The Department of Surgery at Dartmouth-Hitchcock Medical Center

THE TENTH ANNUAL *STARS*

(SURGICAL TRAINEES ADVANCING RESEARCH SYMPOSIUM)

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2	6:37	Michael E. Rezaee	Ileal Conduit versus Continent Urinary Diversion in Radical Cystectomy: Understanding the Current 30-day Perioperative Investment
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12	7:47	Matthew Carroll	The Effect of Preoperative MRI on In-Breast Tumor Recurrence in Patients Undergoing Breast Conserving Surgery: A Systematic Review and Meta-analysis
13	7:54	Shuo-chieh Wu	Urinary Thiosulfate Level in Stone Forming Versus Non-Stone forming Pregnant Females
14	8:01	Xiangyu Zhao	Interval Changes of Intravitreal Anti-Vascular Endothelial Growth Factor (anti-VEGF) Injections following Pars Plana Vitrectomy (PPV)
15	8:08	Eileen Brandes	Trends Among Female Pelvic Medicine and Reconstructive Surgery Fellowships (FPMRS) and Graduates
16	8:15	Xavier P. Fowler	Does Accessing One's Long-term VQI Quality Report Predict Reporting of Long-term VQI Outcomes? Association Between SRS Report Access and Performance on VQI Follow-up Quality
17	8:22	Ashley Sohn	Age as a Prognostic Factor for the Visual Outcome After Scleral Buckle (SB) for Repair of Primary Macula-Off Rhegmatogenous Retinal Detachment

Co-Directors: Philip P. Goodney, MD, MS and Kari M. Rosenkranz, MD

Judges: Jocelyn Beach, MD; Philip Goodney, MD, MS; Michael K. Matthew, MD; Kari Rosenkranz, MD; David Soybel, MD

The Contemporary Impact of *Clostridioides difficile* Infection on Surgical Patients in the United States

Aravind Ponukumati MD[1], Brianna Krafcik MD, MS[1], Dan Neal MS[2], Salvatore Scali MD[2], Jocelyn Beach MD, MS[1], Richard Powell MD[1], Jesse Columbo MD, MS[1], David Stone MD[1]

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Introduction: The Centers for Disease Control has identified prevention of in-hospital *Clostridioides difficile* (CDiff) infection as a priority. However, the impact of postoperative CDiff infection on contemporary surgical patients and its sequelae for hospitals remains poorly defined. The objective of this study was to quantify the procedure-specific impact of postoperative CDiff infection in surgical patients in the United States.

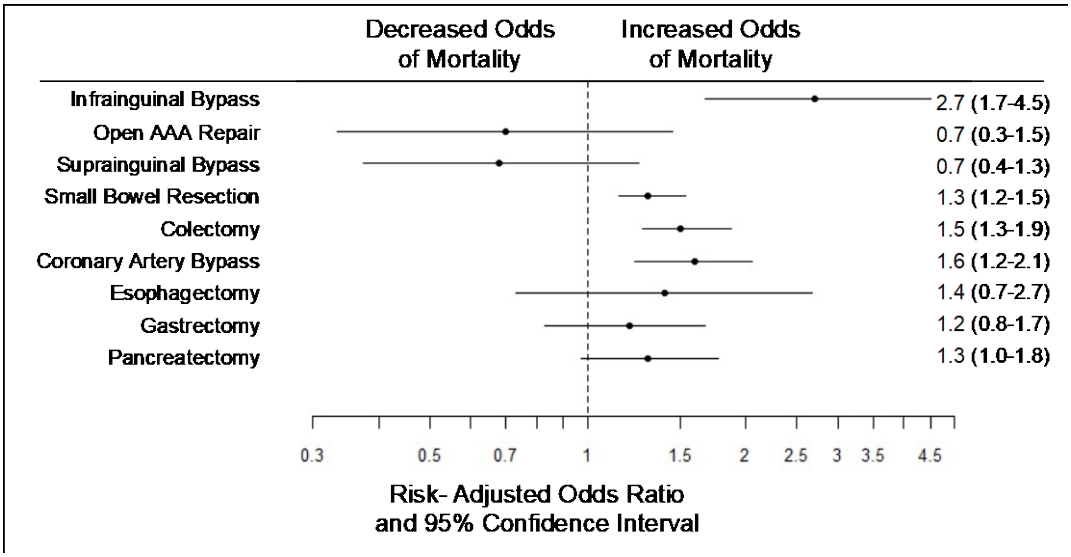
Methods: We studied patients undergoing major cardiac, vascular, general, or oncologic procedures using the VIZIENT database from 2015-2019. Our primary exposure was postoperative CDiff infection. Our primary outcomes were postoperative length of stay (LoS), hospitalization cost, readmission, and in-hospital mortality. We used linear and logistic regression for risk-adjustment.

Results: The overall incidence of CDiff infection was 1.6% (n=6,506/397,750), and was lowest after coronary artery bypass (CABG; 0.7%, n=768/112,593), and highest after gastrectomy (2.3%, n=541/23,832). Patients with CDiff were older, more comorbid, and more frequently underwent urgent surgery. The median postoperative LoS was 7 days (IQR: 5-11 days). Patients with CDiff had a risk-adjusted LoS that was 66% longer (p<.001). Similarly, the median hospitalization cost was $31,000 (IQR: $20,000-$49,000), and after risk-adjustment was 51% greater among patients with CDiff infection (p<.001). Postoperative CDiff was associated with more readmissions after CABG, small bowel resection, colectomy, gastrectomy, pancreatectomy, and infrainguinal bypass (adjusted OR range: 1.4-1.7), and increased mortality following CABG, small bowel resection, colectomy, and infrainguinal bypass (adjusted OR range: 1.3-2.7) (Figure 1).

Conclusions: Postoperative CDiff infection increased LoS, costs, readmissions, and mortality. There was a differential susceptibility among operations toward CDiff infection and its sequelae. Accordingly, focused, procedure-specific efforts to prevent postoperative CDiff infection are justified and may offer a more prudent approach toward reducing infection rates and preserving healthcare resources.

1. Aravind Ponukumati

Figure 1: Likelihood of **mortality** for patients with a postoperative CDiff infection versus those without a CDiff infection.



Ileal Conduit versus Continent Urinary Diversion in Radical Cystectomy: Understanding the Current 30-day Perioperative Investment

Michael E. Rezaee MD, MPH[1], William Bihrle III MD[1], Florian R. Schroeck MD, MS[1], & John D. Seigne MB, BCh[1]

[1]Dartmouth Hitchcock Medical Center, Department of Surgery

Introduction: Continent urinary diversion at the time of radical cystectomy can provide patients with a more cosmetically pleasing and functionally normal lower urinary tract, but potentially at the cost of worse perioperative outcomes. The purpose of this study was to quantify the short-term burden associated with continent diversion relative to ileal conduit creation.

Methods: Patients who underwent radical cystectomy in 2019 and 2020 were identified in the American College of Surgeons National Surgical Improvement Program database using current procedural terminology codes and pathology reports. Patients were grouped by type of urinary diversion performed: ileal conduit versus continent diversion (neobladder or cutaneous pouch). Multiple logistic regression was used to examine the association between type of urinary diversion and 30-day outcomes, including postoperative complications, all-cause readmissions, and mortality.

Results: Of 4,755 patients who underwent radical cystectomy, 677 underwent continent diversion (14.2%). These patients were significantly younger (median 62 vs. 71 years, $p< 0.01$) and less likely to have diabetes (13.6% vs. 20.1%, $p<0.01$), COPD (3.7% vs. 7.1%, $p<0.01$), malnutrition (1.9% vs. 4.2%, $p< 0.01$), prior pelvic radiation (5.5% vs. 13.1%, $p<0.01$), and prior pelvic surgery (46.1% vs. 51.6%, $p<0.01$). A greater proportion of continent diversion patients experienced a postoperative complication (56.0% vs. 48.9%, $p<0.01$) and all-cause readmission (30.3% vs. 20.4%, $p<0.0$). After adjustment, continent diversion patients had 1.4 (95% CI: 1.1 – 1.7) and 1.7 (95% CI: 1.4 – 2.1) the odds of experiencing a post-operative complication or all-cause readmission, respectively. Mortality did not differ between continent and ileal conduit urinary diversion patients (0.9% vs. 1.7%, $p=0.1$).

Conclusions: Compared to ileal conduit creation, continent urinary diversion is associated with a greater likelihood of postoperative complications and readmission to the hospital within 30 days of surgery. Cystectomy patients seeking continent diversion should be thoroughly counseled on the increased short-term morbidity associated with this specific type of diversion.

3. Mark Eid

Global Burden of Disease of Peripheral Artery Disease

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Introduction: Previous efforts to characterize the burden of peripheral artery disease (PAD) have been limited to national patient cohorts, and an up-to-date international analysis is lacking. In this study, we aimed to characterize the burden of PAD globally, providing a comprehensive, updated analysis on geographic and temporal trends of disease from 1990-2019.

Methods: Using data from the Global Burden of Diseases, Injuries and Risk Factors Study (GBD), we estimated the prevalence, mortality and disability-adjusted life years (DALYs, a measure accounting for incurred morbidity and mortality), attributable to PAD. We analyzed results overtime and stratified by sex and Social Demographic Index (SDI) group (low, low-middle, middle, high-middle, and high) across countries. We compared PAD to other atherosclerosis-related conditions (ischemic heart disease and ischemic stroke). We also assessed the contribution of risk factors (smoking, hypertension diabetes, and chronic kidney disease) to PAD DALYs.

Results: Between 1990 and 2019, we observed an increase in the global prevalence of PAD from a low of 1,229 per 100,000 persons to a high of 1,466 per 100,000 persons. This increase was primarily driven by higher rates in countries with high sociodemographic index (e.g. United States: 3,799 per 100,000 people, and Denmark: 5,330 per 100,000 people in 2019). Conversely, the lowest rates of disease were seen in low SDI countries (e.g. Niger: 252 per 100,000 and Afghanistan: 304 per 100,000, Fig 1). Prevalence among women was higher than among men, rising from 1,686 per 100,000 women in 1990 to 1,973 in 2019 (>17% increase). Men, however, experienced a 24% increase, with prevalence rising from 778 per 100,000 in 1990 to 962 per 100,000 in 2019. However, PAD-associated mortality was similar among men and women (men: 0.97 per 100,000, women 0.94 per 100,000). These increases in burden of disease from PAD were in marked contrast to ischemic heart disease and stroke, which had decreasing prevalence and disease-related mortality over the same time frame. Overall, only about 55% of PAD disease burden could be attributed to identified risk factors, with tobacco use, diabetes and hypertension being the three major contributors in all SDI groups (Fig 2).

Conclusion: Option 1: The global prevalence and mortality associated with PAD is increasing in all SDI regions, in contrast to the decreases seen with other forms of atherosclerotic cardiovascular disease. Increases in global vascular surgery resources will be needed to manage these trends and targeted efforts to reduce and treat PAD risk factors are urgently needed.

3. Mark Eid

Option 2: The global prevalence and mortality associated with PAD has increased substantially and impacts women disproportionately to men. This is despite the fact that other forms of cardiovascular disease have seen decreases in prevalence. Targeted efforts to reduce and treat PAD risk factors globally are urgently needed.

Figure 1. World-wide Prevalence of Peripheral Artery Disease in 2019 among Men and Women

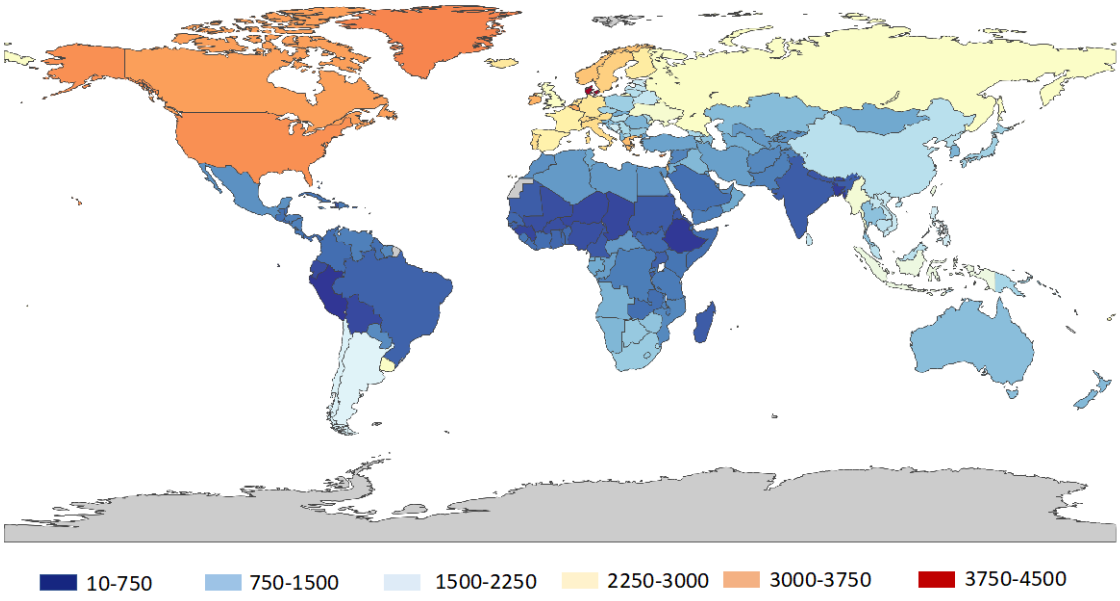
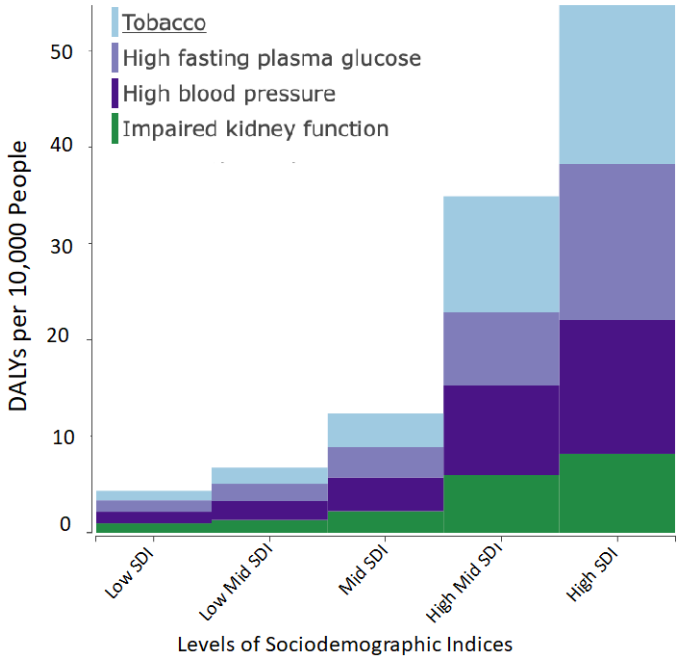


Figure 2. Peripheral Artery Disease Attributable DALY rates by risk factor across disparate levels of Sociodemographic indices



4. Feranmi Bello

Residential Segregation and Cancer-Related Outcomes - A Scoping Review

Feranmi Bello BA[1], Kaveer K. Chatoorgoon MD[2], Andrew P. Loehrer MD[2]

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Introduction: Structural racism has been cited as a key driver of health inequities, including for cancer care. Racial residential segregation, a form of structural racism, has been studied for a variety of health conditions but its influence on cancer outcomes is less well delineated. The primary objective of this study was to evaluate the current data on the association of residential segregation with cancer outcomes.

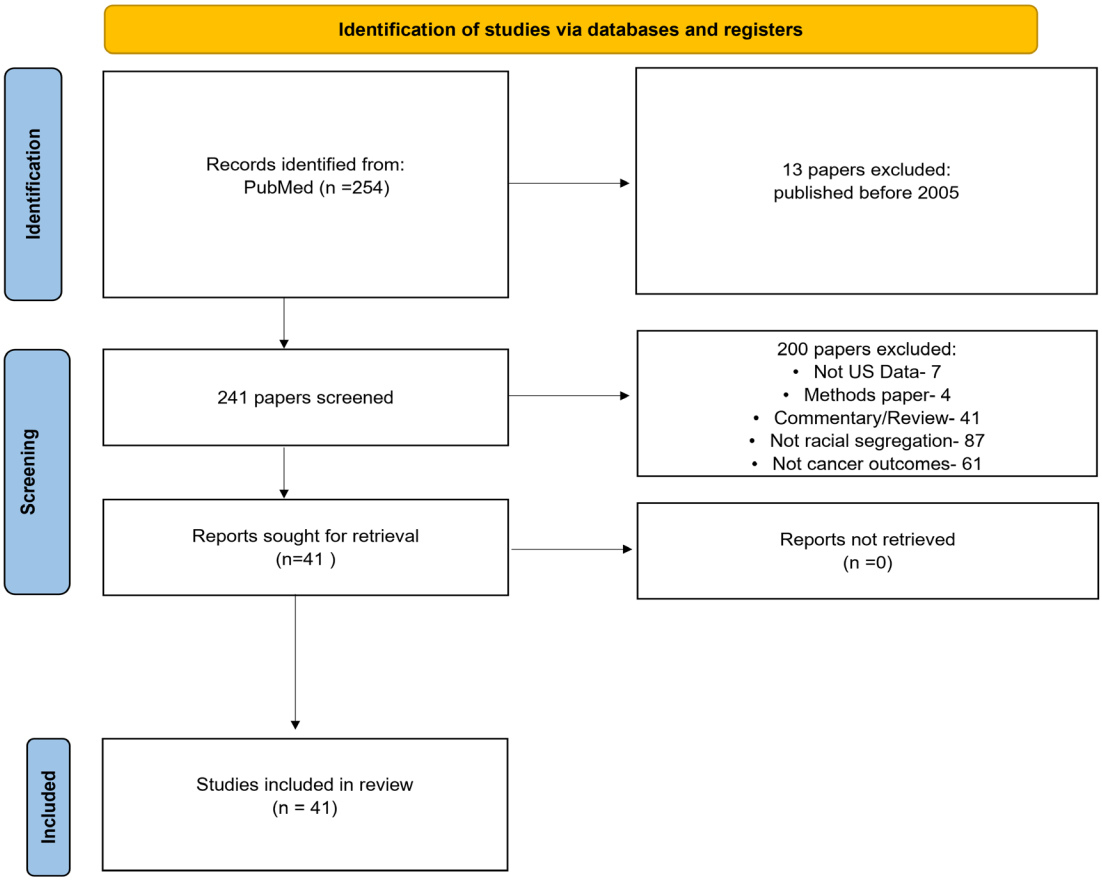
Methods: Variables of interest for abstraction were identified by consensus among the research team. A PUBMED search was then conducted using the MESH headings “racial segregation” and “cancer outcomes”. Studies were independently assessed for inclusion and conflicts resolved by consensus. Papers were excluded if non-English, not using US data, or if cancer was not clearly an outcome measure. Only original research was included. Full articles were reviewed, and variables were extracted.

Results: We identified 41 original studies that evaluated residential segregation and cancer outcomes. In these studies, clinical data was largely obtained from state/national cancer registries in 20 (48.8%) studies or the Surveillance, Epidemiology, and End Results (SEER) database in 14 (34.1%). The sources of residential segregation data included census data 35 (85.3%) and Homeowners Loan Corporation (HOLC) maps 5 (12.2%). The most common cancers studied were breast, lung, colon, and prostate cancers. The outcomes studied included cancer incidence, screening, stage at diagnosis, treatment, and survival with some studies considering multiple outcomes. There were significant associations between racial segregation and cancer outcomes in 33 of the 41 (80.5%) studies. Seven (16.7%) of the studies specifically measured the likelihood of undergoing surgery as their outcome, of which 6 found a significant association between segregation and decreased likelihood of undergoing resection.

Conclusions: Over 80% of our reviewed studies found a significant association between racial segregation and outcomes related to cancer care delivery, including 6 of the 7 studies specifically evaluating the receipt of cancer-directed surgery. However, only 32% and 17% of the papers explicitly mentioned structural racism and redlining, respectively, highlighting significant gaps in the current analysis and contextualization of racial inequities in cancer care. Understanding the influence of structural racism on cancer care delivery and explicitly naming this form of racism are important components to achieve health equity. Policies to mitigate the effects of structural racism on cancer outcomes must account for the multifocal effects of historic redlining and current residential segregation.

4. Feranmi Bello

Figure 1: PRISMA Diagram for Methods of Data Extraction



PRISMA diagram showing flow chart for included studies

5. Kirthi Bellamkonda

The Contemporary Impact of Body Mass Index on Open Aortic Aneurysm Repair

Kirthi Bellamkonda MD[1], Sal Scali MD[2], Jennifer Stableford MD[1], Philip Goodney MD[1], Richard Powell MD[1], Benjamin Jacobs MD[2], Michol Cooper MD[2], Gilbert Upchurch Jr. MD[2], David Stone MD[1]

[1]Dartmouth Hitchcock Medical Center, Section of Vascular Surgery; [2]University of Florida Division of Vascular Surgery

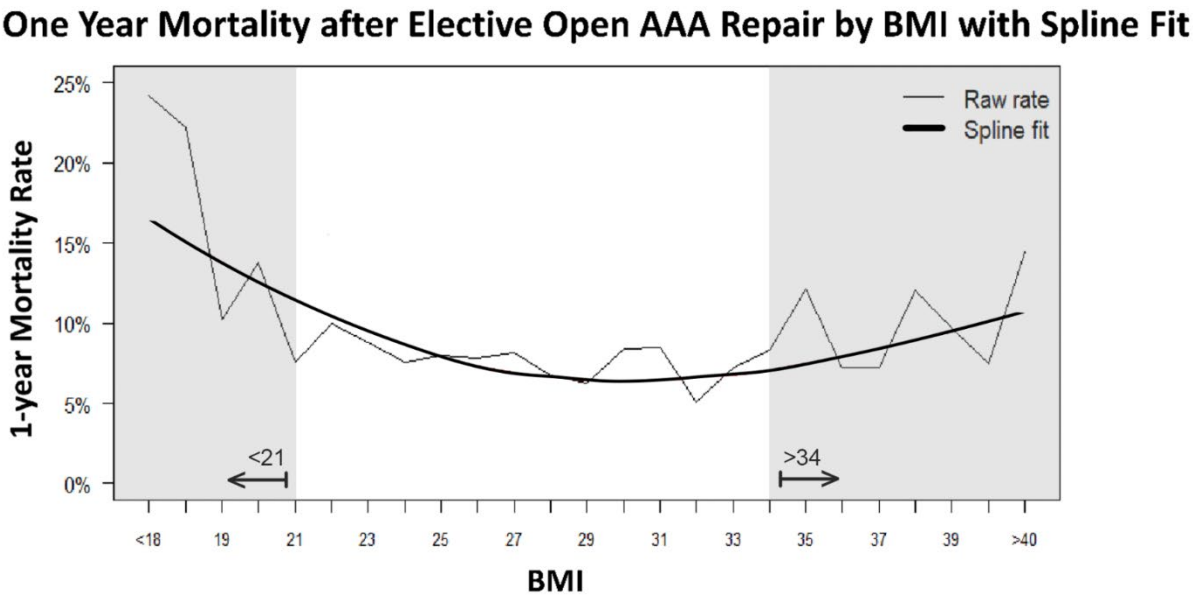
Introduction: The CDC has deemed obesity a national epidemic and contributor to other leading causes of death including heart disease, stroke, and diabetes. Accordingly, the impact of body mass index(BMI) has been a focus of investigation. Interestingly, the BMI surgical literature remains conflicted pertaining to open AAA repair(oAAA). The purpose of this study was to quantify the effect of BMI on oAAA outcomes in contemporary practice.

Methods: Elective oAAAs in the VQI(2010-2021) were identified. End-points included 30-day death/complications and 1-year mortality. Patients were stratified into four cohorts(Q1-BMI<18.5,Q2-18.5≤BMI<25,Q3-25≤BMI<30,Q4-BMI≥30). Spline interpolation was used to verify model performance when determining association with mortality.

Results: 9,479 patients met inclusion criteria(median age-70, 74%-male,BMI 27±6). Lower BMI patients(Q1<18.5) compared to higher BMI(Q4>30) patients were more likely to be women(53% vs. 32%;p<.0001), current smokers(65% vs. 50%;p<.0001), and have COPD(58% vs. 37%;p<.0001). Increased BMI was associated with greater prevalence of diabetes and CAD(DM-26% vs. 6%;p<.0001;CAD-27% vs. 20%;p=.01). There was no difference in cross-clamp position or visceral/renal bypass between groups though low BMI patients necessitated more frequent infrainguinal bypass(5% vs. 2%;p=.0002). 30-day mortality and in-hospital complications were greater among low BMI patients(30-day mortality:12% vs. 4%;p<.0001;complications-47% vs. 37%;p<.0001). Low BMI conferred a nearly 2-fold increase in pulmonary complications(18% vs. 11%;p<.0001). Surgical site infections were twice as common among the lowest and highest BMI groups(4% vs. 2%;p<.0001). 1-year mortality was highest among low BMI patients(23% vs. 9%;p<.0001). Adjusted spline-fit analysis demonstrated increased mortality among patients with BMI<21 or >34(BMI<18.5-HR 2.1, 95%CI 1.6-2.8;p<.0001;BMI>34-HR 1.3, 95%CI 1.1-1.6;p=.009)(**Figure**).

Conclusion: Both low(<18.5) and high (>34)BMI was associated with increased oAAA mortality in current practice. Despite the perception that obesity confers substantial surgical risk during oAAA, diminished BMI was associated with a 3-fold increase in 30-day and 1-year mortality. It appears that extremes in BMI are distinct proxies for differential clinical phenotypes and should inform risk stratification for oAAA repair.

5. Kirthi Bellamkonda



6. Peter Congelosi

Surgical Providers' Perceptions of the Patient Portal: Before and After the 21st Century Cures Act

Peter D. Congelosi MD[1]*, Mark A. Eid MD*[1]*, MS, Meredith J. Sorensen MD, MS*[1]

[1]DartmouthHitchcock Medical Center, Department of Surgery

Introduction: The electronic health record (EHR) may reduce errors and increase efficiency, but it has also been blamed as a source of burnout for health care providers. In April 2021, the Information Blocking Rule of the 21st Century Cures Act went into effect, giving patients immediate access to notes, radiology reports, lab results, and surgical pathology. We aimed to examine changes in surgical providers' perceptions of patient portal usage before and after the implementation of this federal mandate.

Methods: We administered a 37-question survey prior to the implementation of the Cures Act and a 39-question follow up survey three months later. This survey was sent to all surgeons, advanced practice providers (APPs), and clinic nurses in the Department of Surgery at our institution.

Results: There were 66 respondents to the initial survey and 60 to the follow-up survey. Before the implementation of the Cures Act, the majority of providers did not believe it would improve job satisfaction (75.4%) or decrease patient anxiety (63.9%). Impressions were more favorable afterward, with those who disagreed decreasing to 67.3% and 52.6%, respectively. Providers' preference for communication via the patient portal regarding medical questions increased 11.4%, but preferences for method of delivery of lab, radiology or pathology results remained similar. While there was an increase in messages received from patients after implementation of the Cures Act, there was no difference in the self-reported time spent on the EHR. About half of providers screened positive for burnout before (55%) and after (50%) the Cures Act.

Conclusion: Although 43.9% of providers reported the Cures Act had changed their practice, there was no difference in self-reported EHR usage, preferred method of interaction with patients, overall workload, or burnout. Initial concerns regarding the Cures Act's effect on job satisfaction and patient anxiety appear to have lessened.

7. Chad Markey

The use of socioeconomic indices in evaluating cancer care delivery – a scoping review

Chad Markey BA[1], Oluwaferanmi Bello BS[1], Meg Hanley BA[1], Andrew P Loehrer MD, MPH[1,2,3]

[1]Geisel School of Medicine at Dartmouth; [2] Dartmouth Hitchcock Medical Center, Department of Surgery; [3]The Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine at Dartmouth

Introduction: With growing scrutiny of socioeconomic and racial disparities in cancer care delivery, there has been increased examination of how neighborhood characteristics influence cancer care. Multiple composite measures or indices of small area socioeconomic characteristics have been used, but there is little consensus regarding how to employ them. The objective of this review is to summarize the use of these local area socioeconomic indices in recent cancer literature and their association with outcomes.

Methods: Studies from 2015 to 2021 were identified that investigated cancer incidence, stage at diagnosis, and mortality that used area-based indices of deprivation as an independent variable. Data were extracted regarding the geospatial and quantitative use of these indices.

Results: Forty-five studies met all inclusion criteria. Of the 50 outcomes in these studies, 17 (34.0%) investigated cancer incidence, 12 (24.0%) stage at diagnosis, and 21 (42.0%) mortality. Regarding the use of deprivation indices, 19 (42.3%) had an area level of analysis at the census tract level, 15 (33.3%) county level, 6 (13.3%) block group level, and 5 (11.1%) zip code level. Of the indices used by the study authors, 39 (86.7%) were a priori methodologies cited by the authors, and 6 (13.3%) were custom developed. Eighteen unique indices were utilized in total, with 4 indices used most frequently. Regarding the statistical use of the indices, 36 (80.0%) employed the indices as ordinal variables, 6 (13.3%) were used continuously, and 3 (6.7%) studies used indices as both ordinal and continuous. Of the studies that used their indices ordinally, 3 studies defined high and low deprivation dichotomously, 10 utilized tertiles, 13 quartiles, and 15 quintiles. Thirty-eight (76.0%) studies showed a significant association between area deprivation index and cancer-related outcomes.

Conclusion: Neighborhood deprivation indices are most commonly used at the census tract level and ordinally as quintiles. Despite variance in methodology, there is a strong indication that deprived areas are at adverse odds of cancer related outcomes. Further work investigating deprivation in the context of cancer can inform drivers of inequity and identify potential targets for care delivery and policy interventions.

Table 1: Characteristics of 45 studies using deprivation indices

Characteristic	n (%)
Cancer related outcome[a]	
Incidence	17 (34.0)
Stage at Diagnosis	12 (24.0)
Mortality	21 (42.0)
Geographic level of deprivation index	
Census tract	19 (42.3)
County	15 (33.3)
Census block group	6 (13.3)
ZIP code	5 (11.1)
Methodology used to create deprivation index	
Previously validated in other studies	39 (86.7)
Custom	6 (13.3)
Most frequently used deprivation indices	
NCI SES Index[b]	14 (31.1)
Neighborhood Deprivation Index (NDI)	8 (17.8)
Area Deprivation Index (ADI)	6 (13.3)
Social Vulnerability Index (SVI)	3 (6.7)
Treatment of deprivation indices	
Ordinal	36 (80.0)
Continuous	6 (13.3)
Ordinal and continuous	3 (6.7)
Significant association between index and outcome[a]	
Yes	38 (76.0)
No	12 (24.0)

a. Sum adds to more than 45 studies as several studies measured more than one outcome
b. National Cancer Institute Socioeconomic Status Index

8. Michael Rezaee

Current Findings Regarding Perioperative Complications in Benign Scrotal Surgery

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Introduction: Patients commonly pursue benign scrotal surgery for pain control, increased comfort, and improved aesthetics. The potential risks of benign scrotal surgery have not been well described. We sought to characterize patients at the greatest risk of morbidity and mortality after benign scrotal surgery.

Methods: A secondary data analysis was conducted of adults undergoing elective scrotal surgery for benign conditions using 2015-2020 American College of Surgeons National Surgical Quality Improvement data. Patients who experienced a postoperative complication, an unplanned procedure, or who died within 30-days of surgery were identified using the composite outcome "postoperative event". Multiple logistic regression was used to examine the association between patient characteristics and the odds of experiencing a postoperative event.

Results: The study consisted of 12,917 patients, of which 4.1% experienced a postoperative event. After adjustment, malnourishment (OR 4.1, 95% CI: 1.2 – 14.5) decreased functional status (OR 3.8, 95% CI: 2.0 – 7.1), bleeding disorders (OR 3.4, 95% CI: 2.2 – 5.4), age ≥ 40 years (OR 1.6, 95% CI: 1.2 – 2.0), chronic obstructive pulmonary disease, (COPD, OR 1.8, 95% CI: 1.2 – 2.6), smoking (OR 1.4, 95% CI: 1.2 – 1.8), diabetes (OR 1.3, 95% CI: 1.1 – 1.7) and increased body mass index (BMI, OR 1.1, 95% CI: 1.1-1.1) were identified as risk factors for a postoperative event. The risk of a postoperative event was 2.7%, 4.5%, and 11.2% for patients with none, 1 to 2, and > 2 risk factors, respectively.

Conclusions: Complications after benign scrotal surgery are not infrequent. Risk factors include malnourishment, decreased functional status, bleeding disorders, age, COPD, smoking, diabetes, and increased BMI. Our results can be used to counsel patients on their risk of negative outcomes following these procedures.

9. Brianna Krafcik

Discharge to a Rehabilitation or Nursing Facility does not Decrease Readmissions after Lower Extremity Bypass

Brianna M Krafcik MD[1], Aravind S Ponukumati MD[1], David H Stone MD[1], Bjoern D Suckow MD[1], Jennifer A Stableford MD[1], Richard J Powell MD[1], Philip P Goodney MD[1], Jesse A Columbo MD[1]

[1]Dartmouth Hitchcock Medical Center, Section of Vascular Surgery

Introduction: Readmission after lower extremity bypass (LEB) is common. Given their comorbid status, LEB patients are commonly discharged to a facility as a bridge to home. Whether this reduces readmission rates remains unknown. Our objective was to determine whether discharge to a facility reduces 30-day readmissions after LEB.

Methods: We used the Vascular Quality Initiative database to study a contemporary sample of patients who underwent LEB from 2017-2021 for whom readmission status was known. Our primary exposure was discharge location. Our primary outcome was 30-day hospital readmission. We used logistic regression for risk-adjustment.

Results: We identified 6,054 patients who underwent LEB during the study interval. The mean age was 66.41 years (±10.88) and 68.4% of patients were male. The distal bypass targets were 20.6% above knee, 34.8% below knee, and 44.6% tibial and used autologous conduit in 59.4% of cases. We found that 74.5% (4511) of patients were discharged home, 14.5% (880) were discharged to a short-term rehabilitation facility, and 11.0% (663) were discharged to a nursing home. The 30-day readmission rate for the overall cohort was 16.9% (n=1,025). The readmission rate for patients discharged home was 14.7%, 22.4% for patients discharged to a rehabilitation facility and 24.3% for patients discharged to a nursing home. Discharge to a facility did not statistically reduce the likelihood of 30-day readmission. Conversely, patients requiring ambulatory assistance preoperatively, patients on dialysis, and patients suffering bypass graft infection were more likely to be readmitted.

Conclusion: Discharge to a rehabilitation facility following LEB did not lead to a reduction in 30-day readmissions. Factors such as preoperative ambulatory status, dialysis, and bypass graft infections increased the likelihood of readmission. When choosing a location for hospital discharge after LEB, the concern for readmission should not impact decision making.

Table 1. Effect of discharge location and statistically significant comorbidities on readmission after lower extremity bypass.

	Adjusted Odds Ratio	95% Confidence Interval	P value
Discharge to Rehabilitation versus Home	1.19	0.71-1.98	0.51
Discharge to Nursing Home versus Home	0.69	0.37-1.29	0.24
Preoperative Requiring Assistance to Ambulate	1.70	1.12-2.57	**0.01**
Bypass Graft Infection	2.08	1.06-4.09	**0.03**
End Stage Renal Disease on Dialysis	2.82	1.46-5.44	**0.002**

10. Mason Hinchcliff

Novel, Interchangeable, Human and Porcine Laryngeal Dissection Station: Inexpensive Educational Tool for Laryngology Training

Mason Hinchcliff[1] MD, Michael Sramek[2], Yuan Shi[3], Xiaotian Wu[2], Peter Kahng MD[4], Joseph Paydarfar MD[1]

[1]Section of Otolaryngology, Audiology, and Maxillofacial Surgery, Department of Surgery, Dartmouth-Hitchcock Medical Center; [2]Geisel School of Medicine; [3]Thayer School of Engineering at Dartmouth; [4]Department of Otolaryngology – Head and Neck Surgery, University of Michigan

Introduction: The mastery of endolaryngeal surgery requires operative precision. To help achieve this precision, simulation has been used to augment the resident operative experience. Animal larynges provide high simulation validity and are a common and inexpensive resource, but healthcare institutions may restrict the use of operating room equipment on animal tissue. To circumvent this problem we sought to develop a low-cost, 3D printed dissection station that can incorporate multiple 3D printed laryngoscopes and utilize cadaveric and animal tissues.

Methods: 3D CAD models of Dedo and Lindholm laryngoscopes were designed in SolidWorks (Dassault Systèmes, Waltham, MA) based on measurements taken by hand. To facilitate CO2 laser surgery a custom suction port was placed on the superior aspect of the laryngoscopes, which were printed using the FormLabs 3 printer (Somerville, MA). Custom-sized inserts allowed the laryngoscopes to dock with the dissection station. The station was secured to Plexiglass using an adjustable 3D printed arm. Total cost of the station was tabulated using individual component volumes and the per unit price of the material.

Results: The station and custom inserts accepted the 3D printed laryngoscopes without difficulty. Testing of the dissection station allowed for performance of phonomicrosurgery and ablative endolaryngeal surgery, including CO2 laser-assisted cordotomy and partial arytenoidectomy. Total price of the station was $162.

Conclusion: Prior research has demonstrated cadaveric and animal tissue provide high fidelity simulation. 3D printed laryngoscopes help to circumvent potential institutional equipment restrictions, and facilitate low cost, high fidelity simulation for technically challenging laryngoscopy procedures.

11. Jasmine Panton

How Much Do Patients Understand? Scoping Review of Breast Cancer Patients' Understanding of Post-Mastectomy Reconstruction

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Introduction: Patients undergoing post-mastectomy breast reconstruction are faced with complex medical and surgical decisions potentially informed by their degree of health literacy. While studies have evaluated the quality of educational materials on breast reconstruction, there remains little data assessing patients' understanding of post-mastectomy reconstruction. In this study, we present current data assessing health literacy in breast cancer patients contemplating post-mastectomy reconstruction.

Methods: Our scoping review retrieved publications from Cochrane Database of Systematic Reviews, Cumulative Index to Nursing and Allied Health Literature, MEDLINE/PubMed, and Scopus. Based on the initial exploratory research, the following eligibility criteria were selected: original research, systematic reviews, meta-analyses, scoping reviews, rapid reviews, and literature reviews from 2000 onward, English text language, patients aged 18 and older, and surgical intervention including autologous or prosthetic breast reconstruction. The following keywords were used: breast reconstruction, mammaplasty, health literacy, health numeracy, patient education and decision-making aids. Articles were retrieved and analyzed by two independent screeners according to PRISMA-Scr guidelines (Figure 1).

Results: Of 33 articles included for full review, three directly measured levels of patient knowledge surrounding post-mastectomy reconstruction. All publications were prospective, cross-sectional studies that included a total of 2522 women, aged $18 < x < 79$, diagnosed with ductal carcinoma in situ and/or invasive ductal carcinoma. Our included studies showed the following: 25% of demonstrating limited health literacy were significantly less likely to undergo breast reconstruction,[1] a mean knowledge score of 58.5% regarding specifics of breast reconstruction,[2] and that only 11.2% of patients were able to correctly answer all reconstruction-specific questions.[3]

Conclusion: Few studies directly measure breast cancer patients' understanding of post-mastectomy breast reconstruction. Current data suggests a significant proportion of patients demonstrate moderate to low levels of knowledge regarding key components of the procedure, which may in turn be associated with attenuated rates of elective post-mastectomy reconstruction.

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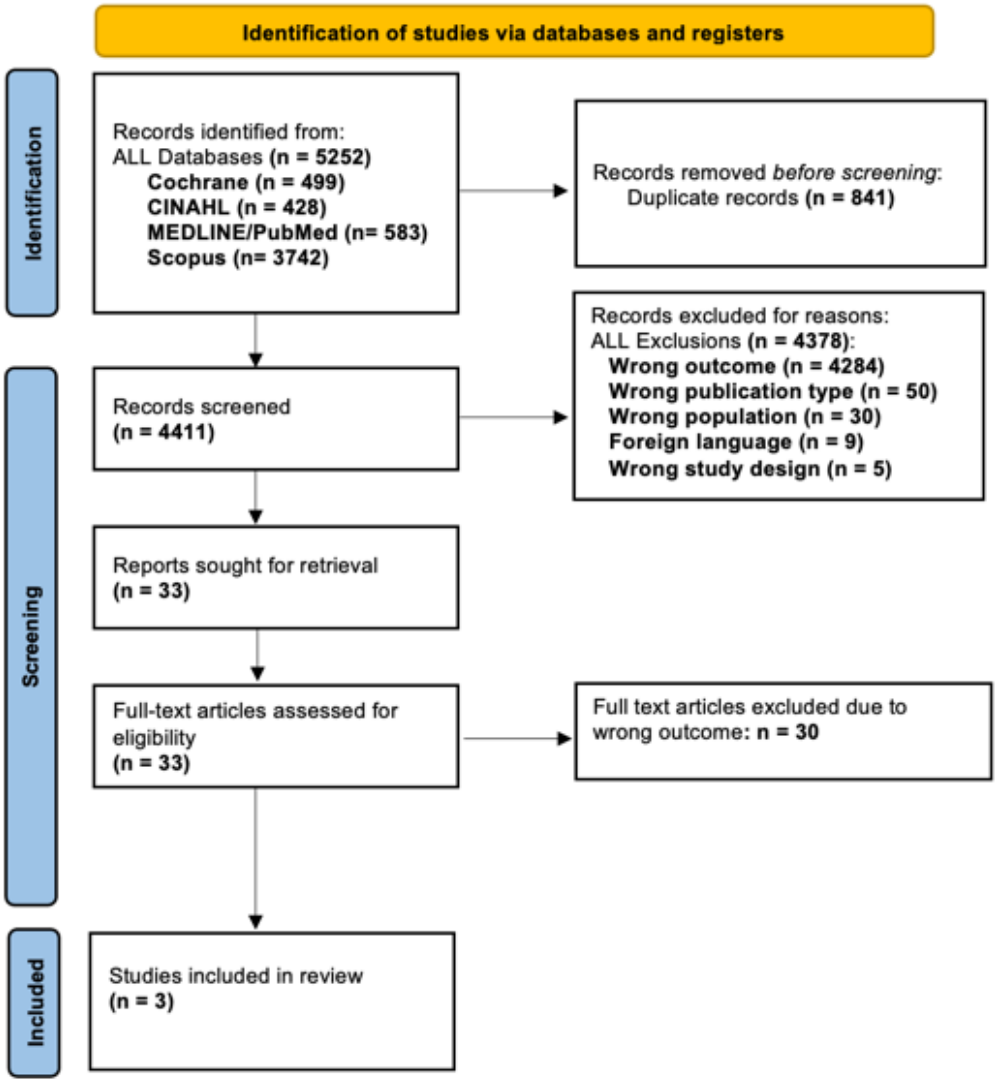
Figure 1. Flow diagram for selection process for articles included in scoping review.



References:

1. Keim-Malpass J, Doede A, Camacho F, Kennedy C, Showalter SL. Impact of patient health literacy on surgical treatment of breast cancer. *Breast Journal*. 2018;24(4):633-636. doi:10.1111/tbj.13011

2. Lee CN, Ubel PA, Deal AM, et al.. How Informed Is the Decision About Breast Reconstruction After Mastectomy?. Annals of Surgery. 2016; 264 (6): 1103-1109. doi: 10.1097/SLA.0000000000001561.

3. Morrow, M., Mujahid, M., Lantz, P.M., Janz, N.K., Fagerlin, A., Schwartz, K., Liu, L., Deapen, D., Salem, B., Lakhani, I. and Katz, S.J. (2005), Correlates of breast reconstruction. Cancer, 104: 2340-2346. https://doi-org.dartmouth.idm.oclc.org/10.1002/cncr.21444

12. Matthew Carroll

The Effect of Preoperative MRI on In-Breast Tumor Recurrence in Patients Undergoing Breast Conserving Surgery: A Systematic Review and Meta-analysis

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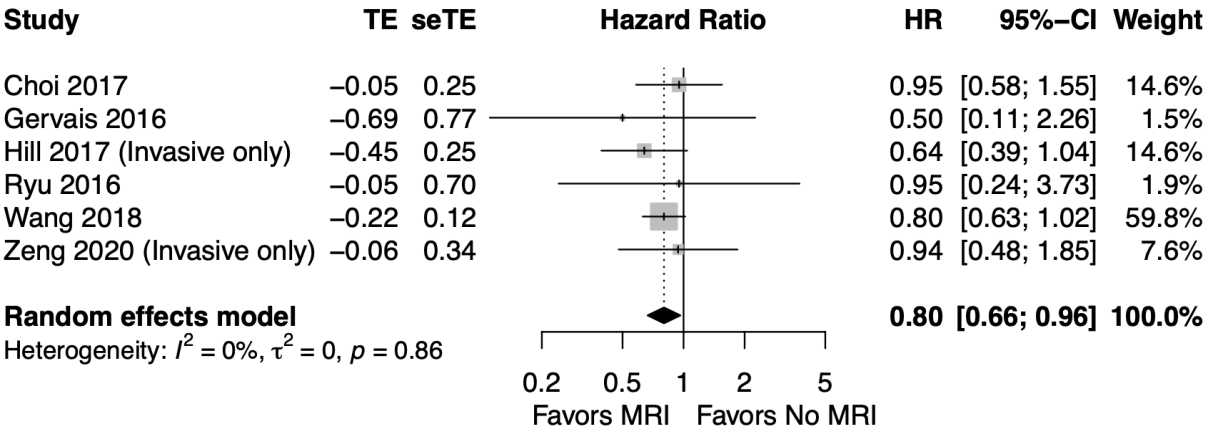
Introduction: Additional ipsilateral cancers can be detected by preoperative MRI and resected at the initial breast conserving surgery (BCS) in 10-15% of patients with primary breast cancer. However, whether this detection decreases the risk of in-breast tumor recurrence (IBTR) in patients undergoing BCS remains poorly understood.

Methods: A systematic review and random effects meta-analysis was conducted with studies reporting data on the use of preoperative MRI and IBTR in patients undergoing BCS. Two researchers independently completed the reference review and data extraction. Authors were contacted for missing information as needed. Eligible studies for the meta-analysis reported a hazard ratio comparing IBTR in MRI vs no-MRI groups. Pooled hazard ratio and 95% confidence interval of risk of recurrence were calculated separately for studies which reported outcomes for patients with invasive cancer, and for studies which included patients with both invasive cancer and DCIS. Heterogeneity was assessed via I 2.

Results: From 767 citations, 17 studies met inclusion criteria for the systematic review and 10 met criteria for the meta-analysis, with 6 studies specifically reporting outcomes for patients with invasive cancer. Statistical heterogeneity yielded an I 2 of 16%. The studies included in the meta-analysis comprised 33,936 patients, with 8,862 (26%) patients receiving preoperative MRI. There were no significant differences between groups in patient age or use of adjuvant radiation, chemo or hormonal therapy. For patients with invasive cancer, the risk of IBTR was lower in patients who received pre-op MRI: HR 0.80 (95% CI 0.66-0.96). When studies reporting patients with DCIS were included, preoperative MRI trended towards being protective against IBTR, HR 0.83 (95% CI 0.698-1.01).

Conclusion: Preoperative MRI in the staging of patients with invasive cancer undergoing BCS was associated with a reduced risk of IBTR. These findings should be considered when deciding on preoperative imaging for patients with invasive breast cancer undergoing BCS.

Figure 1: Locoregional Recurrence of Invasive Cancer



13. Shuo-chieh Wu

Urinary Thiosulfate Level in Stone Forming Versus Non-Stone forming Pregnant Females

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Introduction: Pregnancy is associated with increased excretion of urolithiasis promoters, such as calcium. Increased urinary calcium chelators during pregnancy have been proposed as inhibitors against the urolithiasis promoters, such as citrate. Thiosulfate is a chelating agent that has been associated with protective effect against calcium stone formation in animal models. Our study assessed whether urinary thiosulfate is associated with urolithiasis inhibition during pregnancy.

Method: We recruited a cohort of pregnant patients between year 2014-2019, and collected 24-hour urine. The urine samples were collected from patients on a standardized diet at 3rd trimester, post-partum, and post-lactation stages. Patients were identified as new stone formers during pregnancy or non-stone formers. Urinary thiosulfate and other chemical components were analyzed.

Result: We recruited a total of 14 pregnant patients without history of stones prior to gestation. To control for dietary-induced variation in urine chemistry, all patients were placed on a standardized diet for the day before and day of each collection. Twenty-four hour urine was submitted at 3rd trimester (n = 14), post-partum (n = 12), and post-lactation (n = 6) stages. Four patients had new stone formation during the incident pregnancy. Urinary calcium was noted to be increased in the 3rd trimester ($p = 0.01$) with corresponding increase in the urinary citrate ($p = 0.02$). However, there was no statistical difference ($p = 0.97$) of urinary thiosulfate across 3rd trimester (13.89, IQR 9.1 - 19.71), post-partum (13.87, IQR 8.6 - 20.5), and post-lactation (14.53, IQR 7.7 - 20.9) stages. Stratified analysis showed no significant difference in thiosulfate level between stone former versus non-stone formers.

Conclusion: Unlike urinary citrate and calcium, endogenous urinary thiosulfate does not change significantly from the 3rd trimester of pregnancy to post-partum stage in our cohort of patients on a standardized diet. Our observation does not support urinary thiosulfate as a urolithiasis inhibitor during pregnancy.

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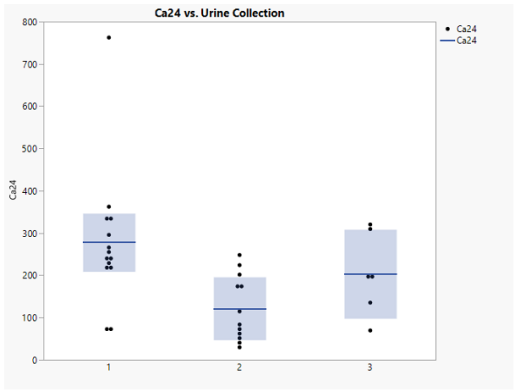
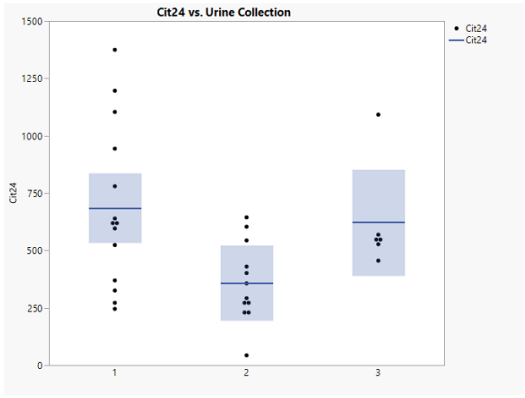
Figure 1. ANOVA of urinary a) calcium, b) citrate, and c) thiosulfate across 3rd trimester (1), post-partum (2), and post-lactation (3) stages.

a)



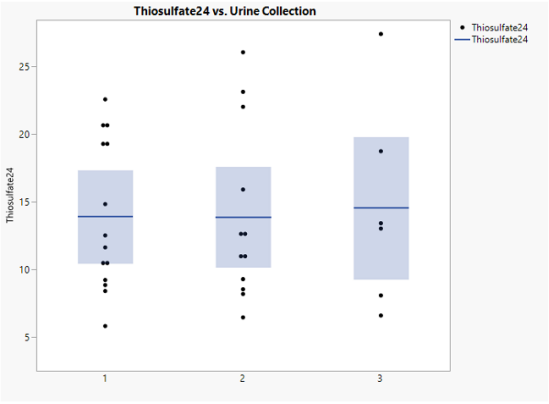
p = 0.01

b)



p = 0.02

c)



p = 0.97

14. Xiangyu Zhao

Interval Changes of Intravitreal Anti-Vascular Endothelial Growth Factor (anti-VEGF) Injections following Pars Plana Vitrectomy (PPV)

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Introduction: We are investigating the effects of pars plana vitrectomy (PPV) on the injection intervals of anti-vascular endothelial growth factor (Anti-VEGF) under the diagnosis of neovascular age-related macular degeneration (nAMD). Given the changes in vitreal properties following the procedure, we hypothesized the intervals would be expected to prolong between two injections. Similarly, we would also study anatomic and functional changes in the eyes that are receiving injections.

Methods: Retrospective chart review was adopted targeting patients who had received PPV and been receiving at least 3 anti-VEGF injections prior to and after PPV. Despite multiple implications of anti-VEGF injections in the retina clinic, we were focusing on the diagnosis of neovascular age-related macular degeneration (nAMD), excluding patients with diabetic macular edema (DME), and retinal vein occlusion (RVO) and other diagnoses. Calculated injection intervals following PPV were statistically compared with those prior to PPV for the same group of patients. Central retinal thickness (CRT) and best-corrected visual acuity (BCVA) outcomes were also assessed.

Results: Forty-five eyes from 45 patients were included under the diagnosis of nAMD. Mean injection interval increased from 44.9 days prior to PPV to 47.4 days following PPV ($p= 0.48$). Measurement of CRT after one year following the PPV was reported to be increased by 34.6 μm ($p<0.001$) significantly in the group of patients with nAMD.

Conclusion: PPV did not significantly alter anti-VEGF injection intervals before and after the procedure. However, significant anatomical changes were observed in the patients.

15. Eileen Brandes

Trends Among Female Pelvic Medicine and Reconstructive Surgery Fellowships (FPMRS) and Graduates

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Introduction: The FPMRS fellowship is a unique collaboration between urology and gynecology specialties, with each program having a core accreditation in either specialty. All programs have identical ACGME milestones, however, there is evidence showing a wide variation in case logs. Additionally, despite programs reportedly accepting residents from either specialty, few have cross-trained graduates. There is paucity of research evaluating the differences between these two fellowship tracks. We aim to characterize FMPRS fellowships between both tracks.

Methods: A 21-item survey was emailed to the 69 ACGME accredited FPMRS fellowship program directors from January 8 through March 9, 2021. The survey aimed to characterize urology-based (UF) or gynecology-based (GF) fellowships and were asked a series of common and specialty-specific questions.

Results: The response rate was 75% (52/69). Many programs stated acceptance of both gynecology and urology-trained applicants (UF 45.4%, GF 68.3%). Within the GF cohort, there have been 10 urology-trained graduates among seven programs (n=1-2) since ACGME accreditation. Barriers to accepting urology applicants were limited gynecologic knowledge/experience (n=14) and length of training (n=11). Thirty-seven (94.8%) GF programs reported their graduates log >30 hysterectomies and 8.3% (n=3) log ≥ three urinary diversions.

Among the UF, there have been 16 gynecology-trained graduates among four programs (n=2–7) since ACGME accreditation. Lack of urologic clinical knowledge (n=4) and training length (n=2) were cited as barriers to accepting gynecology-trained applicants. Three (27%) urology-based programs reported that their graduates log >30 hysterectomies while eight (72.7%) reported that graduates log ≥ three urinary diversions.

Conclusion: Despite many FPMRS programs stating they accept gynecology or urology-trained applicants, few fellows graduate from outside specialty FPMRS training programs. Several barriers were identified that may prevent trainees to be accepted outside of their residency specialty. Procedural training experience differs between UF and GF programs.

16. Xavier Fowler

Does Accessing One's Long-term VQI Quality Report Predict Reporting of Long-term VQI Outcomes? Association Between SRS Report Access and Performance on VQI Follow-up Quality Metrics

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Introduction: Providers interested in the best clinical care need to know the long-term durability of vascular operations – e.g. how EVAR procedures perform over time and when they need further treatment. The Vascular Quality Initiative creates center-specific reports for five-year EVAR outcomes called the Survival, Reintervention, and Surveillance (SRS) Reports. We examined utilization of the 2021 SRS reports and examined associations between report access and performance on two VQI quality metrics (1 year EVAR sac diameter reporting, and 1-year follow-up rates).

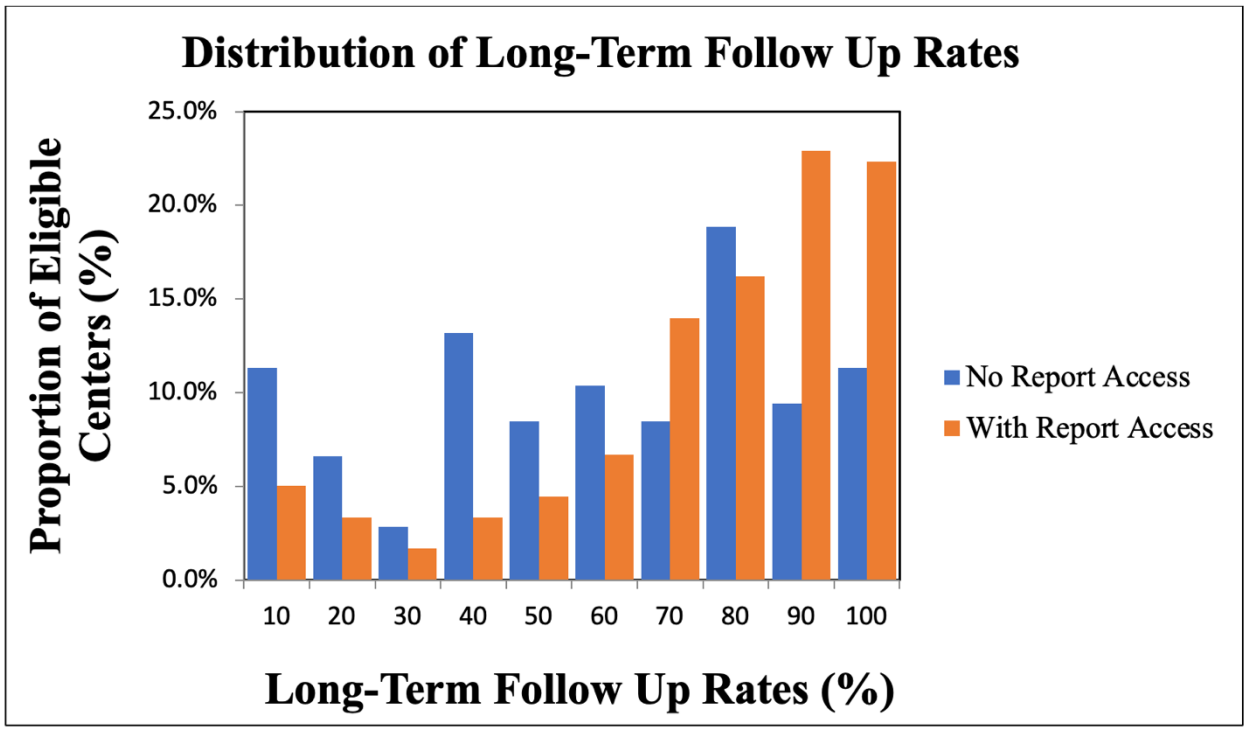
Methods: We obtained data on frequency of report access at all centers issued a 2021 EVAR SRS report. We then examined the frequency of report access and compared this to rates of 1-year EVAR sac diameter reporting and 1-year patient follow-up rates.

Results: 180 (59.4%) of 303 eligible centers accessed their SRS reports. The number of times an eligible center's report was accessed ranged from 0 to 22, with a mean of 1.6. Centers reported sac diameter measurement 0 to 100% of the time, with a mean of 54%. There was a trend towards greater sac diameter measurement reporting amongst centers with at least one report access (57% vs 49%, p=0.07). One-year patient follow up rates ranged from 0% to 100% with a mean of 64%. Mean long-term follow-up rates were significantly higher in centers with at least one access (69% vs 55%, p<.0001). There was no linear relationship between number of accesses and sac diameter reporting rates or long-term follow up rates.

Conclusions: The SRS quality reports were opened by approximately 3 of 5 centers. Centers more likely to satisfy one-year follow up quality metrics were found to have been more likely to have opened their SRS reports. Optimizing SRS report dissemination and impact will be a key priority in future years and has the potential to improve patient care.

16. Xavier Fowler

Figure 1: Distribution of Long-Term Follow Up Rates by Report Access



17. Ashley Sohn

Age as a Prognostic Factor for the Visual Outcome After Scleral Buckle (SB) for Repair of Primary Macula-Off, Rhegmatogenous Retinal Detachment

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Introduction: The purpose of this study was to analyze whether patient's age has a significant effect on the visual outcome after scleral buckle (SB) for treatment of primary macula-off rhegmatogenous retinal detachment (RRD).

Methods: Retrospective consecutive case series. The charts of patients who presented to our institution and NJ Retina with a primary macula-off RRD between 2012 and 2020 were reviewed. Those who underwent treatment with SB were included. These patients were divided into the following two age groups: (A) ≤54 years-old and (B) ≥55 years-old. The primary outcome was post-operative best-corrected visual acuity (BCVA) at final follow-up. The secondary outcome was single-surgery anatomic success (SSAS) rate of scleral buckle. Differences between the two age groups were assessed.

Results: Eighty-six patients met the inclusion criteria. Fifty-eight (67.4%) of them were male. Thirty-seven of them were in Group A and 49 were in Group B. The mean age ± SD was 54.7 ± 16.1 years. The mean follow-up period ± SD was 19.9 ± 12.5 months. The mean pre-operative BCVA logMAR (Snellen equivalent) was 1.21 (20/320) and 1.55 (20/710) for Group A and Group B, respectively. At final follow-up exam, the mean post-operative BCVA logMAR (Snellen equivalent) was 0.33 (20/40) and 0.53 (20/70) for Group A and Group B, respectively (p=0.02). The SSAS rate was 94.6% (35 out of 37) and 79.6% (39 out of 49) for Group A and Group B, respectively (p=0.04).

Conclusion: We found that older age demonstrated a significant negative impact on the visual outcome following scleral buckle repair of macula-off primary RRD. Older age also resulted in a significantly worse SSAS rate.