications to surgical residency.

Design: We created a 27-question surgery using the Likert scale to evaluate the effects of the COVID-19 pandemic on fourth year students' applications to residency. This survey was administered to all fourth-year medical students at two affiliated medical schools in NJ. Following electronic consent, results were de-identified and analyzed.

Results: A total of 330 eligible medical students were identified with 126 respondents (38.5% response). 57 (45%) students indicated interest in pursuing a career in surgery prior to COVID 19 pandemic. Twelve students (9.5%) of students were currently applying to general surgery residency and 20 students (16%) to surgical subspecialty. The majority of respondents were able to complete their mandatory surgery clerkship prior to halting of clinical activities (78%, n=98). Survey results show 41% (n=51) of respondents felt their education was disrupted and 53% (n=65) felt the pandemic affected their operative experience. The majority of respondents also felt that the pandemic negatively impacted their ability to work with mentors (59%, n=74), emotional (66%, n=83) and physical (54%, n=68) wellbeing. Ability to perform research and receive letters of recommendation were less strongly impacted. Twelve students (10%) reported they changed their application decision as a result of COVID 19 pandemic.

Conclusion: The COVID-19 pandemic significantly disrupted the clinical experiences and application process of fourth year medical students applying to surgical specialties. These effects were exacerbated by the loss of elective rotations, away rotations, and disruptions to the application and interview process. Despite these effects, the pandemic had little effect on student decision to apply to surgical field.

Abstract Title: Resident Education and Operative Volume in the Time of COVID-19

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Introduction: The Coronavirus Disease 2019 (COVID-19) pandemic had an irrevocable impact on surgical education. Elective cases halted during the height of the pandemic lead to decreased resident case volume. This study aimed to investigate the impact of COVID-19 on resident operative case volume compared to prior years and discuss the potential impact on surgical education.

Methods: A retrospective review of all OR cases and general surgery resident case logs at a large tertiary care center between March and June 2020 were reviewed and compared to the same dates in 2018 and 2019. Resident case logs for academic years of 2018, 2019, and 2020 were also reviewed. Statistical analysis was done using analysis of variance (ANOVA) at a significance level of $p=0.05$.

Results: There was significant difference in case volume between years observed in almost all surgical specialties. There were significantly different cases logged per resident ($p<0.05$) in Postgraduate Year (PGY)-2 49.5 vs 61.4 vs 15.5), PGY-3 (47.5 vs 52.0 vs 18.2), and PGY-5 (51.5 vs 47.5 vs 18.2) during the initial months of the pandemic. There was no significant in case volume for academic year for PGY-5(251.3 vs 261.7 vs 266.2; $p=0.88$), PGY-4 (275.8 vs 247.2 vs 225.9; $p=0.32$), PGY-3 (208.3 vs 243.2 vs 215.3; $p=0.67$), or PGY-1 (119.6 vs 129.7 vs 130; $p=0.67$).

Conclusion: The COVID-19 pandemic had a significant decrease on operative experience during the initial surge. The overall effect on resident case volume, however, was not significant for most surgical residents, including graduating seniors.

Abstract Title: Short-term and Intermediate Outcomes of Cardiogenic Shock and Cardiac Arrest Patients Supported by Venoarterial Extracorporeal Membrane Oxygenation

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Background: Cardiogenic shock and cardiac arrest are life-threatening emergencies with high mortality rates. Veno-arterial extracorporeal membrane oxygenation (VA ECMO) and extracorporeal cardiopulmonary resuscitation (e-CPR) provide viable options for life sustaining measures when medical therapy fails. The purpose of this study is to determine the utilization and outcomes of VA ECMO and eCPR in patients that require emergent cardiac support at a single academic center.

Methods: A retrospective chart review of prospectively collected data was performed at an academic institution from January 1st, 2018 to June 30th, 2020. All consecutive patients who required VA ECMO were evaluated based on whether they underwent traditional VA ECMO or eCPR. The study variables include demographic data, duration on ECMO, length of stay, complications, and survival to discharge.

Results: A total of 90 patients were placed on VA ECMO for cardiac support with 44.4% (40) of these patients undergoing eCPR secondary to cardiac arrest and emergent placement on ECMO. A majority of the patients were male (n=64, 71.1%) and the mean age was 58.8 ± 15.8 years. 44.4% of patients were transferred from outside hospitals for a higher level of care and 37.8% of patients required another primary therapy such as an Impella or IABP. The most common complication experienced by patients was bleeding (n=41, 45.6%), which occurred less often in eCPR (n=29, 58% vs. n=12, 30%). Other complications included infections (n=11, 12.2%), limb ischemia (n=13, 14.4%), acute kidney injury (n=17, 18.9%), and cerebral vascular accident (n=4, 4.4%). The length of stay was longer for patients on VA ECMO (32.1±40.7 days vs. 17.7±18.2 days). Mean time on ECMO was 8.1±8.3 days. Survival to discharge was higher in VA ECMO patients (n=23, 46% vs. n=8, 20%).

Conclusion: VA ECMO provided an effective rescue therapy in patients in acute cardiogenic shock with a survival greater than the expected ELSO guidelines of 40%. While the survival of eCPR was lower than expected, this may reflect the severity of patient's condition and emphasizes the importance of careful patient selection and planning.

Abstract Title: HER2 Positive Mucinous Carcinoma of the Breast-A SEER Population Based Analysis

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Background: Pure mucinous carcinoma of the breast is a rare tumor type representing 2-4% of invasive breast cancers and has a favorable prognosis relative to invasive ductal carcinoma. This tumor type most often presents in postmenopausal women with high rates of ER, PR positivity and HER2 negativity. There is a subtype of this tumor that is HER2+ and is suspected to have worse prognosis in terms of aggressive clinical and histological features such as axillary lymph node metastasis, higher TNM staging and higher rates of Ki 67 expression. Currently, the National Comprehensive Cancer Network (NCCN) lacks specific guidelines for management of this rare variant. We aim to clearly define the incidence of HER2 positivity among mucinous breast carcinoma using a large national dataset and hope to gain insight on the necessity of establishing a standard of care for this tumor type.

Methods: emale patients with mucinous breast carcinoma between 2010-2018 were selected from the Surveillance, Epidemiology, and End Results (SEER) database. The covariates analyzed were age, race/ethnicity, tumor grade, depth of invasion (T), regional lymph node (N), distant metastasis (M), ER, PR, HER2 receptor status and survival. Descriptive statistics were used to describe the incidence of HER2 positivity among the population of mucinous breast cancers. Kaplan Meier survival analysis was used to define the prognostic significance of HER2 receptor status.

Results: A total of 11,141 female patients with mucinous breast carcinoma were selected. Most patients were between ages 55-75 years with mean age of 65 years (SD 13.6). In terms of race/ethnicity, 63.9% where non-Hispanic White, 12.7% non-Hispanic Black, 10.9% of Hispanic origin and 12.5% of other race. The majority of subjects were ER/PR positive (95%/88%) while only 5% of subjects were HER2 receptor positive. As expected, most tumors were well and moderately differentiated (53% and 34%), low T stage (T1 63%, T2 26%), without lymph node involvement (N0 87%) and without metastasis (M0 97%). HER2 receptor positivity was significantly associated with TNM stage, Grade and overall survival ($p<0.05$). Kaplan Meier survival analysis demonstrated a statistically significant survival benefit with HER2+ stratified by grade and TNM stage.

Conclusion: Our study demonstrated that HER2 receptor positivity was a predictor of better survival compared to ER/PR positive, HER2- mucinous breast cancers. The triple negative mucinous carcinomas had the worst outcomes as expected. Further studies that include treatment data may be needed to explore if the survival advantage of HER2 positivity could be related to the use of anti-HER2 hormonal therapy such as Herceptin (Trastuzumab).

Abstract Title: Changes in trauma epidemiology during the height of the Covid-19 pandemic in urban Guatemala.

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Introduction: Guatemala, classified as a middle income country (MIC) by the World Bank, has one of the highest rates of trauma-related deaths in the world. The first case of Covid-19 infection in the country was diagnosed on March 13, 2020, and as infection rates continued to rise, the Guatemalan government instituted a series of lockdowns over the subsequent six months that coincided with the peak period of new infections nationally. The objective of this preliminary analysis was to characterize the impact of the Covid-19 pandemic on urban trauma patient demographics, injury characteristics, prehospital and surgical resource utilization, and in-hospital outcomes.

Methods: The data for this retrospective, descriptive, single-center study was collected from the Injury Support Initiative for Trauma (INSIGHT) database, a prospectively collected trauma registry for Hospital Roosevelt Guatemala, one of two quaternary care centers in Guatemala City and the main referral trauma center for the country. Trauma admissions data from a six-month "pre-Covid" period (October 2019 to March 2020) was compared to data collected during the peak of the Covid pandemic in Guatemala (April 2021 to October 2021). Categorical data was compared using Chi-squared and Fisher's Exact test, as appropriate, and continuous data was compared using t-test or Wilcoxon rank-sum test, as appropriate. All cases documented in the registry during these two time periods were included in the analysis. Statistical significance was defined as a two-tailed p value 0.05. Statistical analyses were performed in IBM SPSS Statistics v28.0.1.1 (14).

Results: Trauma admissions decreased by 42.3% from the pre-Covid period (n=478) to the Covid period (n=276); correspondingly, the 30-day admissions rate decreased from 86.4 cases to 45.2 cases. Patient demographics, however, remained stable: young males constituted the largest group of trauma patients during both periods (male = 84.1% pre-Covid, 87.0% Covid; mean age 33.4 years, SD 15.58 pre-Covid, 35.12 years, SD 15.87 Covid). Mechanism of injury trends changed in three areas: gunshot wounds increased from 16.3% to 23.6% and falls increased from 10.1% to 17.1% of total cases, while assaults decreased from 3.8% to 0.7% of cases ($p=0.002$). The Covid lockdown period also saw an increase in the proportion of patients transported via hospital ambulance (from 12.1% to 19.6%) as the proportion of patients transported via municipal fire department vehicles decreased (from 34.5% to 22.8%) ($p<0.001$).

The proportion of patients who underwent surgical intervention, most commonly exploratory laparotomy, increased from 38.3% pre-Covid to 65.6% during Covid ($p<0.001$). Intraoperative mortality remained stable (1.3% pre-Covid, 1.4% during Covid). ICU admissions also saw a significant increase during Covid (from 11.3% to 23.9% of admissions, $p<0.001$). Although a greater proportion of patients were discharged home (35.1% pre-Covid, 50% during Covid), the in-hospital mortality rate did not show a statistically significant change (11.5% to 14.5%, $p=0.42$).

Conclusions: Trauma volumes decreased significantly as Covid-19 infection caseloads grew in Guatemala. While young adult males continued to constitute the majority of the trauma patient population, the peak Covid period during 2021 saw changes in trauma patterns that may have reflected new social distancing mandates and nationwide lockdowns. Although trauma patients during this period were higher acuity, requiring more frequent surgical intervention and ICU care, in-hospital mortality rates remained at their pre-pandemic levels.

Abstract Title: SIRT3 Deletion Increases Inflammation and Mortality in Sepsis

Authors:
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Introduction: Sirtuin 3 (SIRT3) is a member of the sirtuin family of NAD-dependent deacetylases. SIRT3 is located in the mitochondria and can confer resistance to cellular stress in aging, metabolic disease, and cancer by inhibiting oxidative stress. We hypothesized that SIRT3 mitigates the septic response by promoting mitochondrial function and reducing inflammation.

Methods: 12-week-old male C57BL/6J mice and constitutive SIRT3 KO (S3KO) mice underwent cecal ligation and puncture (CLP) or sham surgery. For in vitro studies, bone marrow derived macrophages (BMDMs) were harvested from S3KO and WT mice, and treated with LPS. Intracellular mRNA expression was quantified using RT-PCR. Serum IL6 protein expression was quantified using ELISA. Mitochondria were isolated from renal and hepatic tissues and complex-specific activity was determined by high-resolution respirometry with Oroboros Oxygraph-2k. BUN, AST, and ALT levels were measured from serum. Mouse survival was observed for up to 5 days.

Results: Renal and hepatic *Sirt3* mRNA levels decreased from baseline 0.87±0.17 fold and 0.32±0.09 fold respectively within the first 18 hours after CLP. Peak IL6 levels after CLP were greater in S3KO mice compared to WT (169.5 ng/mL vs 84.0 ng/mL, p=0.03). In LPS treated BMDMs, IL6 mRNA levels peaked earlier in S3KO cells than WT (4 hrs vs 8 hrs). There was no difference in hepatic or renal mitochondrial complex I-IV activity at 36 hours or 5 days after CLP in S3KO vs WT mice. SIRT3 deletion did not affect BUN (22.4 mg/dL vs 18.1 mg/dL, p=0.54), AST (783.8 U/L vs 714.4 U/L, p=0.61), or ALT (323.6 U/L vs 316.0 U/L, p=0.91) levels at 36 hours after CLP, but S3KO mice did have a trend towards increased AST (1246.2 U/L vs 468.7 U/L, p=0.28) and ALT (342 U/L vs 126.9 U/L, p=0.39) compared to WT mice at 5 days post-CLP. Median survival was shorter in S3KO compared to WT mice (102 hrs vs not reached), and 5-day survival trended lower in S3KO mice (50% vs 65%, p=0.092) (***Figure 1***).

Conclusions: SIRT3 may play a key role in the septic inflammatory response. Following a septic insult, tissue *Sirt3* mRNA expression acutely decreases which may promote the early hyper-inflammatory response observed in sepsis. Accordingly, SIRT3 deletion results in a robust IL6 response, exacerbated organ dysfunction, and earlier mortality. Unlike previous studies, however, we did not find SIRT3 deletion induced changes in mitochondrial activity in late-stage sepsis. Our data suggests SIRT3 is a promising therapeutic target in sepsis.

Abstract Title: Social Vulnerability Subtheme Analysis Improves Perioperative Risk Stratification in Hepatopancreatic Surgery

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Background: There has been increased interest in understanding how social determinants of health (SDH) may affect care both in the medical and surgical setting. We sought to define the impact of various aspects of social vulnerability on the ability of patients to achieve a "textbook outcome" (TO) following hepatopancreatic surgery.

Methods: Medicare beneficiaries who underwent hepatopancreatic resection between 2013 and 2017 were identified using the Medicare database. Social vulnerability was defined using the Centers for Disease Control Social Vulnerability Index (SVI), which is comprised of four subthemes: socioeconomic (SE), household composition and disability (HCD), minority status and language (MSL), and housing type and transportation (HTT). TO was defined as the composite endpoint: absence of 90-day mortality or readmission, absence of an extended length of stay (LOS), and no complications during the index admission. Cluster analysis was used to identify vulnerability cohorts, and multivariable logistic regression was utilized to assess the impact of these SVI subthemes on the likelihood to achieve a textbook outcome.

Results: Among 37,707 Medicare beneficiaries, 64.9% (n = 24,462) of patients underwent pancreatic resection while 35.1% (n = 13,245) underwent hepatic resection. Median patient age was 72 years (IQR: 68-77), just over one-half were male (51.9%; n = 19,558), and the median CCI was 3 (IQR: 2-8). Cluster analysis revealed five distinct SVI profiles with wide variability in the distribution of SVI subthemes, ranging from 15 (profile 1 IQR: 7-26) to 83 (profile 5 IQR: 66-93). The five profiles were grouped into 3 categories based on median composite SVI: "low vulnerability" (profile 1), "average vulnerability" (profiles 2 and 3), or "high vulnerability" (profiles 4 and 5). The rate of TO ranged from 44.6% in profile 5 (n = 4022) to 49.2% in profile 1 (n = 4836). Multivariable analyses comparing patients categorized into the two average SVI profiles revealed that despite having similar composite SVI scores, the risk of adverse postoperative outcomes was not similar. Specifically, patients from profile 5 had lower odds of achieving a TO (OR 0.89, 95%CI: 0.83-0.95) and higher odds of 90-day mortality (OR 1.29, 95%CI: 1.15-1.44) versus patients in profile 4.

Conclusion: Distinct profiles of SVI subtheme characteristics were independently associated with postoperative outcomes among Medicare beneficiaries undergoing HP surgery, even among patients with similar overall composite SVI scores.

Abstract Title: SIRT1 Deletion Increases Mortality in Sepsis

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Objectives: Sepsis is a hyperinflammatory response to infection that leads to multiorgan failure and eventually death. Often, this multiorgan failure is heralded by renal dysfunction. Sirtuin 1 (SIRT1) promotes resistance to cellular stress by inhibiting inflammation and promoting mitochondrial function. We hypothesize that SIRT1 plays an important role in mediating inflammatory response and organ failure in sepsis, predominantly via expression in myeloid cells.

Methods: We performed CLP on C57BL/6J, whole body SIRT1 KO (S1KO), and myeloid cell specific SIRT1 KO (S1LysM) mice. Serum IL6 was quantified by ELISA. Renal mitochondrial complex activity was measured using Oroboros Oxygraph-2k. BUN was measured from serum. Mouse survival was observed for up to 5 days.

Results: Following CLP, S1KO mice had decreased renal mitochondrial complex I (259.5 vs 409.5 mmolO2/mg/min, p=0.013) and II (906.3 vs 1153, p=0.027)-dependent respiratory capacity, as well as reduced rates of fatty acid oxidation (180.4 vs 301.5, p=0.022). S1KO mice also had increased BUN (40.8mg/dL vs. 15.9mg/dL, p=0.049). IL6 levels were elevated in S1KO mice (84.0ng/mL vs 60.7ng/mL, p=0.028) and S1KO-LysMCre mice (35.5ng/mL vs 23.1ng/mL, p=0.033) compared to controls 12 hours after surgery. 5d survival in S1KO (33.3% vs 83.3%, p=0.025) and S1KO-LysMCre (60% vs 100%, p=0.049) mice was decreased compared to controls.

Conclusions: SIRT1 deletion increases systemic inflammation in sepsis. Renal mitochondrial dysfunction, kidney injury, and mortality following CLP were also exacerbated by SIRT1 deletion. Similar effects on inflammation and survival are seen following myeloid-specific SIRT1 deletion, indicating myeloid cell SIRT1 expression may be a predominant factor in the systemic effects of SIRT1 in sepsis.

Abstract Title: Virtual Recruitment in Surgical Residency Programs

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Purpose of Review: The Covid-19 pandemic forced residency programs to drastically change their interview processes and adopt virtual interviewing for the 2020-2021 match cycle. While virtual interviewing decreased cost and increased convenience for applicants and programs involved in the match, it also introduced several potential challenges and disadvantages. In this review we explore strategies for overcoming these challenges to help programs make the most of future virtual interviews.

Recent Findings: Two major challenges arising from the change to virtual interviews were newly introduced technical challenges, and changes in the number of programs applied to per applicant. Technological challenges with virtual interviewing can be minimized by ensuring participants are given appropriate training on how to use the platform ahead of time. Many programs found that using breakout rooms and keeping a strict schedule were essential to improving conversation flow and interviewee experience during interview days. During this interview season, applicants applied to an increased number of programs, likely due to decreased costs of applications. While this did not appear to impact surgical programs' match rates or decrease the match rates of MD or DO applicants, it may have negatively impacted match rates for IMG applicants.

Summary: In this review, we examine the benefits and disadvantages of virtual interviewing, review recommendations from the current literature on how to improve the process, and discuss what we learned from our own experience at an academic general surgery residency program over the course of this unprecedented interview season.

Abstract Title: Impact of care fragmentation on the outcomes of patients receiving neoadjuvant and adjuvant therapy for pancreatic adenocarcinoma

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Introduction: Neoadjuvant therapy (NT) is increasingly used for localized pancreatic ductal adenocarcinoma (PDAC). The impact of care fragmentation during NT on the outcomes of patients with PDAC is unknown.

Methods: Adult patients with Stage I-III PDAC who received NT and patients who underwent surgery first followed by adjuvant therapy (AT) between 2004 and 2016 were queried from the National Cancer Database. Short- and long-term outcomes were compared between patients who received fragmented care (FC; care provided at >1 hospital) versus integrated care (IC; care at a single institution).

Results: Among 6522 patients who underwent NT before pancreatectomy, 3755 (57.6%) received FC and 2767 (42.4%) received IC. While patients who received FC had a longer time to initiation of treatment (33.2 vs. 29.7 days, $p < 0.001$), there was no difference in median overall survival (OS) (26.7 vs. 26.5 months, $p = 0.6$). Among patients who underwent upfront surgery followed by AT (n = 15 291), patients who received FC had a longer time from diagnosis to undergoing surgery but less time from surgery to AT and no difference in OS (24.0 vs. 24.0 months, $p = 0.910$).

Conclusion: Although care fragmentation was associated with slightly longer times to initiate and complete treatment among patients with localized PDAC, long-term survival outcomes were similar.

Abstract Title: Longevity Pathways in Stress Resistance: Targeting NAD+ and Sirtuins to Treat the Pathophysiology of Hemorrhagic Shock

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Abstract:

Stress resistance correlates with longevity and this pattern has been exploited to help identify genes that can influence lifespan. Reciprocally, genes and pharmacological agents that have been studied primarily in the context of longevity may be an untapped resource for treating acute stresses. Here we summarize the evidence that targeting SIRT1, studied primarily in the context of longevity, can improve outcomes in hemorrhagic shock and resuscitation. Hemorrhagic shock is a potentially fatal condition that occurs when blood loss is so severe that tissues no longer receive adequate oxygen. While stabilizing the blood pressure and reperfusing tissues are necessary, re-introducing oxygen to ischemic tissues generates a burst of reactive oxygen species that can cause secondary tissue damage. Reactive oxygen species not only exacerbate the inflammatory cascade, they can directly damage mitochondria, leading to bioenergetic failure in the affected tissues. Treatment with the polyphenol resveratrol and with nicotinamide adenine dinucleotide (NAD) precursors have both shown promise in rodent models of hemorrhagic shock and resuscitation. Although a number of different mechanisms may be at play in each case, a common theme is that resveratrol and NAD both enhance the activity of SIRT1. Moreover, many of the physiologic improvements observed with resveratrol and NAD precursors are consistent with modulation of known SIRT1 targets. Because smaller blood vessels and limited blood volume make mice more difficult hemorrhagic shock models than rats, there is a paucity of direct genetic evidence testing the role of SIRT1 in hemorrhagic shock. However, the development of more robust methods in mice as well as genetic modifications in rats should allow the study of SIRT1 transgenic and KO rodents in the near future. The potential therapeutic effect of SIRT1 in hemorrhagic shock may serve as an important example supporting the value of considering "longevity" pathways in the mitigation of acute stresses.

Abstract Title: Recurrent Sigmoid Volvulus in a Female Marathon Runner

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Abstract:

Colonic volvulus is the third most common cause of colonic obstruction worldwide and typically occurs in either the cecum or sigmoid colon[1,2,3,4]. Known risk factors include advanced age, chronic constipation, and high fiber diet; well-described etiologies include narrow mesenteric bases, intestinal redundancy, and embryological developmental failures[1,2]. Management of sigmoid volvulus typically entails endoscopic decompression followed by definitive surgical resection. We present a case of recurrent sigmoid volvulus induced by extensive running in a young, healthy female patient.

A 55-year-old female with no significant history presented with one day of intermittent severe abdominal pain while training for a marathon, and associated obstipation and anorexia. She had one similar episode after running that spontaneously resolved. Imaging revealed gaseous colonic distention and mesenteric swirling in the left lower quadrant, consistent with a sigmoid volvulus. The patient was discharged after successful endoscopic detorsion with follow up plans for elective sigmoidectomy. She presented again four days later with identical complaints after running, was diagnosed with recurrent sigmoid volvulus and had successful endoscopic decompression. Given the multiple episodes in a short time span, she underwent an open sigmoidectomy with anastomosis. She was then discharged after an unremarkable post-operative course and was without complaints on follow-up.

Running-induced volvulus is rarely described in the literature and existing reports only describe cecal volvuli[5,6]. Volvulus in athletes can potentially be explained by the loss of fat in the bowel mesentery leading to increased mobility. Clinical suspicion must be high in patients who have rigorous exercise regimens as delays in diagnosis and treatment risk bowel compromise or perforation. Surgical resection is ultimately recommended, as the recurrence rate is high with non-operative management. We present this unique case of recurrent sigmoid volvulus secondary to exercise that should be considered with the appropriate clinical history.

Abstracts Title: COVID-19 Influence on Patients with Esophageal, Gastric, and Colorectal Malignancies: The Effect of Screening Disruption

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Objective: Screening endoscopy is critical for detection of esophageal, gastric, and colorectal malignancies. The COVID-19 pandemic disrupted routine medical care, including the cancer screening process, likely affecting the downstream delivery of gastrointestinal (GI) oncologic therapy. The aim of this analysis is to determine if GI oncologic operations and associated neoadjuvant therapy (NAT) recovered to pre-COVID levels after the first 18 months of the pandemic.

Methods: Major GI oncologic operations reliant on endoscopy for diagnosis included esophageal, gastric, colon and rectal malignancies. The national Vizient Clinical Database was queried for 18 months before (October 2018 – March 2020) and 18 months during (April 2020 – September 2021) the COVID-19 pandemic. Case volumes with and without NAT were compared before and during the pandemic. Analyses were performed with QI Macros Control Charts.

Results: Over 36 months, 41,431 patients underwent surgery for esophageal (N=499, 1.2%), gastric (N=4,109, 9.9%), colon (N=31,774, 76.7%) and rectal (N=5,049, 12.2%) malignancies. The monthly operative volumes for esophageal (A), gastric (B), colon (C) and rectal (D) malignancies decreased significantly during COVID-19 (Figure), and none recovered to pre-COVID levels by September 2021. Patients receiving NAT prior to rectal cancer operations also decreased during the pandemic (-16.6%, $p<0.01$).

Conclusions: Operative volume for esophageal, gastric, colon and rectal malignancies, which require endoscopy for diagnosis, decreased during the COVID-19 pandemic. Neoadjuvant therapy for rectal cancer also was impeded. The volume of these operations as well as NAT for rectal cancer had not recovered to pre-pandemic levels by September 2021.

Abstract Title: Did COVID-19 Disrupt Neoadjuvant Therapy or Surgery for Patients with Pancreatic and Hepatic Malignancies?

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Objective: The initial phase of the COVID-19 pandemic paused elective operations and disrupted outpatient systemic therapy regimens. The pandemic's impact on neoadjuvant therapy (NAT) and major hepatopancreatobiliary (HPB) oncologic operations is unknown. The aims of this analysis were to determine whether the national volume of NAT treatments and major HPB oncologic operations have been influenced by the COVID-19 pandemic.

Methods: The Vizient Clinical Database was queried for national data from 97% of academic medical centers and over 100 oncologic hospitals for 18 months before (October 2018 – March 2020) and 18 months during (April 2020 – September 2021) the COVID-19 pandemic. Patients undergoing major operations for pancreatic, primary hepatic, and secondary hepatic (colorectal metastases) malignancies were included. Case volumes with and without NAT were compared before and during the pandemic using QI Macros Control Charts.

Results: Over 36 months, 24,302 patients underwent surgery for pancreatic (N=13,472, 55.4%), primary hepatic (N=8,358, 34.4%), and secondary hepatic (N=2,472, 10.2%) malignancies. Pre-existing trends with increasing NAT for pancreatic malignancies continued during the pandemic (Figure A). The monthly volumes of pancreatic and secondary hepatic malignancy operations were not affected by the pandemic (Figures B and C). The monthly volume of hepatic operations for primary hepatic malignancies decreased for only four months (Figure D).

Conclusions: During the first 18 months of COVID-19, trends of increasing neoadjuvant therapy for pancreatic cancer continued despite the pandemic. Operative volume for pancreatic and secondary hepatic (colorectal metastases) malignancies were not affected while the volume of operations for primary hepatic malignancies was only transiently reduced.

Abstract Title: Association of Medicaid Expansion of the Affordable Care Act with Access to Surgery for Benign Endocrine Surgical Disease.

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Background: The Affordable Care Act's Medicaid Expansion (ME) increased insurance coverage in participating states. Prior work showed that ME was associated with increased Medicaid patients undergoing thyroid cancer surgery, but the impact of ME on patients with benign endocrine disease remains unclear.

Methods: The Vizient National Database was queried for Inpatient and Outpatient benign thyroid, parathyroid, and adrenal operations from 2011-2017. The data was then categorized by ME status in January 2014. States that expanded before or after January 1, 2014 were excluded. Descriptive statistics and difference-in-differences (DD) analyses were performed to analyze the association of ME with insurance status at time of surgery, adjusted (Adj) by age, sex, race, comorbidities, and state and year fixed effects. Adjusted odds of undergoing thyroid, parathyroid, or adrenal surgery were performed via logistic regression.

Results: 137,655 patients were analyzed. Patients in expansion states (ES) were younger and more likely to be non-white compared to non-expansion states (NES) (both $p<0.001$). ME was associated with an increase in Medicaid coverage for those undergoing benign thyroid (Adj DD: 6.28%[95% CI: 5.17%-7.40%] $p<0.001$), parathyroid (Adj DD: 4.27%[CI: 3.13%-5.41%] $p<0.001$), and adrenal operations (Adj DD: 5.38%[CI: 2.62%-8.26%] $p<0.001$) in ES compared to NES. There was an associated decrease in the proportion of uninsured patients undergoing thyroid (Adj DD: -3.92%[CI: -4.64%- -3.20%] $p<0.001$) and parathyroid operations (Adj DD: -1.53%[CI: -2.07%- -0.99%] $p<0.001$) and in privately insured patients undergoing thyroid (Adj DD: -2.60%[CI: -4.00%- -1.21%] $p<0.001$) and adrenal operations (Adj DD: -4.04%[CI: -7.66% - -0.41%] $p=0.029$). Medicaid patients had increased odds of undergoing thyroid surgery (OR 1.49[CI: 1.42-1.56] $p<0.001$~~) (OR 1.66[CI: 1.56-1.78] p<0.001)~~ and decreased odds of undergoing parathyroid (OR 0.71[CI: 0.68-0.75; $p<0.001$]) or adrenal surgery (OR 0.70[CI: 0.64-0.76; $p<0.001$]) compared to privately insured patients, even after ME.

Conclusion: Medicaid Expansion was associated with an increase in Medicaid coverage for surgical patients with benign endocrine disease in expansion states. There was an associated decrease in privately insured patients undergoing thyroid and adrenal surgery and uninsured patients undergoing thyroid and parathyroid surgery. Medicaid patients remained at decreased odds of undergoing parathyroid and adrenal operations, which may indicate under diagnosis in this population.

Abstract Title: The Impact of Surgical Boot Camp on Medical Students Regarding Confidence and Imposter Syndrome: Are they the same?

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Introduction: Transitioning from medical student to surgical intern brings a steep learning curve filled with clinical and academic challenges, while creating personal challenges regarding self-confidence in this new environment. Imposter syndrome, defined as doubting one's abilities and fearing exposure as a fraud despite adequate external evidence of success, is known to be prevalent among physicians. We hypothesized that a two-week surgical boot camp designed for fourth year students applying for surgical internships would improve task related confidence levels and reduce imposter syndrome characteristics.

Methods: Pre and post-course surveys were completed by 30 fourth year medical students entering into surgical internships. The survey included the Clance Imposter Phenomenon Scale and a Likert scale measuring confidence levels as related to clinical knowledge and tasks.

Results: Pre and post-course Likert scales rating knowledge and task confidence levels showed an increase in the mean significantly greater in the post-course survey ($p<0.001$). Mean Likert scale totals were significantly higher among students who had a break in training outside of medicine ($p<0.001$). There was no difference in the total Clance Imposter Phenomenon Scale score when comparing the pre and post-course surveys.

Abstract Title: Advanced Directives in the Pediatric Surgery Population – Implications, Current Proceedings, and Future Directions

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Abstract:

Increasingly, pediatric surgeons are confronted with requests to operate on patients with preexisting "Do Not Resuscitate" (DNR) orders.(Fallat) There is a lack of data regarding end of life care and DNR status of pediatric surgical patients, and therefore there is a lot of confusion and uncertainty surrounding the care of these high risk patients. There are both clinical and ethical reasons to either suspend or not suspend the DNR order in the perioperative period. These decisions should be the subject of shared decision-making between surgeon and patient or surrogate decision-makers. In this review of current literature and policies, we describe the factors that contribute to these decisions.

The decision not to attempt resuscitation can be seen as one of many interventions at the end of life that should be considered to respect a patient's beliefs and right to autonomy. All of the professional organizations involved in providing treatment to patients in the perioperative setting including the American Society of Anesthesiologists (ASA), the American College of Surgeons (ACS), and the Association of Operating Room Nurses (AORN) have stated that it is inappropriate to automatically suspend a patient's advance directive, and that a required reconsideration of DNR is the standard of care.(Singer)

DNR orders for pediatric patients are written if the child's parent or surrogate decision maker prefers that resuscitation be withheld in the event of cardiopulmonary arrest.(Fallat) The rate of documented DNR status is extremely low in the pediatric surgical population undergoing elective surgery, even among severely ill children.(Brown) DNR orders in the pediatric population create unique circumstances for providers and caregivers because the decisions are typically made by parents or surrogate decision makers. The decision to suspend or continue DNR orders in the perioperative period should take into consideration the planned procedure, its likely benefit, and risk of compromise.(Sumrall) After agreement is reached, the plan must be recorded in the medical record and communicated to the entire perioperative team. We propose a multidisciplinary team for required reconsideration of DNR orders in the pediatric population to include surgeons, anesthesiologists, patients or surrogate decision makers, and palliative care specialists or social workers as deemed necessary. Increased education for perioperative providers and staff surrounding perioperative DNR should be implemented to increase understanding. This multipronged approach would provide clarity to those providing care to these high risk patients.

Abstract Title: Thoracic aortic aneurysm sac remodeling after TEVAR affects late outcomes after repair

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Objective: Prior studies have demonstrated failure of sac regression after EVAR is associated with higher rates of late mortality and reinterventions. However, the effect of aneurysm sac remodeling on late outcomes after TEVAR has not been studied.

Method: All patients who underwent TEVAR for degenerative aortic aneurysm in the VQI from 2011-2021 with one-year follow-up imaging (±6 months) were identified. Sac remodeling was defined as sac expansion (≥5mm increase), sac stable (<5mm change), or sac regression (≥5mm decrease). Logistic regression was used to examine factors independently associated with sac expansion. A subgroup analysis of 4-year survival, rupture, and reintervention was assessed using Kaplan Meier estimates and Cox regression in VQI patients from 2011-2018 with linkage to Medicare claims data.

Results: We identified 2247 patients with one-year follow-up imaging after TEVAR for degenerative thoracic aortic aneurysm. Among these patients 21% demonstrated

sac expansion, 38% stable sac, and 42% sac regression. Aortic diameter was smallest in patients with sac expansion (*Expansion* 48mm vs *Stable* 51mm vs *Regression* 59mm; p<.001). Sac expansion had the highest rate of any completion endoleak (12% vs 7.0% vs 6.1%; p=.015) and type II completion endoleak (5.4% vs 2.2% vs 2.0%; p=.025). Factors independently associated with sac expansion included aortic diameter ≤5.5cm (OR 1.7; 95%CI [1.2-2.3]), increasing age (by decade, OR 1.2 [1.1-1.4]), and any completion endoleak (OR 3.5 [1.2-3.4]). Among 976 patients with linkage to Medicare data, 19% demonstrated sac expansion, 36% stable sac, and 45% sac regression. No difference was observed in 4-year survival (87% vs 92% vs 90%; log-rank p=.550). Late rupture was highest in patients with sac expansion (15% vs 8.5% vs 5.2%; log-rank p=.013) (Figure 1). Furthermore, when compared with sac regression, sac expansion was associated with higher risk of late rupture (HR 3.4 [1.4-8.5]). Four-year reintervention rates were highest in patients with sac expansion (54% vs 37% vs 30%; log-rank p<.001) (Figure 2). When compared with sac regression, sac expansion was associated with higher risk of reintervention (HR 2.3 [1.5-3.4]).

Conclusion: Sac expansion after TEVAR is associated with increased risk of late rupture and reintervention. Furthermore, completion endoleak is associated with higher odds of sac expansion during follow-up. Further study is warranted to determine if shorter interval follow-up in patients at risk for sac expansion can improve late rupture rates in these patients.

Abstract Title: Gut microbial shifts indicate melanoma presence and bacterial interactions in a murine model

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Abstract:

Through a multitude of studies, the gut microbiota has been recognized as a significant influencer of both homeostasis and pathophysiology. Certain microbial taxa can even affect treatments such as cancer immunotherapies, including the immune checkpoint blockade. These taxa can impact such processes both individually as well as collectively through mechanisms from quorum sensing to metabolite production. Due to this overarching presence of the gut microbiota in many physiological processes distal to the GI tract, we hypothesized that mice bearing tumors at extraintestinal sites would display a distinct intestinal microbial signature from non-tumor-bearing mice, and that such a signature would involve taxa that collectively shift with tumor presence. Microbial OTUs were determined from 16S rRNA genes isolated from the fecal samples of C57BL/6 mice challenged with either B16-F10 melanoma cells or PBS control and analyzed using QIIME. Relative proportions of bacteria were determined for each mouse and, using machine-learning approaches, significantly altered taxa and co-occurrence patterns

between tumor- and non-tumor-bearing mice were found. Mice with a tumor had elevated proportions of *Ruminococcaceae*, *Peptococcaceae*.g_rc4.4, and *Christensenellaceae,* as well as significant information gains and ReliefF weights for *Bacteroidales.f__S24.7*, *Ruminococcaceae*, *Clostridiales*,and *Erysipelotrichaceae*. *Bacteroidales.f__S24.7*, *Ruminococcaceae*, and *Clostridiales* were also implicated through shifting co-occurrences and PCA values. Using these seven taxa as a melanoma signature, a neural network reached an 80% tumor detection accuracy in a 10-fold stratified random sampling validation. These results indicated gut microbial proportions as a biosensor for tumor detection, and that shifting co-occurrences could be used to reveal relevant taxa.

Abstract Title: Intrahepatic Cholangiocarcinoma: How Do Hepatectomy Outcomes Compare to Liver Metastases and Hepatocellular Carcinoma?

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Background: Intrahepatic cholangiocarcinoma (iCCA) is rare in Western nations but its incidence continues to rise. Hepatectomy is the only curative treatment option. Short-term outcomes following hepatectomy for colorectal liver metastases (CRLM) and hepatocellular carcinoma (HCC) are well described whereas they are not for iCCA. The aim is to compare post-hepatectomy outcomes for iCCA to those for CRLM and HCC.

Methods: The 2014-18 American College of Surgeons NSQIP procedure targeted hepatectomy PUF was utilized. Patients diagnosed with iCCA, CRLM, and HCC were identified. Others were excluded. Demographic, disease, and procedural characteristics were collected. Univariable and multivariable analyses (Chi-Square for categorical and Kruskal-Wallis for continuous variables) were performed for mortality, serious morbidity, bile leak, need for invasive biliary procedure, severe post-hepatectomy liver failure (PHLF), and readmission all within 30-days post-hepatectomy.

Results: 11,165 patients underwent hepatectomy including 1,168 for iCCA (10%), 6,683 for CRLM (60%), and 3,314 for HCC (30%). iCCA patients were more likely to be female, white, undergo major hepatectomy, and were less likely to receive neoadjuvant chemotherapy. On multivariable analysis, hepatectomy for iCCA vs. CRLM or HCC carried a higher 30-day mortality (3.3% vs 0.9% vs 2.0%, respectively $p<0.001$). iCCA also displayed higher rates of serious morbidity, bile leak, invasive procedures, severe PHLF, and readmission (Table). Similar trends were observed when separately examining major or minor hepatectomies.

Conclusion: Hepatectomy for iCCA is associated with worse short term outcomes than liver surgery for CRLM or HCC. Surgeons and patients should be aware of these risks during surgical planning.

Abstract Title: AAST Multicenter Study: Does Angioembolization Improve Survival for Severe Hepatic Injuries?

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Introduction: The hypothesis is that angioembolization (angio) improves survival in patients with severe hepatic injuries.

Methods: Data from 29 trauma centers were collected and analyzed on adult (□18 yrs.) patients with Grades III, IV, and V hepatic injuries. Demographics, mechanism of injury, shock index (SI), transfusions (□ 6 PRBCs), length of stay (LOS), ISS, use/timing of angio, and outcomes were recorded. Data were analyzed by mechanism and management: nonoperative with/without angio, operative with pre or post angio, and operation alone. Logistic regression was used to identify associations with mortality, $p < 0.05$.

Results: From 2013-2018, 2,430 patients (1,697 blunt, median ISS = 29; 733 penetrating, median ISS = 25) sustained severe hepatic injuries. The strongest associations of mortality for blunt and penetrating patients were ISS □25 ($p<0.0001$) and □6u PRBC in the first 24 hours ($p<0.0001$). SI was found to be associated with a higher mortality but only in a subgroup analysis of blunt Grade V liver injuries. For patients undergoing operative management, the use of preop or postop angio had no impact on survival, but angio showed a decrease in mortality in penetrating injured patients when compared to nonoperative management alone, ($p=0.0046$)

Conclusion: Angio does not improve survival in most cases of severe hepatic injuries but does offer a survival benefit in nonoperative high grade penetrating hepatic injuries.

Abstract Title: Association Between Hereditary Lobular Breast Cancer Due to CDH1 Variants and Gastric Cancer Risk

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Importance: Hereditary cancer risk is informed by the presence of a germline gene variant more so than by family history of cancer.

Objective: To assess gastric cancer risk among patients who received a diagnosis of hereditary lobular breast cancer (HLBC) owing to a germline loss-of-function variant in CDH1 by establishing prevalence of signet ring cell carcinomas among asymptomatic patients.

Design, setting, and participants: A prospective cohort study of patients with germline CDH1 pathogenic or likely pathogenic (P/LP) variants at a quaternary medical center were enrolled between October 2017 and January 2021. Data analysis was performed in May 2021. Analyses for associations were performed for these 3 patient groups: (1) family history of breast cancer and no gastric cancer in the HLBC group; (2) family history of gastric cancer and no breast cancer in the hereditary diffuse gastric cancer (HDGC) group; and (3) family history of both breast and gastric cancers in the mixed group. Categorical variables were compared using the Pearson $\chi 2$ test.

Main outcomes and measures: The primary end point of this study was the prevalence of occult signet ring cell carcinoma of the stomach in patients with HLBC. Personal and family medical history, genotype, and pathologic data from risk-reducing total gastrectomy and surveillance endoscopy were examined.

Results: A total of 283 patients with CDH1 P/LP variants (199 [70.3%] were female, and 259 [91.5%] were White; median age, 48 years [range, 18-81 years]) were enrolled in a prospective study of HDGC. The cohort consisted of 151 families. Patients were categorized according to family history of breast and/or gastric cancer: HLBC 15.5% [44 of 283 patients]), HDGC (16.2% [46 of 283 patients]), and mixed (68.2% [193 of 283 patients]). The HLBC group included 31 distinct families with 19 CDH1 variants; 10 of those variants were also

present in the HDGC and mixed groups (52.6% [10 of 19 variants]). Nearly all of the patients with HLBC (93.8% [15 of 16 variants]) who elected for risk-reducing total gastrectomy owing to their underlying CDH1 P/LP variant harbored occult signet ring cell gastric adenocarcinoma on final pathology (median age, 50 years [range, 21-67 years]). The prevalence of occult gastric cancer among asymptomatic patients in the HDGC group was similar (94.7% [18 of 19 of variants]; P = .98).

Conclusions and relevance: Carriers of CDH1 P/LP variants with no family history of gastric cancer exhibited high rates of occult signet ring cell gastric cancer. Germline CDH1 P/LP variants appear to have a highly penetrant gastric phenotype irrespective of family history. These data may prove useful for counseling families with CDH1 variants presumed to have HLBC.

Abstract Title: Implementing a training program to improve feedback in a surgical residency

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Introduction: Increasing demands on faculty-level surgeons coupled with stricter work restrictions on surgical residents implores methods to improve efficiency in surgical training. Feedback is an essential and highly effective learning tool in surgical education. We seek to include feedback training in our program to improve the culture of feedback at our institution. We propose the Kirkpatrick model, a framework that assesses workplace training initiatives, to evaluate our strategy.

Methods: We surveyed surgical trainees (n=42) for baseline attitudes on feedback. Training modules were done separately with faculty (n=12) and residents (n=28) and consisted of a 35- minute presentation on the effective use of feedback followed by a workshop modeled after the *Association for Surgical Education* Committee on Graduate Surgical Education's "Giving Verbal Feedback" workshop. Participants give and receive feedback using standardized scenarios in front of their peers, which is followed by a debriefing. Analysis of the training model was done using a Kirkpatrick level 1 survey utilizing thirteen 5-point Likert scale questions and Kirkpatrick level 2 pre- and post-training quizzes containing 6 knowledge-based questions analyzed using Student's t-test.

Results: Among surgical residents, 97.4% agree that feedback is an important part of resident learning. 64.1% do not believe attendings make feedback a priority and only 23.1% of residents believe that attendings provide effective feedback. Residents agree that feedback should be part of faculty training (94.9%) and senior resident training (89.7%) (response rate 93%). 100% of faculty (response rate: 50%) were satisfied with the feedback training module, as well as 100% of residents (response rate 79%). The average score of the pre- and post-training quizzes among faculty improved significantly (63% to 83%, p-value = 0.03). The average score for residents also improved (56% to 77%, p-value = <0.001).

Conclusions: Feedback is an efficient and impactful tool to complement surgical residency training. Our experience demonstrates that surgical trainees feel that feedback is essential to their training and is inadequately provided by their educators. Our training modules were well- accepted by faculty and residents and facilitated learning on techniques for effective feedback.

Abstract Title: Trends in Surgical Patents Held by Surgeons from 1993 to 2018

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Objective: This study aims to quantify the number of patent-holding surgeons and determine their specialty demographics.

Summary Background Data: The number of intellectual property filings related to surgery has exponentially increased over the past 40 years, yet surgeon inventor status among these inventions remains poorly defined.

Methods: A query of the United States Patent and Trademark Office (USPTO) Patent Full-Text and Image Database was performed over the years 1993 to 2018. Patents related to surgery were defined as surgical devices, implantables, dressings, introducers, and sterilization equipment based on Cooperative Patent Classification (CPC) code. Inventor names were cross-indexed with names of active Fellows in the American College of Surgeons (FACS) as of 2019. Surgeon inventors were identified and differences between specialty and gender were evaluated.

Results: 275,260 patents related to surgery were issued over the study period. The number of surgical patents has increased by 462% from 4593 per year to 21,241 per year. A total of 9,008 patents were held by a total of 2,164 surgeons (4% of FACS). This represents 3.3% of all surgical patents with a mean of 5 patents (range 1-346) per patent-holding surgeon. Specialties with the largest number of patent holders include neurosurgery (9%) and orthopedic surgery (8%). 97% of patent-holding surgeons were male.

Conclusions: 3.3% of patents related to surgery involve a surgeon inventor, and while the number of surgical patents has shown an exponential increase, surgeon involvement in these inventions has grown minimally. Surgical innovation training may offer an opportunity to reduce these discrepancies and increase surgeon involvement as patent holders.

Abstract Title: Global, regional, and national estimates of surgical volume for 189 countries from 2010 to 2019: A modelled longitudinal approach to the surgical volume world development indicator

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Background: Surgical volume was introduced as a core surgical indicator by the Lancet Commission on Global Surgery (LCoGS) who set a target for all countries to deliver over 5,000 operations per 100,000 population by 2030, but its value in monitoring health system capacity remains limited due to inconsistent reporting. Here we provide modelled, longitudinal estimates of surgical volume at the national level and evaluate growth trends in order to better track surgical delivery on a global scale.

Methods: Gaussian process regression was used to model surgical volume, defined as the number of operations per 100,000 population, for all 189 World Bank member countries from 2010 through 2019. The model included surgical volume data for 97 countries and 263 health, social, and economic time series indicators, extracted via principal components analysis.

Findings: From 2010 through 2019, the total number of operations performed globally grew at an annual average growth rate of 4·8% per year from 226·5 (90% Prediction Interval 156·2-408·5) to 343·5 (90%PI 154·5-1359·7). Total number of operations grew 19% (3·2-3·8 million) among low-income countries (LICs), 208% (23·4-72 million) among lower middle-income countries, 38% (73·5-101·5 million) among upper middle-income countries,and 31% (126·4-166·1 million) among high

income countries. In 2019, only 1% of the world's total operations were performed in LICs of which none are near the Lancet target of 5,000 operations per 100,000 population.

Interpretation: Surgical volume is growing globally with increases driven primarily by middle income countries. Among LICs, surgical volume remains far below minimum targets established by the LCoGS. Tracking surgical volume can help provide valuable feedback to monitor progress towards the Lancet goals and inform wider health policy decision.

Abstract Title: Timing of Mortality after Coronary Artery Bypass Grafting (CABG) Did Not Change with the Adoption of the STS 30-day Post-Procedure Mortality Hospital Performance Benchmark

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Purpose: In December 2011, the Society of Thoracic Surgeons(STS) adopted 30-day post-procedure mortality as a performance benchmark, raising concerns that decisions affecting the continuation of care and timing of mortalities would be negatively impacted. We examined whether there were shifts in the timing of mortalities as this measure came into effect.

Methods: The National Inpatient Sample(NIS) was queried for all patients greater than 18 years of age who had undergone a coronary artery bypass grafting(CABG) between 2009 and 2014. Those who underwent valvular surgery were excluded. Patients were separated into two temporal cohorts for comparison: 2009-2011, preceding the new performance measure, and 2012-2014, after this new standard. Baseline characteristics such as age and comorbidities were compared. Comparisons were made between post- procedural mortalities reported 1, 2, and 3 days before and after the 30-day mark were compared using t-tests. P-values of less than 0.05 were considered statistically significant.

Results: 219,407 patients underwent CABG between 2009 and 2014. The later time cohort was older and had significantly higher rates of diabetes, hypertension, renal failure, and obesity ($p<0.001$ for all comparisons). 4,086 (1.86%) of the total cohort died prior to discharge. When patient deaths in 2009- 2011 were compared with patient deaths in 2012-2014, no significant difference in post-procedural mortality was observed ($p=0.64$). Furthermore, when the proportion of mortalities occurring on post- procedural days 27, 28, and 29 were compared with those on post-procedural days 31, 32, and 33, no significant differences were observed (Table 1). This data is represented graphically in Figure 1.

Conclusions: Concerns that STS's 30-day mortality performance standard would incentivize providers and hospitals to prolong time to mortality in patients to meet that measure appear to be unfounded. This study found no increase in greater than 30-day post-procedural mortality prior to and after the institution of this performance measure.

Abstract Title: Endoscopic Sleeve Gastroplasty Requiring Conversion to Partial Gastrectomy with Paraesophageal Hernia Repair

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Abstract:

Endoluminal bariatric surgery has gained popularity due to the lower costs and risks compared to more traditional surgical techniques. This is particularly true for patients where open or laparoscopic surgeries may carry increased operative risk from scarring and adhesions, especially during bariatric revision surgeries. These new approaches offer patients a "non-surgical" option for weight loss and potentially safer alternatives in abdominal revision surgery. The more commonly employed endoluminal bariatric therapies include intragastric balloon, endoscopic bypass, and endoscopic gastroplasty. Our case will discuss an endoscopic gastroplasty that resulted in the patient requiring a paraesophageal hernia repair with removal of gastroplasty sutures and partial gastrectomy.