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Abstracts

CANADIAN ASSOCIATION OF GENERAL SURGEONS

01

Evaluation of physicians' practices and knowledge regarding the treatment of acute uncomplicated diverticulitis. *Raphaëlle Brière, Marce Émond, Axel Benhamed, Pierre-Gilles Blanchard, Sébastien Drolet.* From Université Laval (Brière, Émond, Blanchard, Drolet) and Université Claude Bernard Lyon 1 (Benhamed).

Background: Recent international guidelines recommend treatment without antibiotics for uncomplicated diverticulitis (UD). We assessed physicians' current knowledge and practices regarding UD treatment and identified obstacles to practice changes. **Methods:** A provincial Web-based survey (09/2022 to 11/2022) was emailed to general surgeons, emergency physicians and gastroenterologists through their associations, and to general practitioners via their university family medicine group. Physicians not treating diverticulitis were excluded. **Results:** The overall response rate was 16%. The 466 participants consisted of general practitioners (41%), general surgeons (29%), emergency physicians (18%), residents (7%) and gastroenterologists (5%). Most physicians (43%) were exposed to 1–5 episodes of diverticulitis monthly. One-third (32%) were unaware of the guidelines on UD treatment. Among the participants, 82% had heard of the no antibiotics strategy for UD; however, the majority expressed a certain discomfort toward this management and most reported “never” or “rarely” using it. Compared with primary care physicians (emergency physicians and general practitioners), almost all surgeons had heard of the no antibiotics strategy (75% v. 99%, $p < 0.001$), they were more “comfortable” or “very comfortable” with it (40% v. 66%, $p < 0.001$) and only a few were unaware of the guidelines (43% v. 11%, $p < 0.001$). When informed of the no antibiotics strategy, 29% and 51% of all physicians, respectively, indicated that this would or could change their practice. The most common barriers restricting UD treatment without antibiotics were concerns about treatment failure (70%), lack of knowledge of the recommendations (67%), difficulty in carrying out a close follow-up (59%) and workplace culture (55%). **Conclusion:** Physicians' knowledge of the guidelines recommending the treatment without antibiotics for UD and application of this practice appeared suboptimal. Practice change requires efficient knowledge transfer, education strategies and workplace consensus among all specialties involved in UD management.

03

What is the effect of rurality on outcomes for parathyroidectomy in a large North American jurisdiction? *Rogeb Habashi, Babar Golbon, Jonas Shellenberger, Jesse Pasternak.* From the University of Toronto (Habashi, Golbon, Pasternak) and Queen's University (Shellenberger).

Background: While high-volume surgeons have better results after parathyroidectomy, little is known about patient outcomes across the rurality index (RI). Given a growing demographic outside of urban centres after the pandemic out-migration, regional health systems struggle to support high-quality care pathways close to where patients live. This study investigates outcomes for those undergoing parathyroidectomy in centres across the spectrum of RI within a Canadian province. **Methods:** Using a provincial database, we per-

formed a retrospective cohort study of all patients with classical primary hyperparathyroidism (preoperative calcium > 10.4 mg/dL and nonsuppressed parathyroid hormone [PTH]) who underwent parathyroidectomy between April 2016 and December 2019. Using univariate analyses, we investigated demographics, intraoperative PTH use, outpatient surgery, surgeon volume and outcomes (30-day morbidity and cure rate) by RI. **Results:** All 5136 parathyroidectomies were performed in the most urban regions. Specifically, surgeons in the most populous region (population 2 732 000) performed 35% (1816) of operations while those in the most rural regions (average 34851) performed only 2% (110). General surgeons operated more in cities (40% urban v. 10% smaller communities), although parathyroidectomies were more likely performed by otolaryngologists, particularly in rural settings (60% urban v. 78% smaller communities). Urban surgeons had more than 6 times the yearly volume (37 v. < 6 , $p < 0.0001$) and performed more outpatient surgery (34.2% v. 4.5%, $p < 0.0001$). Less than 10% of parathyroidectomies used intraoperative PTH, with no significant difference across RI (7.1% v. 6.4%, $p = 0.99$). Community surgeons operated on older (66 v. 60 yr, $p < 0.001$), equally morbid (Aggregated Diagnosis Groups 21 v. 18, $p = 0.10$) patients compared with urban surgeons. Similar mean preoperative calcium (11.42 mg/dL), cure rate (91.8%) and 30-day morbidity (3%) were seen across RI. **Conclusion:** Parathyroidectomy was performed exclusively in larger communities, and RI did not influence outcome. Referral patterns and surgeon practice likely push some patients to larger communities but may also signal an undertreatment of those in remote regions.

05

Characteristics of opioid providers for patients undergoing same-day breast surgery in Ontario, Canada. *Shaila Merchant, Jonas Shellenberger, Julie La, Monakshi Sawhney, Susan Brogly.* From Queen's University (Merchant, La, Sawhney, Brogly) and ICES Queen's (Shellenberger, Brogly).

Background: Opioid overprescribing in patients undergoing breast surgery is a concern. We aimed to describe characteristics of opioid providers and determine associations between provider characteristics and high opioid filling in patients undergoing same-day breast surgery in Ontario, Canada. **Methods:** Patients aged 18 years and older undergoing same-day breast surgery between 2012 and 2020 were identified and linked to provider and opioid prescribing data. Opioid prescription filling within 7 days of surgery was used as a proxy for provider prescribing. Primary outcome was current high opioid filling, defined as above the 75th percentile of the mean oral morphine equivalents (OME; in milligrams). Provider sex, main specialty, years in practice, practice setting and history of high opioid prescribing in the previous year were captured. Associations (adjusted risk ratios [RR] and 95% confidence intervals [CI]) between provider characteristics and the primary outcome were estimated in multivariable modified Poisson regression models. **Results:** In total, 60620 patients filled an opioid prescription, of whom 56507 were linked to provider data, with 3545 unique providers and 59251 prescriptions. The mean OME filled for all surgical procedures was 162 ± 355 mg. The mean provider age was 46 ± 11 years, 57% were male, and the mean length of time in practice was 22 ± 11 years. The most

common specialty was general surgery (71%), followed by family medicine (5%), plastic surgery (2%) and surgical oncology (1%). More than half (1971 of 3545 [56%]) of providers wrote at least 1 prescription that was above the 75th percentile of mean OME. Provider characteristics associated with a higher likelihood of high current opioid prescribing were family medicine specialty (RR 1.76, 95% CI 1.55–1.99), male sex (RR 1.21, 95% CI 1.05–1.40) and previous high opioid prescribing behaviour (RR 2.49, 95% CI 2.24–2.78). Family medicine physicians provided only 8% of first prescriptions, but 51% of second prescriptions. **Conclusion:** More than half of providers prescribed amounts greater than the 75th percentile of prescribing. While existing literature focuses on surgeon prescribing habits, our data suggest other specialties, such as family medicine, may also contribute to opioid overprescribing in surgical patients.

06

Improving the management and outcomes of complex non-pedunculated colorectal polyps at a regional hospital in British Columbia. *Lina Cadili, Michael Horkoff, Scott Ainslie, Jeffrey Demetrick, Brian Chai, Kevin Wiseman, Hamish Hwang.* From the University of British Columbia.

Background: Colorectal cancer arises from precancerous lesions, primarily adenomatous and serrated polyps. Some polyps pose significant technical endoscopic challenges due to their size, location and/or morphology. A standardized protocol for documentation and management of these polyps can optimize clinical outcomes for patients. **Methods:** A quality-improvement project compared patients with a complex polyp, defined as nonpedunculated and over 2 cm, for 12 months prior and 12 months after protocol introduction. Documentation and polyp management details were compared pre- and postimplementation using the χ^2 test. **Results:** Seventy patients were diagnosed with complex polyps before the protocol introduction and 77 after. In total, 78% (114/147) of patients underwent endoscopic mucosal resections (EMR) locally, and 17% (25/147) underwent surgery locally. After protocol introduction, there was significant improvement in documentation of suspicious appearing polyps (23% to 52%, $p < 0.005$), luminal circumference (16% to 36%, $p = 0.005$), and management plans (87% to 96%, $p = 0.048$), though other elements of documentation were similar. The number of patients reviewed at multidisciplinary conferences (MDC) increased from 1% to 58% ($p < 0.005$). Patients rebooked for EMR in a 1-hour double endoscopy time slot increased from 19% to 61% ($p < 0.005$), as did specific consent for EMR from 20% to 54% ($p < 0.005$). Among patients with polyps 3 cm or larger (23 pre- 37 postimplementation), MDC review increased from 4% to 68% ($p < 0.005$), primary polypectomy decreased from 72% to 23% ($p = 0.001$), patients rebooked in a double endoscopy slot increased from 33% to 81% ($p = 0.001$), and specific consent increased from 39% to 73% ($p = 0.023$). **Conclusion:** The introduction of a formalized protocol for complex polyp adjudication and management has led to improved documentation, multidisciplinary discussion, and optimal management of complex polyps with dedicated appropriate time for EMR, particularly for polyps larger than 3 cm. There is room for improvement, and this can be approached in a collaborative manner.

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Actinomycosis presenting as an anterior abdominal mass after laparoscopic cholecystectomy. *Zainab Albumoud, Amro Salem.* From King Fahad Specialist Hospital.

Background: Abdominal actinomycosis (AMC) is a rare disease caused by different anaerobic *Actinomyces* species. We report the case of a 55-year-old woman who presented with a painless, slow growing, left upper-abdominal mass that developed after a laparoscopic cholecystectomy. **Methods:** Computed tomography and magnetic resonance imaging scans of the abdomen revealed a desmoid tumour of the left rectus abdominis muscle. Surgical excision was performed, with an uneventful postoperative course. **Result:** The histological analysis of the specimen was inconsistent with a desmoid tumour and revealed an infection of *Actinomyces israelii* in the anterior abdominal wall that was confirmed with a microbiology culture. The surgical treatment was followed by a course of penicillin antibiotic therapy for 6 months. This treatment resulted in full recovery with no further complications. Although it is rare, the patient's history of laparoscopic cholecystectomy was identified as the likely source of infection. **Conclusion:** This case was an unusual presentation of abdominal wall AMC masquerading as a soft tissue tumour of the abdominal wall. Although abdominal AMC is a rare, chronic, granulomatous infection, it should always be considered in the differential diagnosis for patients presenting with an abdominal mass who have a history of surgical or invasive procedures. Diagnosis of abdominal AMC is often difficult: the diagnosis is made preoperatively in less than 10% of cases. Radiological imaging is often suggestive of neoplasm. Definitive diagnosis is based on histochemical and microscopic examination of tissue specimens. Abdominal AMC is an extremely rare infection to occur after cholecystectomy. This is the first case to be reported as an abdominal wall mass after laparoscopic cholecystectomy related to bile spillage, without identification of other previous predisposing risk factors.

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Prioritizing melanoma surgeries to prevent wait time delays and upstaging of melanoma during the COVID-19 pandemic. *Rebecca Lau, Katherine Aw, Carolyn Nessim.* From the University of Ottawa.

Background: The COVID-19 pandemic has disrupted the delivery and usage of health care services. For aggressive cancers such as melanoma, prompt diagnosis, staging and surgical management strongly impact prognosis. Considering the limited resources, emergency closures and staffing shortages during the pandemic, our institution implemented a dedicated care pathway to prioritize cancer surgeries. We aimed to assess whether this strategy was effective at preventing surgical wait time delays and upstaging of melanoma. **Methods:** We retrospectively collected data of patients aged 18 years and older with biopsy-proven primary melanoma who underwent wide local excision between Mar. 1, 2018, and Feb. 29, 2020 (pre-COVID-19), and between Mar. 1, 2020, and Feb. 28, 2022 (during COVID-19). Patients with distant metastasis, recurrence and unknown primary tumour were excluded. Wait time from consult to surgery, tumour (T) and nodal (N) stage, and overall stage were collected. **Results:** We included 409 patients (203 pre-COVID-19 and 206 during COVID-19) with a mean age of 62.2 ± 15.2 years and a male to female ratio of 1.3:1. The mean wait time to surgery was 38.1 ± 23.2 days pre-COVID-19 and 40.2 ± 24.0 days during COVID-19 ($p = 0.482$). There were no differences found in T stage ($p = 0.124$), N stage ($p = 0.177$), or overall melanoma stage

($p = 0.191$). **Conclusion:** These findings highlight the importance of streamlining melanoma surgery during a pandemic. As we emerge from the pandemic and the need arises to meet surgical backlogs, including benign surgery, dedicated cancer surgery should maintain a priority in order not to negatively affect cancer outcomes.

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Trust me, I know them: assessing interpersonal bias in general surgery residency interviews. *Nada Gawad, Kameela Alibhai, Chelsea Towaij, Danielle Doan, Isabelle Raïche.* From the University of Ottawa.

Background: Residency selection integrates objective and subjective data sources. Interviews help assess characteristics like insight and communication, but have the potential for bias. Structured multiple mini-interviews (MMI) may mitigate some elements of bias; however, the degree of familiarity with applicants may contribute to inflated assessments. This study aimed to identify whether prior knowledge of applicants influenced interviewer scores during an MMI-style interview for a Canadian general surgery residency program. **Methods:** This retrospective cohort study compared file review and MMI scores of Canadian and international residency applicants between 2019 and 2021. Applicants were categorized as “home” if they were enrolled in our institution’s undergraduate medical education program, “known” if they completed an elective at the institution, or “unknown” if they had not. The Kruskal–Wallis H test compared median interview scores between groups. Spearman rank-order correlation (r_s) assessed the correlation between file review and interview scores where scores less than 0.3, 0.4–0.6 and greater than 0.7 were considered weak, moderate and strong correlations, respectively. **Results:** Over 3 cycles, 169 applicants were interviewed; 62%, 31% and 6% were unknown, known and home, respectively. Because of the COVID-19 pandemic, 88% of applicants in the 2021 cycle were unknown compared with 55% and 46% in the 2 previous cycles. Median [IQR] interview scores of home applicants (76.0 [13.8]) were significantly higher than known (73.0 [10.0]) and unknown (68.0 [10.3]) applicants ($H = 48.51$, $p = 0.01$). Comparison of groups showed higher positive correlations between file review and interview scores with increasing applicant familiarity ($r_s = 0.15$ v. 0.36 v. 0.55 in unknown, known and home, respectively). **Conclusion:** Interview scores were significantly higher among home applicants. There was also an increased positive correlation between file review and interview scores with applicant familiarity. The MMI process may carry inherent biases that may result in discrepancies between how known and unknown applicants are scored and ultimately selected.

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Current state of female and BIPOC representation in Canadian academic surgical societies. *Rabim Valji, Simon Turner.* From the University of Alberta.

Background: National professional surgical societies comprise the leaders of their respective fields and, as such, it is vital for them to embrace equity, diversity and inclusion (EDI). This study examines sex and racial diversity in 2 Canadian surgical societies. **Methods:** Web sites of the Canadian Society of Cardiac Surgeons (CSCS)

and the Canadian Association of General Surgeons (CAGS) and previous programs of their annual meetings were reviewed. Leadership positions, conference speakers and award winners were categorized by sex and race. Sex and race was determined using a combination of online profiles, first names, surnames and photographs. This study took place in June/July 2022. **Results:** White males made up the largest category for CSCS board of directors and officers (47%), CSCS Spring Meeting speakers (45%), Canadian Cardiovascular Congress (CCC) speakers (CSCS track; 56%), CAGS committee members (45%), CAGS past presidents (88%), Canadian General Surgery Foundation (CGSF) Operating Grant Competition winners (53%) and Canadian Surgery Forum (CSF) speakers (57%). Data on CSF speakers were broken down by year. Data on CAGS committee members were broken down by committee. Of the 17 members who made up the CSCS board of directors and officers, 8 were white males (47%), 5 were Black, Indigenous and people of colour (BIPOC) males (29%), 3 were white females (18%), and 1 was a BIPOC female (6%). Of the 42 members of the CAGS board of directors and advisory committee, 16 were white males (38%), 5 were BIPOC males (12%), 17 were white females (40%), and 4 were BIPOC females (10%). **Conclusion:** Women and BIPOC individuals are underrepresented in both societies. However, in CAGS, improvements in representation can be seen in recent years. Additionally, they have both established EDI committees, which is encouraging. It is imperative that both of these organizations set examples for the rest of their respective fields and embrace diversity.

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Harnessing a province-wide network of surgical excellence and diverse talents for the continuous improvement of surgical care in BC. *Patricia Nicole Balmes, Hamish Hwang, S. Morad Hameed.* From the University of British Columbia.

Background: The general surgery community in British Columbia is a diverse group, with individuals distributed throughout the province. As such, engaging and organizing this varied group in order to achieve their goal of continuously improving surgical care in the province can be a challenge. **Methods:** The private website UBC Reticulum was developed to address this challenge. Based on the needs of the surgeons in the division, key features were introduced: the “Netter” messaging board, the Connections feature and a repository for educational and training resources for practising surgeons. To investigate the impact of UBC Reticulum, site metrics such as traffic and use of specific features were tracked and analyzed. Project outcomes from mentorships under the Reticulum Mentorship Grant were also tracked, along with a survey on mentor and mentee experience. **Results:** Since the launch of UBC Reticulum in May 2019, it has been a transformative tool in connecting and engaging the division. Its 395 users include 211 surgeons, an impressive number for a division with just under 200 surgeons on faculty. And despite the users’ demanding schedules, UBC Reticulum gets 800 to more than 1000 visits per month. The overall use of certain features further highlights the values of the division: more than 50% view educational and training videos, and around 25% visit the Connect page to connect with colleagues with similar interests or to contact colleagues for patient care. The Reticulum Mentorship Grant has also been invaluable in fostering mentorships within the division, with projects ranging from mini-fellowships to rural–urban surgical partnerships. **Conclusion:**

UBC Reticulum has proven to be invaluable in uniting this province-wide division of general surgery. In this way, the UBC Reticulum network serves as a model for other surgical teams in how a coordinated action in surgical education, research and innovation is possible even for diverse networks such as general surgery.

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Massive stone or is it glass: a curious case of porcelain gallbladder. *Jun Guang Kendrick Tan, Ruwan Wijesuriya.* From St. John of God Midland Hospital.

Background: With the increased use of computed tomography (CT) scans, the rate of incidental findings is concomitantly rising. One such finding is gallbladder wall calcification, or “porcelain gallbladder.” Historically, the risk of gallbladder malignancy is 7%–61%; hence, cholecystectomy was routinely offered to all patients. However, about one-third of porcelain gallbladders may be overcalled on imaging. **Methods:** We report a case of porcelain gallbladder mimic and propose suggestions on management. A 64-year-old female had an incidental finding of gallbladder wall peripheral calcification suggestive of porcelain gallbladder on a CT scan of her lumbar spine for workup of back pain. She had a long history of biliary colic, but otherwise no significant medical conditions. We performed a cholecystectomy, and histopathology revealed chronic cholecystitis without wall calcification. **Results:** Upon re-examination of her CT scan, we suspect the rim calcification initially visualized could have been calcification along the outer rim of a large 60mm × 45mm gallstone. **Conclusion:** Current literature reports the risk of gallbladder malignancy in patients with gallbladder wall calcification to be 6% compared with 1% in matched patients without calcification. Hence, if a patient is medically comorbid, it is reasonable to adopt a nonoperative approach. For symptomatic or asymptomatic patients who are medically fit, we recommend prophylactic cholecystectomy.

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Choosing your endoscopist: a retrospective single-centre cohort study. *Jun Guang Kendrick Tan, Nicole Lee Chui Hew, Ruwan Wijesuriya.* From St. John of God Midland Hospital.

Background: Colorectal cancer is the second most common internal malignancy affecting Australians, and colonoscopy is the gold standard for large bowel assessment. There are different specialties that perform colonoscopies, most commonly general surgeons and gastroenterologists. Understanding the difference in scope quality between these specialties could facilitate appropriate triaging. **Methods:** We performed a retrospective single-centre cohort study on 940 patients undergoing colonoscopies by 6 surgeons and 9 gastroenterologists between June 2021 and May 2022. Primary outcomes compared cecal intubation rates (CIR), photo documentation rates (PDR), documented withdrawal rates (DWR), withdrawal times (WT) and adenoma detection rates (ADR) against national guidelines. Secondary outcomes characterized adenoma frequency, optimal WT and indications for colonoscopies. **Results:** We found significant differences between surgeons and gastroenterologists in CIR (93.4% v. 98.3%), PDR (86.8% v. 98.3%), DWR (8.7% v. 82.6%), WT > 6 minutes (80.5% v. 96.6%) and ADR (33.9% v. 61.2%). Subgroup analysis revealed adenoma frequency peaked at 50–70 years of age and optimal WT was 8 minutes or more. We demonstrated surgeons mainly per-

form colonoscopies for diverticulitis surveillance, abnormal imaging, post-cancer resections and rectal bleeding, but gastroenterologist predominantly investigate bowel symptoms, polyp surveillance, positive fecal occult blood test and iron deficiency anemia. **Conclusion:** Despite both specialties surpassing national standards in CIR and ADR, there were significant differences in performance indicators. We believe differences in ADR could be explained by the different indications for which each specialty performs colonoscopies, and simple measures such as increasing WT > 8 mins could improve ADR.

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The local experience with endoscopic ampullectomy for non-invasive ampullary lesions at a single tertiary care centre. *Matthew Lund, Jeffrey Hawel, Jamie Gregor, Ken Leslie.* From Western University and London Health Sciences Centre.

Background: Ampullary neoplasms are rare lesions, often associated with familial adenomatous polyposis (FAP). Resection is mandatory because of the risk of malignant conversion. Traditionally, resection required a formal pancreaticoduodenectomy. More recently, advances in endoscopic techniques meant that endoscopic ampullectomy (EA) has become a viable option for select patients. However, a standardized technique does not exist, and high-quality data on outcomes and safety are lacking. **Methods:** A retrospective cohort study of all patients who underwent EA for noninvasive ampullary lesions at a single tertiary care centre between Jan. 1, 2010, and June 30, 2022, was performed. Our primary outcome was rate of tumour recurrence after EA. Secondary outcomes included rates of postprocedure bleeding, pancreatitis and duodenal perforation. Demographics and patient outcomes were compared between FAP and non-FAP patients undergoing EA. **Results:** A total of 10 FAP and 33 non-FAP patients were identified. None of the FAP patients had invasive carcinoma in the final specimen, compared with 2 of the non-FAP patients. Tumour recurrence occurred in 28% of cases, with an average time to recurrence of 32 months. Five of 10 FAP patients had recurrence, compared with 7 of 33 non-FAP patients ($p = 0.075$). Complications occurred in 30.2% of patients. Postprocedure pancreatitis requiring hospitalization was the most common complication, occurring in 16.3% of patients. Prophylactic pancreatic duct stenting was associated with a significantly reduced rate of pancreatitis (7.4 v. 31.3%, $p = 0.041$). Postprocedure bleeding occurred in 7% of cases. Rates of perforation and stenosis were 2.3% and 4.7% of patients, respectively. There was no difference in complication rate between FAP and non-FAP patients. **Conclusion:** EA remains a low-volume procedure, with a higher complication rate than for standard endoscopic retrograde cholangiopancreatography. Tumour recurrence is common, reaffirming the importance of postprocedure surveillance. Patients who received pancreatic duct stenting had a significantly reduced rate of postprocedure pancreatitis.

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Defining appropriate intraoperative patient blood management strategies in noncardiac surgery: the Ottawa Intraoperative Transfusion Consensus. *Tori Lenet, Daniel McIsaac, Julie Hallet, Angela Jerath, Manoj Lalu, Stuart Nicholls, Justin Presseau, Alan Tinmouth, Michael Verret, Christopher Wherrett, Dean Fergusson, Guillaume Martel; for the Ottawa Consensus On Intraoperative PBM.* From the University of Ottawa (Lenet, McIsaac, Lalu, Tinmouth, Wherrett,

Martel), University of Toronto (Hallet, Jerath), Ottawa Hospital Research Institute (Nicholls, Presseau, Fergusson), and Université Laval (Verret).

Background: There is marked variability in red blood cell (RBC) transfusion practice during the intraoperative period. The development and implementation of existing clinical practice guidelines have been ineffective in reducing this variability. We sought to develop an internationally endorsed consensus statement about intraoperative transfusion decision-making in major noncardiac surgery. **Methods:** A Delphi technique with an anonymous 3-round iterative rating and feedback process was used. An international expert panel of surgeons, anesthesiologists and transfusion medicine specialists was invited to participate. Thirty-eight statements were developed addressing decision-making (interprofessional communication, clinical factors, hemoglobin measurement techniques, procedural considerations and audits), restrictive transfusion strategies, patient-centred considerations, and research considerations (equipoise, outcomes, protocol suspension, minimal clinically important differences). Panellists were asked to score statements on a 7-point Likert scale. Consensus was established when at least 75% agreement was observed. **Results:** The 33-member expert panel recommended routine pre- and intraoperative discussion between surgeons and anesthesiologists about intraoperative RBC transfusion and postoperative review of intraoperative transfusion events. The use of point-of-care hemoglobin testing devices was recommended to guide RBC transfusion, along with an algorithmic transfusion protocol that may include a restrictive hemoglobin transfusion trigger, although this requires further evaluation owing to a lack of evidence assessing the implementation of restrictive triggers in the operating room. Expert consensus recommended a detailed preoperative consent discussion with patients of the risks and benefits of both anemia and RBC transfusion and routine disclosure of intraoperative transfusion. Postoperative morbidity and mortality were recommended as the most relevant outcomes related to intraoperative RBC transfusion, and transfusion triggers of 70 and 90 g/L were considered acceptable hemoglobin triggers to evaluate restrictive and liberal transfusion strategies in clinical trials. **Conclusion:** This consensus statement offers internationally endorsed expert guidance on intraoperative RBC transfusion practice for noncardiac surgical procedures at medium or high risk of bleeding across several key domains. Future work should emphasize knowledge translation strategies to integrate these recommendations into routine clinical practice and transfusion research activities.

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Postoperative gastrointestinal dysfunction after neuromuscular blockade reversal with sugammadex versus cholinesterase inhibitors in patients undergoing gastrointestinal surgery: a systematic review and meta-analysis. *Sabil Sharma, Tyler McKechnie, Gaurav Talwar, Janhavi Patel, Luke Heimann, Aristiibes Doumouras, Dennis Hong, Cagla Eskicioglu.* From McMaster University (Sharma, McKechnie, Talwar, Patel, Doumouras, Hong, Eskicioglu) and Liberty University (Heimann).

Background: Postoperative gastrointestinal dysfunction (POGD) is common following gastrointestinal surgery and is associated with anesthetic agents. Cholinesterase inhibitors have

traditionally been used for neuromuscular blockade reversal and are implicated in the development of POGD. Sugammadex is a novel reversal agent associated with reduced POGD. Comparative review between these agents on POGD following gastrointestinal surgery is lacking. Our study aimed to systematically review the effects of sugammadex on POGD compared with cholinesterase inhibitors following gastrointestinal surgery. **Methods:** Comprehensive search of MEDLINE, Embase and CENTRAL was performed to July 2022. Articles were included if they compared sugammadex with cholinesterase inhibitors in patients undergoing gastrointestinal surgery in terms of POGD. Secondary end points included length of hospital stay, readmission and postoperative morbidity. **Results:** Following screening of relevant articles, 2 randomized controlled trials and 3 retrospective cohorts met inclusion criteria. Overall, 717 patients were in the sugammadex group (mean age 59 ± 13 yr, 53.4% female) and 812 patients were in the cholinesterase inhibitors group (mean age 59 ± 14 yr, 50% female). Significantly lower rates of postoperative ileus (odds ratio [OR] 0.44, 95% confidence interval [CI] 0.25–0.77, $p < 0.05$) were seen with sugammadex. No significant difference in postoperative nausea and vomiting (OR 0.58, 95% CI 0.31 to 1.09, $p = 0.09$), readmission (OR 0.92, 95% CI 0.57 to 1.5, $p = 0.74$), postoperative morbidity (OR 0.6, 95% CI 0.3 to 1.21, $p = 0.15$), or length of stay (mean difference -0.01 , 95% CI -0.38 to 0.37 , $p = 0.97$) was observed. **Conclusion:** The use of sugammadex for reversal of neuromuscular blockade following gastrointestinal surgery is associated with significantly lower rates of postoperative ileus compared with cholinesterase inhibitors. This does not translate into a significant reduction in length of stay, morbidity, postoperative nausea and vomiting, or readmission rates. Our results were limited by the number of studies included and missing data. Future prospective studies are needed to delineate the role of sugammadex in recovery after gastrointestinal surgery.

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Factors influencing recurrence in medial breast cancer after skin-sparing mastectomy and immediate breast reconstruction. *Cbristine Wang, Michael Guo, Longlong Huang, Shaun Sun, Noelle Davis.* From University of Calgary (Wang), University of British Columbia (Guo, Davis), and University of the Fraser Valley (Huang, Sun).

Background: Skin-sparing mastectomy (SSM) with immediate breast reconstruction (IBR) has been established as a safe option for curative-intent surgical resection. Prior studies have shown that medial location of the primary tumour is associated with increased risk of local recurrence. The purpose of this study was to determine the factors associated with recurrence and survival in individuals with breast cancers located in the inner quadrants (medial) who underwent SSM with IBR. **Methods:** A retrospective chart review was done on individuals with medial breast cancer who received SSM with IBR in our province between 1980 and 2012. Patient demographics, disease characteristics, treatment and recurrence outcomes were gathered. **Results:** Of 136 individuals with medial breast cancer undergoing SSM with IBR, with a mean follow-up duration of 19.25 years, 27.9% experienced local recurrence (LR) and 42.6% overall recurrence. Factors associated with recurrence were T stage (44.8 v. 22.4% with T2 disease, $p = 0.02$), transverse rectus abdominis muscle

(TRAM) flap reconstruction (48.3 v. 29.5%, $p = 0.00395$), prior breast surgery (87.9 v. 63%, $p = 0.002$) and prior radiation therapy (74.1 v. 38.5%, $p < 0.0001$). LR was associated with higher mortality (odds ratio 2.78). **Conclusion:** For patients with medial tumours undergoing SSM with IBR, potential risk factors for recurrence are T stage, TRAM flap reconstruction, prior breast surgery and prior radiation therapy. Local recurrence is associated with poor survival.

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What is the role of fit in medical education? A scoping review. *Julian Wang, Samuel Skulsky, Lindsey Sikora, Isabelle Raïche.* From the University of Ottawa.

Background: Finding applicants who fit in with educational environments is a goal of many educators in hopes that it will lead to successful training. Fit is used colloquially to describe a general feeling; however, the field of study has grown to include specific terms describing the compatibility between people and their environments, organizations and jobs. This review aimed to examine the current literature of fit in medical education. The focus was on how fit is defined, measured and whether it correlates to educational outcomes. **Methods:** A systematic database search was conducted in 2022 with MEDLINE, Embase, APA PsychINFO, ERIC and Education Source from 1970 to Dec. 31, 2021. Key search terms included fit, student, medicine, clinical and education. Relevant data included definitions of fit, measurement tools and correlation with educational outcomes. The study used the standard 6-step scoping review framework while adhering to PRISMA methodology. **Results:** The search identified 1277 nonduplicate articles. After screening, 10 articles were included in the review. Academic definitions of fit were found in 2/10 articles. The word “fit” alone was used in 4/10, and 4/10 articles described it in other words. Fit was measured primarily through personality and value testing with interviews and surveys. Educational outcomes were reported in 2/10 articles and correlated positively with fit. **Conclusion:** Person–organization fit may correlate positively with medical education outcomes; however, there is limited research in this field. Further research should explore methods in evaluating for fit in trainee selection while avoiding discrimination based on intrinsic biases.

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The obesity paradox revisited: Is obesity still a protective factor for patients with severe comorbidities or in high-risk operations? *Hyo Jin Son, Denise Gee, David Gomez, James Jung.* From the University of Toronto (Son, Gomez, Jung) and Massachusetts General Hospital (Gee).

Background: Obesity is a risk factor associated with lower life expectancy and quality of life. However, in cases of acute stress (i.e., critical illness, surgery), patients with obesity appear to have better outcomes than healthy-weight counterparts, a phenomenon known as the obesity paradox. It is unknown whether this paradox extends to patients with severe comorbidities and high-risk surgery. **Methods:** We performed an observational study of adult patients who underwent surgery using the 2016–2019 National Surgical Quality Improvement Program (NSQIP) database to evaluate the association between body mass index (BMI) and 30-day postoperative mortality. BMI was categorized into underweight (< 18.5 kg/m²),

healthy (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), obesity class I (30–34.9 kg/m²), obesity class II (35–39.9 kg/m²) and obesity class III (≥ 40 kg/m²). We first estimated the risk-adjusted effects of BMI on mortality using pertinent confounders. We then stratified the cohort by case complexity and comorbidity severity using a modified Charlson Comorbidity Index (mCCI) and mortality probability. Stratified subgroups were analyzed using multivariable regression models. **Results:** In the sample of 3 085 582 patients, 47% had obesity. There was a reverse J-shaped association between BMI and mortality, with highest and lowest odds in the underweight (odds ratio [OR] 1.58, 95% confidence interval [CI] 1.47–1.70) and obesity class II categories (OR 0.69, 95% CI 0.65–0.73), respectively, confirming the obesity paradox. However, obesity status was no longer protective against mortality for patients who underwent high-risk procedures (BMI 30–34.9 kg/m²: OR 0.93, 95% CI 0.86–1.01; BMI 35–39.9 kg/m²: OR 0.92, 95% CI 0.83–1.03; BMI ≥ 40 kg/m²: OR 0.94, 95% CI 0.83–1.07), those with high comorbidity severity of mCCI ≥ 8 (BMI 30–34.9 kg/m²: OR 0.95, 95% CI 0.77–1.16; BMI 35–39.9 kg/m²: OR 0.78, 95% CI 0.60–1.02; BMI ≥ 40 kg/m²: OR 0.84, 95% CI 0.63–1.12) and with top 3% mortality probability (BMI 30–34.9 kg/m²: OR 0.96, 95% CI 0.90–1.02; BMI ≥ 40 kg/m²: OR 0.94, 95% CI 0.86–1.01). **Conclusion:** The obesity paradox did not hold true for patients with high comorbidity severity or those undergoing high-complexity cases.

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Planetary health education for residents — an integrative approach through quality improvement. *Rajajee Selvam, Nieve Seguin, Lisa Zhang, Ariane Lacaille-Ranger, Lindsey Sikora, Daniel McIsaac, Husein Moloo.* From the University of Ottawa.

Background: Climate change is a public health emergency. Health care providers need to adapt care to this reality to mitigate our carbon footprint. For many residents, education in planetary health does not exist. To understand how to incorporate planetary health into residencies, we performed a scoping review to explore the inclusion of planetary health in medical education. **Methods:** A search strategy developed with a health sciences librarian was run on 6 databases from inception to February 2022: MEDLINE, Embase, APA PsycINFO, CINAHL, Global Health and Scopus. The framework outlined by Arksey and O’Malley (2005) was implemented to select studies that described the implementation of planetary health within undergraduate and postgraduate medical education. Commentaries were included if they outlined what a potential curriculum would entail. Extracted data were grouped thematically based on competencies described, key considerations for curricular development and anticipated barriers. **Results:** After screening 2564 studies, 43 studies were included, of which 11 were observational studies, 21 were commentaries, 3 were reviews and 8 were qualitative studies. Twenty-seven studies involved medical education, while 14 discussed multidisciplinary education including veterinary medicine and nursing education. Two studies discussed planetary health education for staff physicians. Reported competencies were varied, but included the dissemination of climate health literacy and its application to clinical practice. Key considerations for curricular development included longitudinal implementation, interprofessional collaboration and experiential

learning through case-based discussions or quality-improvement (QI) projects. Barriers to implementation included time constraints and the lack of knowledgeable educators. **Conclusion:** Our scoping review highlights themes to help faculties and accreditation bodies implement and advocate for planetary health within resident education. Experiential learning through QI projects allows for interprofessional collaboration as well as the longitudinal integration of these concepts across residency education. Efforts should be made to facilitate QI projects with an emphasis on the triple bottom line.

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A rare case of concurrent primary malignancies: adrenal cortical carcinoma and metastatic colon cancer. *Alicia Follett, Holly, Michael Organ, David Pace.* From the Memorial University of Newfoundland (Follett, Dempster, Organ, Pace) and Eastern Health (Dempster, Organ, Pace).

Background: Adrenal cortical carcinoma (ACC) is a rare disease. We report, to our knowledge, the first documented case of concurrent ACC and stage IV colon adenocarcinoma. **Methods:** A 76-year-old female was incidentally found to have concurrent ACC and colon adenocarcinoma after presenting to the emergency department with a fractured hip. There was no family history of adrenal or colorectal cancer. Following successful treatment of the hip fracture, a colonoscopy was performed to investigate her microcytic anemia. A mass in the descending colon was identified, and pathology showed at least high-grade dysplasia. Computed tomography scanning of chest/abdomen/pelvis was unable to visualize the colonic mass, though a heterogeneous mass in the left upper quadrant was identified. Subsequent magnetic resonance imaging of the abdomen identified an 8.7-cm left-sided retroperitoneal mass. Uncertain of the origin of the mass, a biopsy was performed that revealed an epithelized neoplasm of uncertain malignant potential favouring adrenal cortical origin. Screening adrenal bloodwork and tumour markers were unremarkable. After discussion at tumour boards, the case was referred for surgery. **Results:** At the time of laparotomy, a left hemicolectomy was performed as well as a left adrenalectomy/splenectomy. An isolated 1.5-cm hard, white nodule was found in the left lobe of the liver and removed. Final pathology showed adrenal cortical carcinoma with invasion through the capsule and focally to an inked resection margin, mucinous adenocarcinoma without lymph node involvement, and metastatic mucinous adenocarcinoma in the liver consistent with the colonic primary. Adjuvant chemotherapy was not offered owing to poor performance status. Radiation therapy to the adrenal resection bed is being considered. **Conclusion:** We report a case of concurrent primary adrenal carcinoma with stage IV colon adenocarcinoma. After appropriate workup, surgery was successfully performed with an uneventful recovery. Adjuvant treatment options were limited owing to the poor performance status of the patient.

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Effect of video-based self-assessment on intraoperative skills: a pilot randomized controlled trial. *Saba Balvardi, Pepa Kaneva, Koorosh Semsar-Kazerooni, Carmen Mueller, Melina Vassiliou, Mohammed Al Mabroos, Julio F. Fiore Jr., Kevin Schwartzman, Liane Feldman.* From McGill University (Balvardi, Kaneva, Mueller, Vassiliou, Al Mahroos, Fiore Jr., Feldman), the Steinberg-Berstein Centre for Minimally

Invasive Surgery and Innovation (Kaneva, Semsar-Kazerooni), McGill University Health Centre (Semsar-Kazerooni) and the Research Institute of the McGill University Health Centre (Schwartzman).

Background: The value of video-based self-assessment in enhancing surgical skill is uncertain. This study investigates the feasibility and estimates sample size for a full-scale randomized control trial (RCT) to evaluate the effectiveness of video-based self-assessment to improve surgical performance of laparoscopic cholecystectomy (LC) in trainees. **Methods:** This parallel pilot RCT included general surgery trainees performing supervised LC randomized 1:1 to the control (traditional intraoperative teaching) or intervention group (video-based self-assessment and traditional teaching). Operative performance was measured by the attending surgeon, blinded to group assignment at the time of surgery using assessment tools (GOALS and OPRS). The intervention group had access to their video recordings on a Web-based platform and performed self-assessment using the same instruments. Primary outcome for estimation of sample size was change in faculty-assessed operative performance from the first to third case. Feasibility criteria included > 85% participation, > 85% adherence to case submission and > 85% completion of self-assessment. Multivariate linear regression was used to compare changes in operative skill between the 2 groups. **Results:** Of 37 eligible trainees approached, 32 consented and were randomized (86%); there were 16 in the intervention group and 15 in the control group (55% male, 55% junior trainees). Twenty-four (75%) participants submitted 3 cases. Thirteen trainees (81%) accessed the platform and completed 26 (63.2%) case self-assessments. There was greater improvement in the intervention than the control group for GOALS (adjusted difference +3.34, 95% confidence interval [CI] -0.07 to 6.76) and OPRS (+0.80, 95%CI -0.07 to 1.67). Fifty-five trainees will be needed to power a full-scale RCT with GOALS and 130 trainees with OPRS as the assessment tool. **Conclusion:** This pilot study contributes important data to inform the design of an adequately powered RCT. While a priori trial feasibility criteria were not achieved, automated video capture and storage could significantly improve adherence in future trials.

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A cost-utility study of elective hemorrhoidectomies in Canada. *Michael Guo, Abmer Karimuddin, Gui Ping Liu, Trafford Crump, Jason Sutherland.* From the University of British Columbia (Guo, Karimuddin, Liu, Sutherland), St. Paul's Hospital (Karimuddin), and University of Calgary (Crump).

Background: Elective hemorrhoidectomies are one of the most common colorectal surgeries, with demonstrated improvements in quality of life reflecting symptomatic relief provided by surgery. Cost-utility data on hemorrhoidectomies incorporating patient perspectives are not yet described in a Canadian context. This study will estimate the cost-utility of a hemorrhoidectomy using preference-based measures of health using Canada-specific costs and patient preferences. **Methods:** This study is based on a longitudinal cohort of patients who underwent elective hemorrhoidectomies between September 2015 and November 2022. Quality-adjusted life years (QALYs) attributable to surgery were calculated by comparing and discounting pre- and postoperative health utility values derived from the EQ-5D(5L) questionnaire. Health benefit

from hemorrhoidectomy was interpreted across a 10-year interval after surgery and the average Canadian lifespan of 82 years. Costs were calculated from a health system perspective, which incorporated costs of hospital stay and specialists' fees (in 2022 Canadian dollars). **Results:** Among eligible patients, 94 (47%) completed both pre- and postoperative EQ-5D questionnaires. The mean gain in QALYs 10 years after surgery was 1.0609, and 1.7762 QALYs over a presumed lifespan of 82 years. The average cost of the surgery was \$3166, which was higher and more variable in the oldest age group (71–81 yr). The average cost per QALY was \$2985 when health benefits were expected to accrue for 10 years following surgery. The cost per QALY was higher for females (\$3821/QALY) than males (\$2485/QALY) and higher with age (\$8079/QALY for 71–81 yr and \$2052/QALY for 19–40 yr, respectively). **Conclusion:** Hemorrhoidectomies have been associated with significant gains in health status and were inexpensive relative to the associated gains in quality of life compared with established willingness-to-pay thresholds. These data suggest that incremental increases in surgical capacity for elective hemorrhoidectomies are beneficial from a health systems perspective.

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Opioid-free hernia repair using local anesthetic: an assessment of postoperative pain and recovery. *Kala Hickey, Erin M. Bonisteel, Jurgienne Umali, Ibrahim Dogar, Geoffrey Warden, Darrell Boone, Alexander Mathieson, Michael Hogan, David Pace.* From Memorial University of Newfoundland (Hickey, Bonisteel, Umali, Dogar, Warden, Boone, Mathieson, Hogan, Pace).

Background: Hernia repair using local anesthetic is a safe, cost-effective approach to hernia repair. This study was a prospective evaluation of the short-term outcomes of patients undergoing hernia repair in a day surgery unit using local anesthetic. The primary outcome was postoperative pain. **Methods:** Thirty-three patients underwent hernia repair using local anesthetic between August 2022 and March 2023. All patients were given a prescription of oral ketorolac for pain control following surgery and were advised to take acetaminophen as required. No patients were prescribed opioids. Patients were contacted by telephone on postoperative days 0, 1 and 7 to assess outcomes. Pain was assessed using a 4-point verbal rating scale (0 = none, 1 = mild, 2 = moderate, 3 = severe), and patient satisfaction was assessed using a 9-item Quality of Recovery Score (QoR-9), both validated questionnaires. **Results:** There were 27 males and 6 females included, with a mean age of 56 (range 30–79) years and a mean body mass index of 28 (range 22–38) kg/m². Repairs, performed by 4 different surgeons, included 16 inguinal hernias, 12 umbilical hernias, 4 incisional hernias and 1 femoral hernia. Mesh was used in all but 6 cases. Mean operative time was 30.5 (range 9–58) minutes. Lidocaine 1% with epinephrine was used in all cases. The mean pain scores on postoperative day 0 and day 1 were 1.52 and 1.42 and they decreased significantly by day 7 to 0.70. The QoR-9 scores were high, increasing in a nonsignificant manner on postoperative days 0, 1 and 7 from 16.2 to 16.4 to 16.9 out of a maximal score of 18. Two patients went to the emergency department on postoperative day 0 for incisional bleeding. At the 2-month follow-up visit, there were no early hernia recurrences and no wound infections. **Conclusion:** Hernia repair using local anesthesia is safe and well tolerated without the need for opioids.

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Mitigating the environmental burden of surgical and isolation gowns. *Nieve Seguin, Husein Moloo, Yiran Li, Gordon Best.* From the University of Ottawa (Seguin, Best) and The Ottawa Hospital (Moloo, Li).

Background: By accounting for 4.6% of Canada's total greenhouse gas emissions, health care is a significant contributor to environmental deterioration and subsequently deleteriously affects human health. It is paramount to find sustainable alternatives to commonly used disposable hospital items. We therefore applied the triple bottom line approach to transition from disposable to reusable gowns. **Methods:** An assessment of the environmental, financial and social perspective of shifting from disposable to reusable gowns was undertaken at a tertiary care centre with a yearly use of 273 150 gowns. Life cycle assessment, a structured tool deemed most effective for environmental performance, was adapted to our institution. For the financial evaluation, we considered price per use, reduction in warehouse space, inventory management cost and loss of surgical instruments. Literature review was used to incorporate patient safety and staff preference. **Results:** Based on the yearly use mentioned from 2021/22 data, the transition of both surgical and isolation gowns would result in total savings of approximately 2 million MJ of natural resource energy, 131 000 kg CO₂ of global warming potential, 103 000 kg of blue water and 33 000 kg of waste generated. The estimated savings from switching to reusable gowns is 135 000\$ CAD per year. Based on our literature review, reusable gown use does not increase the rate of surgical site infection, and laundering did not significantly affect gown safety performance. **Conclusion:** The findings from this analysis resulted in a decision to facilitate change at our institution. Furthermore, this methodology was already used to initiate projects with goals to yield similar results at 3 other major centres. Based on this initiative, we strongly believe every health care centre in Canada should shift to reusable gowns.

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The evolution and contributions of the *Canadian Journal of Surgery*: a bibliometric study. *Rachel Leong, Sam Wiseman.* From the University of British Columbia (Leong, Wiseman) and St. Paul's Hospital (Wiseman).

Background: The *Canadian Journal of Surgery* (*CJS*) is Canada's longest published surgical journal. For 66 years it has contributed to significantly advancing the nature of surgery, patient care and outcomes through publication of high-quality research. The objective of this study was to perform a bibliometric analysis of all papers published in *CJS* since its indexing in 1968 to identify impactful contributions and trends in publication, and thus an overview of its impact in the field. **Methods:** Bibliometric data from all publications in *CJS* from Jan. 1, 1968, to Dec. 31, 2022, were extracted from the Web of Science Core Collection database. Descriptive and visual bibliometric analysis was performed using Bibliometrix and VOSViewer software, respectively. VOSViewer was used to visualize co-citation and co-occurrence analyses. **Results:** There were 6290 documents, excluding meeting abstracts, published in *CJS* during the 54-year study period. The average age of these documents was 28 years, with an average citation per document rate of 9.596 and an annual growth rate of 0.69%. The majority of these publications were original papers

($n = 4465$ [70.99%]), reported by Canadian centres ($n = 3207$ [50.99%]), and from authors affiliated with the University of Toronto ($n = 813$). There were 8 classic cited papers published. The most common keywords for *C7S* papers were management ($n = 205$), surgery ($n = 215$) and outcomes ($n = 112$). **Conclusion:** Bibliometric analysis of *C7S* provides an overview of the impact and contributions of this journal. We identified the most productive countries, provinces, institutions, authors and topics. *C7S* has been, and continues to be, an important part of Canadian surgical discourse through its continued dissemination of quality research.

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Clinical and oncologic outcomes of patients with rectal cancer and past radiotherapy for prostate cancer: a case-control study. *Abmed Amine Alaoui, Roy Hajjar, Evelyne Wassef, Danny Sebastien Metellus, François Dagbert, Rasmy Loungnarath, Richard Ratelle, Frank Schwenter, Éric Debroux, Ramses Wassef, Marianne Gagnon-Konamna, Alfons Pomp, Carole S. Richard, Herawaty Sebjang.* From the Centre hospitalier de l'Université de Montréal and Université de Montréal.

Background: Patients presenting with rectal cancer and past prostate cancer are often clinically challenging, and the management of these patients is not well established in the literature. This study aims to evaluate and compare surgical and oncological outcomes of patients who underwent rectal cancer surgery following prostate cancer treatments. **Methods:** A single-centre retrospective cohort study was conducted among men who had an oncological rectal surgery with past treatments for prostate cancer. The prostate cancer group was divided into 2 groups: those with prostate radiotherapy (RT) with or without radical prostatectomy (PRT group) and those with prostate cancer not treated with RT (PNRT group). For the control group, 100 men presenting for rectal cancer surgery at the Centre hospitalier de l'Université de Montréal without past prostate cancer were randomly selected. Of these 100 patients, only men 55 years or older, respecting the inclusion/exclusion criteria, were included in the study. **Results:** There were 61 patients in the prostate cancer group (36 with prostate RT and 25 without prostate RT). In the control group, 66 patients were included in the analyses. The 3 groups were comparable in age, comorbidities and colorectal cancer characteristics. The control group had more anastomoses (100%) than the PNRT group (76.0%) and the PRT group (41.2%; $p < 0.0001$). Concerning anastomotic healing, the anastomotic leak rate was significantly higher in the PRT group (33%) than the PNRT group (26%) and the control group (11%; $p = 0.05$). However, the length of hospital stay was not significantly affected (control: 12 d; PNRT: 16 d; PRT: 14 d). There was no significant difference between the 3 groups concerning disease-free and overall survival. **Conclusion:** Patients with past prostate cancer have increased surgical morbidity, as shown by the higher anastomotic leak rate. Their disease-free survival and overall survival are, however, not affected.

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Antibiotic prophylaxis and mechanical bowel preparation in elective colorectal surgery: a survey of Quebec general surgeons. *Abmed Amine Alaoui, Roy Hajjar, François Dagbert, Rasmy Loungnarath, Herawaty Sebjang, Richard Ratelle, Frank Schwenter, Éric Debroux, Ramses Wassef, Marianne*

Gagnon-Konamna, Alfons Pomp, Manuela M. Santos, Carole S. Richard. From the Centre hospitalier de l'Université de Montréal (Alaoui, Hajjar, Dagbert, Loungnarath, Sebjang, Ratelle, Schwenter, Debroux, Wassef, Gagnon-Konamna, Pomp, Richard), the Centre de recherche du Centre hospitalier de l'Université de Montréal (Alaoui, Hajjar, Dagbert, Loungnarath, Sebjang, Ratelle, Schwenter, Debroux, Wassef, Gagnon-Konamna, Pomp, Santos, Richard), and Université de Montréal (Alaoui, Hajjar, Dagbert, Loungnarath, Sebjang, Ratelle, Schwenter, Debroux, Wassef, Gagnon-Konamna, Pomp, Santos, Richard).

Background: The recommendations for antibiotic prophylaxis (ABP) and mechanical bowel preparation (MBP) in elective colorectal surgery have evolved in recent years. Nowadays, intravenous (IV) and oral antibiotics are required before surgery, and MBP is necessary for all colonic segments. The adherence rate to these recommendations in the province of Quebec is unknown, and this study aims to assess provincial practices in elective colorectal surgery. **Methods:** An electronic questionnaire was sent to the 478 general surgeons practising in the province of Quebec. **Results:** In total, 147 surgeons participated in the survey (31% participation rate), and 137 responses were included in the analysis after excluding participants with missing answers. Most participants (70.8%) were based in hospitals with a capacity of 100–500 beds. All but 3 responders performed at least 10 elective colorectal cases per year. For the ABP, 26 participants (19.0%) fully adhered to the latest recommendations. The majority adhered to the recommendation of administering IV antibiotics, but a minority added appropriate oral antibiotics. Sixty-seven participants (49%) fully adhered to the latest recommendations concerning MBP. Most participants (51.0%) did not prescribe MBP for some or all colonic segments before surgery. In total, 17 participants (12.4%) fully adhered to the recommendations concerning ABP and MBP. There was no correlation between adherence to the recommendations and the number of colorectal procedures performed annually or the hospital's capacity. **Conclusion:** This study suggests that most participants administer ABP and MBP before elective colorectal surgery. However, only a minority administer oral antibiotics and MBP for all colonic segments. As the latest recommendations are not widely followed, propagation of this knowledge is required to ensure optimal preparation of patients before elective colorectal surgeries.

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Identifying core deficiencies and needs in the surgical knot-tying curriculum: a single-centre qualitative analysis. *Ge Shi, Regina Leung, Christina Lim, Sarah Knowles.* From Western University.

Background: Knot tying is a fundamental skill in surgical education. To gain proficiency, trainees are typically taught in person following the “see one, do one” apprenticeship model with supplemental resources such as videos. However, the quality and availability of training is subject to limited resources in the form of time, expertise and finances. The pandemic further emphasized this limitation in fundamental skills training with mass cancellations of in-person learning and elective surgeries. Our objective was to assess the core deficiencies and needs of

undergraduate training in surgical hand ties at a single centre to ultimately guide curriculum development using novel technologies. **Methods:** An anonymous questionnaire was administered to all medical students at a single undergraduate medicine institution who had completed their core surgical clerkship rotation. Basic demographic data, Likert-scale questions regarding preparedness with hand tying and short-answer responses regarding resources and challenges on learning hand ties were assessed. Appropriate combined quantitative and qualitative analyses were conducted. **Results:** Fifty learners completed the questionnaire. In total, 28% did not feel comfortable performing hand ties at the end of their surgical rotation, and 44% did not feel comfortable laying a square knot. Only 14% were satisfied with the medical school teaching of hand ties, and 66% wished for improved resources. Most learners used online videos and in-person workshops for learning hand ties with a median total learning time of 1–2 hours. Common challenges identified by learners were lack of high-quality resources, opportunity and time as well as difficulty of translation from simulated practice to clinical setting. Self-identified methods for improving the curriculum included more in-person teaching sessions, dedicated opportunities to practise, personalized feedback by experts and high-quality offline resources to teach hand ties. **Conclusion:** This study has revealed core needs and deficiencies in our undergraduate knot-tying curriculum. We aim to use these findings to develop and implement curricular improvements using emerging immersive technologies.

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Spleen-preserving surgery for symptomatic benign splenic cyst: video case report. *Simran Parmar, Christine Wang, Estifanos Debru.* From the University of Calgary.

Background: Splenic cysts (SCs) may be true cysts or pseudocysts that may develop after a traumatic event. Nonparasitic SCs are rare. No treatment guidelines exist for the management of SCs, and many variations in technical details have been reported to preserve the spleen. Techniques include partial splenectomy, cyst fenestration and cystectomy. **Methods:** We present the case of a 36-year-old healthy male who presented to our clinic with symptoms of abdominal fullness and flank discomfort. This was diagnosed as a large benign SC based on preoperative workup that included computed tomography (CT) imaging. The CT scan demonstrated a magistral splenic artery. **Results:** The patient underwent a laparoscopic splenic cystectomy without any complication, resulting in complete symptom relief. Pathology showed benign splenic tissue with pseudocyst present. The patient was discharged on postoperative day 2 and made a full recovery at 6 weeks postoperatively. **Conclusion:** Minimally invasive spleen-preserving techniques for benign uncomplicated SCs are a viable alternative to splenectomy. Spleen-preserving surgical approaches have the advantage of preserving splenic function and mitigating patient morbidity.

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Learning to manage power differentials and navigate uncertainty: a qualitative interview study about decision-making in surgery. *Fardowsa Mobamed, Megan Anakin.* From the University of Otago.

Background: Decision-making is a vital part of surgical practice. Decision-making skills are taught from preregistration education to specialist training. It can be challenging to learn and teach decision-making skills in surgical settings, where decisions are complex, urgent and can be high stakes. When these challenges are viewed through a social and cultural lens, we may be able to understand the process by which students and clinicians learn and teach decision-making. This study examines how sociocultural factors influence learning and teaching decision-making skills in a surgical setting. **Methods:** The Theory of Practice Architectures was used to inform the design of this qualitative study. Twelve semistructured interviews were conducted with 4 final-year medical students, 4 registrars/residents and 4 consultant surgeons in a regional New Zealand department of general surgery. Transcripts were analyzed with a reflexive thematic approach. **Results:** Findings indicate that factors that influence the learning and teaching of decision-making skills are embedded in a network of expectations and behaviours. This network enables and constrains how students and teachers interact with each other. Two key elements were identified: 1) tacit rules of who spoke or acted suggested how power differentials between people determined how decision-making was performed, and 2) the way teachers characterized and negotiated uncertainty had an impact on how students experienced their role in the decision-making process. **Conclusion:** When surgical education is viewed from a social and cultural perspective, interactions between students and clinicians become powerful influences on how decision-making is learned. By further considering how power differentials can be managed and how uncertainty may be navigated in surgical settings, students and their teachers may be able to critically analyze their behaviour and expectations to make changes that enhance decision-making for everyone.

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Surgical education checklist: a novel tool to improve uptake of Competence By Design in a residency program and surgical resident experience. *Yung Lee, Yasith Samarasinghe, Jigish Khamar, Bradley Petrisor, Tyler McKechnie, Cagla Eskicioglu, Ilun Yang.* From McMaster University.

Background: Canadian surgical residents have reported difficulties in completing their entrustable professional activity (EPA) requirements for the Competence By Design (CBD) curriculum. The surgical education checklist (SEC) aims to streamline discussion surrounding the EPA assessment and is being implemented through a multi-institutional study. We provide preliminary results from residents and faculty regarding their experience with the CBD curriculum before SEC implementation. **Methods:** The SEC contained pre- and postoperative components and was provided to surgical residents and faculty for 6 months at teaching hospitals. A pre- and post-checklist survey collected experiences with the SEC and overall CBD curriculum. The EPA data specific to general surgery residency was collected to identify changes in EPA completion and faculty engagement. Subgroup analyses occurred based on postgraduate year (PGY). **Results:** In total, 29 faculty surgeons and 33 residents responded to the pre-checklist survey. Among faculty, 31% are satisfied with the institution's approach to EPAs. Among residents, 15% believe they can consistently obtain EPA evaluations, 3% agree that EPA feedback has improved their

operative skills, 73% are anxious regarding EPA completion, and 12% feel that EPAs will ensure they have the necessary skills to practice. Specifically for the general surgery residency program, 485 EPAs were triggered between July 2022 and December 2022, with 17.5% left incomplete by faculty. Only 76.6% of faculty completed at least 2 EPAs, with a mean of 8.5 ± 7.6 EPAs per faculty. Mean EPAs triggered by residents were greater in PGY5t than PGY1 (20.8 v. 6.1, $p = 0.03$). **Conclusion:** Overall, the current provision of the CBD curriculum requires change, as faculty and residents highlight dissatisfaction and issues with the current approach, including lack of consistency, anxiety around EPA evaluations and low EPA completion rates. The SEC may address this issue by providing a standardized platform to engage in EPA discussions.

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A comparative evaluation of management strategies and patient outcomes for acute appendicitis in the post-COVID era. *Hamaa N. Mughal, Mumtaz Bhugio, Mubammed A. Gok, Usman A. Khan.* From East Cheshire NHS Trust.

Background: Acute appendicitis (AA) is the most common cause of acute surgical abdomen worldwide. Operative management of AA has been the mainstay of treatment. Aerosol-generating procedures, including appendicectomies, were at high risk of spreading infection during the COVID-19 pandemic. Therefore, NHS England opted for nonoperative management strategies in treating surgical emergencies during this period. This study aimed to evaluate the management of AA both during and after the pandemic. **Methods:** Descriptive demographics, preoperative imaging, biochemistry and patient outcomes were evaluated for AA cases between March 2020 and February 2023. The AA cases post-COVID were used as controls. **Results:** Total AA cases during and after the pandemic were $n = 354$ and $n = 235$, respectively. Admissions via primary care were greater post-COVID (37.4%, $p < 0.0001$). Admissions via emergency departments were greatest during the pandemic (84.2%, $p < 0.001$). However, these cases were radiologically uncomplicated ($p < 0.0001$), managed nonoperatively ($p < 0.0001$), had prolonged antibiotic courses ($p < 0.005$) and had greater rates of readmission ($p < 0.05$). Preoperative biochemical markers (white cell count and C-reactive protein) or size of resected appendix specimen did not adversely affect operating times, surgical approach or length of stay during and after the pandemic ($p = \text{NS}$). **Conclusion:** Increased radiologically complicated presentations of AA via primary care post-COVID suggests delayed presentation due to the pandemic. Use of preoperative biochemistry and radiology for clinical diagnoses of AA facilitated the safe nonoperative management of AA during the pandemic. However, conservative management strategies have resulted in increased cost and workload to resource-constrained surgical departments through outpatient follow-up, readmissions, repeat imaging and interval appendicectomies post-COVID.

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External benchmarking of colorectal resection outcomes using ACS-NSQIP: accurately categorizing procedures at risk of morbidity. *Alisha R. Fernandes, Richard Spence, Geoffrey Porter, C. Marius Hoogerboord, Katerina Neumann.* From Dalhousie University.

Background: American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) semi-annual reporting (SAR) of an 11-site provincial collaborative (PC) of colorectal surgery outcomes in 2021 suggested higher overall morbidity and surgical site infection (SSI) compared with the international benchmark. Higher morbidity and SSI were noted following colectomy but not proctectomy, specifically at the provincial tertiary care hospital (TCH). The NSQIP identifies subgroups using procedure-targeted coding (CPT). Inter-rater reliability of CPT coding is poor within Canada, resulting in frequent mis-coding of proctectomies as colectomies. By contrast, *International Classification of Diseases 10th Revision* (ICD-10) codes are assigned by disease location. Here, ICD-10 codes were used instead of CPT codes to stratify the PC cohort for subgroup analysis using the ACS-NSQIP Surgical Risk Score Calculator. **Methods:** The calculator was used to generate risk-adjusted expected outcomes per the international benchmark for malignant colorectal procedures (January–December 2021), which were stratified into colectomy and proctectomy by ICD-10 code. With expected outcome set as the control and observed outcome as the event, odds ratios were calculated. **Results:** The PC performed 429 colorectal procedures for malignancy. Observed overall morbidity (odds ratio [OR] 1.7, 95% confidence interval [CI] 1.2–22.7, $p = 0.0014$) and anastomotic leak (OR 2.7, 95% CI 1.3–5.3, $p = 0.0041$) were significantly higher than expected. There was no significant increase in overall morbidity or anastomotic leak for PC ($n = 241$) or TCH ($n = 42$) colectomies. Among PC proctectomies ($n = 188$) overall morbidity (OR 2.0, 95% CI 1.3–3.2, $p = 0.0031$) and anastomotic leak (OR 3.2, 95% CI 1.1–8.9, $p = 0.0285$) were higher than expected; this was similar in the TCH cohort ($n = 58$; overall morbidity: OR 2.3, 95% CI 1.0–5.1, $p = 0.047$; anastomotic leak: OR 10.5, 95% CI 1.3–85.6, $p = 0.0285$). The SSI rate was not significantly different in any cohort. **Conclusion:** Using the ACS-NSQIP calculator for benchmarking, we found increased overall morbidity and anastomotic leak after proctectomy, but not colectomy for the PC and TCH when stratified by ICD-10 codes, in contrast to SAR results. ICD-10 subgroup stratification of NSQIP data may be informative when implementing targeted quality-improvement initiatives.

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Role of thymectomy in surgical treatment of secondary and tertiary hyperparathyroidism. *Michal Pillar, Michael Guo, Neraj Manbas, Adrienne Melck.* From the University of British Columbia (Pillar, Guo, Manbas), and St. Paul's Hospital (Melck).

Background: Routine transcervical thymectomy at the time of parathyroidectomy in patients with renal hyperparathyroidism (HPT) remains controversial. While it may decrease recurrence rates if a supernumerary and/or ectopic intrathymic parathyroid gland or parathyroid cell rests are excised, it may also increase the risk of parathyroidectomy. Recently published guidelines provide a weak recommendation to consider routine thymectomy based on low-quality evidence. To provide further evidence for or against routine thymectomy in these patients, we aimed to compare rates of recurrent HPT and surgical complications with and without thymectomy in patients undergoing parathyroidectomy for secondary and tertiary HPT. **Methods:** A retrospective cohort of patients who underwent surgical treatment for renal HPT between Jan. 1, 2010, and Oct. 1, 2022, was identified from a tertiary

endocrine surgery referral centre. In those who underwent concomitant transcervical thymectomy, pathology from the thymus was reviewed for the presence of parathyroid tissue. Recurrent HPT and surgical complications were compared between those who underwent thymectomy and those who did not. **Results:** Of 81 patients included (44 with secondary and 38 with tertiary HPT), 15 (18.3%) had a thymectomy at the time of subtotal parathyroidectomy. Two thymus glands (13.3%) contained parathyroid tissue. Recurrence was observed in 7 patients (8.6%), 3 of whom underwent reoperation. Receiving a thymectomy was not significantly associated with disease recurrence (odds ratio 1.25, 95% confidence interval 0.06–10.19, $p = 0.85$), even after adjusting for secondary/tertiary status and preoperative calcium. More complications (including nerve injury, permanent hypoparathyroidism, and bleeding) were observed in the thymectomy group than the nonthymectomy group (26.7% v. 19.4%). **Conclusion:** Our data do not support routine thymectomy at the time of parathyroidectomy for renal HPT as it did not afford lower rates of recurrent HPT yet it did lead to more postoperative complications. Parathyroid tissue was only identified in 2 of the resected thymus glands.

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Starting position during colonoscopy: a systematic review and meta-analysis of randomized controlled trials. *Tania Kazi, Tyler McKechnie, Ghazal Jessani, Luke Heimann, Yung Lee, Dennis Hong, Cagla Eskicioglu.* From McMaster University (Kazi, McKechnie, Jessani, Lee, Hong, Eskicioglu) and Liberty University (Heimann).

Background: Traditional endoscopic teaching has been for patients to be placed in the left lateral decubitus position at the start of colonoscopies. This approach is rather dogmatic, however, without high-quality data supporting its use. As such, recent randomized controlled trials (RCTs) have been designed to compare a left lateral decubitus starting position to other approaches. The aim of this systematic review and meta-analysis was to compare different starting positions for colonoscopies in terms of efficiency and effectiveness. **Methods:** MEDLINE, Embase and CENTRAL were searched from inception to November 2022. Articles were eligible for inclusion if they were RCTs comparing at least 2 different starting positions for adults undergoing diagnostic or surveillance colonoscopy. The main outcome was cecal intubation time. A meta-analysis was performed using an inverse variance random effects model. Risk of bias (RoB) of the included studies was assessed with the Cochrane RoB Tool for RCTs 2.0. **Results:** After screening 1523 citations, 14 RCTs were included. Four studies compared left lateral decubitus to right lateral decubitus, 4 studies compared left lateral decubitus to left lateral tilt-down, 3 studies compared left lateral decubitus to prone, and 3 studies compared left lateral decubitus to supine. There was no significant difference in cecal intubation time across all of the pairwise comparisons (left lateral decubitus v. right lateral decubitus: mean difference [MD] 14.9, 95% confidence interval [CI] -111.8 to 141.6, $p = 0.82$, $I^2 = 85\%$; left lateral decubitus v. left lateral tilt-down: MD -31.3, 95% CI -70.8 to 8.3, $p = 0.12$, $I^2 = 82\%$; left lateral decubitus v. prone: MD 17.2, 95% CI -174.9 to 209.4, $p = 0.86$, $I^2 = 94\%$; left lateral decubitus v. supine: MD -149.9, 95% CI -443.6 to 143.9, $p = 0.32$, $I^2 = 89\%$). **Conclusion:** The starting position for diagnostic or therapeutic colonoscopies likely does not influence cecal intubation time. The present review was limited by between-study heterogeneity.

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Enhanced Recovery After Surgery protocols following emergency intra-abdominal surgery reduces length of stay and postoperative morbidity: a systematic review and meta-analysis. *Tyler McKechnie, Léa Tessier, Vicki Archer, Lily Park, Dan Cohen, Sameer Parpia, Mohit Bhandari, Joanna Dionne, Cagla Eskicioglu.* From McMaster University.

Background: Enhanced Recovery After Surgery (ERAS) protocols are standard of care for patients undergoing elective surgery, but their use in patients undergoing emergent surgery is less common. This systematic review and meta-analysis was designed to evaluate whether ERAS protocols for adult patients undergoing emergency intra-abdominal surgery improves outcomes compared with conventional perioperative care. **Methods:** MEDLINE, Embase, Web of Science, CENTRAL and PubMed were searched from database inception to December 2022. Articles were eligible for inclusion if they were randomized controlled trials (RCTs) or cohort studies comparing ERAS protocols to conventional perioperative care for adult patients undergoing emergency intra-abdominal surgery. The main outcomes were postoperative length of stay (LOS) and postoperative morbidity. Meta-analyses was performed using an inverse variance random effects model. Risk of bias (RoB) was assessed with the ROBINS-I or Cochrane RoB Tool for RCTs 2.0. Grading of Recommendations, Assessment, Development, and Evaluations assessment of the certainty of evidence were performed. **Results:** After screening 1018 citations, 20 studies (9 RCTs, 11 observational cohorts) with 1615 patients enrolled in ERAS programs and 1933 patients receiving conventional perioperative care were included. Low-certainty evidence demonstrated a significant reduction in postoperative LOS in the ERAS group for patients undergoing upper gastrointestinal (GI) surgery (mean difference [MD] 3.35 d, 95% confidence interval [CI] 2.52–4.17 d, $p < 0.001$, $I^2 = 61\%$) and lower GI surgery (MD 2.80 d, 95% CI 2.62–2.99 d, $p < 0.001$, $I^2 = 0\%$). Low- to very-low-certainty evidence demonstrated a 44%, 34% and 58% reduction in risk of overall postoperative morbidity in the ERAS group for patients undergoing upper GI surgery (relative risk [RR] 0.56, 95% CI 0.30–1.02, $p = 0.06$, $I^2 = 25\%$), lower GI surgery (RR 0.78, 95% CI 0.67–0.91, $p = 0.001$, $I^2 = 0\%$) and general surgery (RR 0.50, 95% CI 0.38–0.67, $p < 0.001$, $I^2 = 0\%$), respectively. **Conclusion:** Current best evidence suggests ERAS protocols for patients undergoing emergency intra-abdominal surgery decreases postoperative LOS and morbidity. Definitive conclusions are limited by RoB, imprecision and indirectness of available studies.

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Competencies, privileging and geography: preparing general surgery residents for rural practice in British Columbia. *Sara Bolin, Rebecca Afford, Madeleine Armstrong, Abmer Karimuddin.* From the University of British Columbia.

Background: For general surgeons practising in rural areas, multiple factors influence care beyond skills learned in residency. The British Columbia Privileging Dictionary (BCPD) defines core and non-core procedures that shape the scope of procedures performed by general surgeons. Moreover, the Royal College of Physicians and surgeons of Canada has adopted a Competence by Design (CBD) curriculum that employs entrustable professional activities (EPAs) that list the surgical skills in which residents must be proficient by graduation. Our goal is to better understand current practice

patterns of non-urban general surgeons in BC based on these policies and local factors to better inform general surgical training. **Methods:** Medical Service Plan (MSP) data were collected from 2011 to 2021 based on general surgeons working in Rural Subsidiary Agreement (RSA) communities. The MSP fee codes were organized into core or non-core procedures, as outlined by the BCPD. The EPAs were assessed and compared with the non-core procedures. **Results:** From 2011 to 2021, 222 793 procedures were performed in rural sites in BC. On average, 85.69% (\pm standard deviation [SD] 20.78) procedures done in all communities were BCPD core procedures. The most common non-core procedures performed by general surgeons were in plastic surgery ($n = 8080$, 3.63%). In total, 8.63% of all procedures performed were not covered by general surgery training program EPAs. Notably, all EPAs have been performed in rural settings. **Conclusion:** General surgeons working in rural settings perform procedures outside of EPAs that account for almost 9% of their caseload, and approximately 1 in 7 procedures done are in non-core privileges. This provides some insight into the potential limitations of the BCPD on new surgeons in these communities. Furthermore, the CBD curriculum provides a more flexible approach to learning in the form of EPAs, so it may be tailored to suit residents' learning and career goals, including varied surgical skills to suit rural needs.

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Holographic surgical skills training: Can we use holograms to teach hand ties and is it comparable to in-person learning? *Regina Leung, Ge Shi, Christina Lim, Aaron Grant, Julie Ann Van Koughnett, Sarah Knowles. From Western University.*

Background: Rapid advances in display technologies have brought about mixed reality (MR) devices in many sectors of society. These technologies integrate digital objects into our physical world and create immersive environments where users can interact with holograms. They are flexible, individualized and intuitive visualization tools. While they are increasingly theorized for use in teaching complex visual-spatial motor skills, their uptake within surgical education systems is still in its infancy. During the pandemic, surgical skills teaching such as hand tie sutures suffered owing to the cancellation of in-person learning. As a result, greater emphasis was placed on digital learning formats that can be delivered in a self-directed or remote manner. We explored the feasibility of learning visual-spatial motor skills such as hand ties using MR. Following this, we developed the first MR application to teach surgical hand ties. **Methods:** A pair of holographic hands were created and projected in front of learners who were evaluated on their ability to learn complex hand motions with MR in comparison to traditional methods of video- and apprenticeship-based learning. Following this, we used MakeHuman, Blender and Unity to develop the first prototype of our MR application, HoloHands, with modules that teach surgical hand ties. **Results:** Scores between HoloLens and in-person apprenticeship learning were comparable. All felt MR was an effective learning tool. Most noted that MR models were better than existing didactic methods. The MR advantages included the ability to provide true 3D spatial representation, improved visualization of smaller structures in detail and improved interactivity. **Conclusion:** We demonstrate the ability to learn visual-spatial motor skills such as hand ties effectively with MR holograms. Using this pilot data, we developed the first proof-of-concept MR application, HoloHands, to teach surgical hand ties in a high-fidelity, 3D, sustainable and interactive fashion.

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The association between gender and confidence in UBC general surgery residents. *Elizabeth Clement, Claire Lange, Aishwi Rosban, Abmer Karimuddin, Tracy Scott. From the University of British Columbia.*

Background: Confidence is integral to a successful and safe surgical practice, and it has recently been suggested that a confidence crisis exists among graduating residents. Many factors influence a trainee's confidence, including the trainee-evaluator relationship, operative experience and stress level. Interestingly, it has been shown that male gender is associated with self-reported increased confidence, implying that women's confidence lags relative to that of their male counterparts. This study aimed to investigate whether there is an association between gender and confidence among general surgery trainees. **Methods:** All narrative comments from resident evaluations from 2014 to 2019 were collected, deidentified and sorted for their use of the word confidence. The comments were then scored independently by 2 raters, categorizing a resident's confidence level as under-, appropriate or over-confidence, or other meanings, including a staff's confidence in a resident. Discordantly scored comments were moderated by a third rater. Data were then unblinded and χ^2 analysis performed to determine significant differences, with significance set at 0.05. **Results:** In all, 2469 evaluations (52% female, 48% male) were searched and 145 contained "confident" (57% female, 43% male, $p = 0.215$). After scoring, inter-rater reliability was 0.91. There were 110 that commented on resident confidence level (63 female, 47 male, $p = 0.308$), while 34 relayed other uses such as the staff's confidence in the resident (19 female, 15 male). Of the comments about resident confidence, 57 relayed under-confidence (33 female, 24 male), 50 relayed appropriate confidence (30 female, 20 male), and 3 relayed over-confidence (0 female, 3 male, $p = 0.0495$). **Conclusion:** It is just as likely for males and females to receive narrative comments about their levels of confidence when being evaluated and, overall, there is no association between gender and a resident's confidence. However, an association between gender and confidence emerges when analyzing residents with discrepant levels of confidence, suggesting that males are more likely to demonstrate overconfidence than females.

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Quality improvement in timeliness of EPA completion in general surgery residency. *Kara Nadeau, Jennifer Macmillan, Jaime Wilson, Madeleine Deschenes, Aruba Nurullah, Caitlin Cahill. From the Northern Ontario School of Medicine (Nadeau, Macmillan, Wilson, Deschenes, Nurullah, Cahill), Muskoka Algonquin Healthcare (Macmillan), Health Sciences North (Cahill), and Northeastern Ontario Rectal and Colong Specialists (Cahill).*

Background: With the transition to Competence by Design (CBD), entrustable professional activities (EPAs) have become a key component in resident evaluation. They provide essential feedback and coaching, identify challenges for early remediation, determine resident progression and provide quality assurance of surgical training. Preimplementation, the turnover period for completion of EPAs ranged from immediate to months after the encounter. Many are never completed at all. The feedback provided when completion is delayed is generally vague owing to

limited recall of the event. It has been suggested that the optimal time to evaluate EPAs is within 72 hours of the encounter and that completion after 14 days should be excluded from assessment data. Preimplementation audit revealed that only 32% of EPAs were completed within 3 days of the encounter, and only 57% were completed within 14 days. **Methods:** A quality-improvement initiative was undertaken within the general surgery department with the aim to improve timeliness of resident EPA completion. Stakeholder analysis identified timeliness as a necessary component of EPAs to provide constructive feedback, that a cultural shift may increase surgeon motivation and accountability to prioritize timely EPA completion, and that EPAs are felt to be time-consuming in an already busy environment. Multiple interventions were undertaken, including an educational session, facilitation of the technological process, email and poster reminders and personalized feedback. **Results:** A substantial improvement in EPA timeliness was achieved, with 93% completion within 14 days of the encounter and no incomplete assessments since implementation. The rate of same-day completion improved from 15% to 62%. The median number of days to completion improved from 6.8 to 0.8 days. **Conclusion:** Timely completion of EPAs is a key component of high-quality feedback for residents in CBD. The quality-improvement initiative was successful at significantly improving timeliness in our institution.

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Gastrointestinal system surgical outcomes in the highly active antiretroviral therapy (HAART)-era HIV-positive patient: a scoping review. *Victoria H. Chen, Keiko M. Patterson, Sam M. Wiseman.* From St. Paul's Hospital (Chen, Wiseman) and University of British Columbia (Chen, Patterson, Wiseman).

Background: Since 1996, widespread highly active antiretroviral therapy (HAART) use has drastically improved health outcomes in HIV patients. Early HAART-era studies suggested higher postoperative complications after gastrointestinal (GI) system surgeries in HIV patients. However, more recent studies give varied reports of surgical outcomes. The aim of this scoping review was to evaluate GI system surgery complications in HAART-treated HIV patients. **Methods:** MEDLINE and Embase were searched for primary publications since 1996 reporting on GI tract and associated solid organ surgery outcomes in exclusively HAART-treated HIV patients, or where subset analysis of this population was performed. Two reviewers performed 2 sequential screens against study criteria. National Surgical Quality Improvement Project reported complications (NRCs), such as mortality, surgical site infections (SSI), sepsis, wound dehiscence and hospital stay (LOS) were extracted, along with non-NRCs, HIV disease parameters and procedure details. **Results:** Twelve studies matched study criteria, reporting on bowel surgery ($n = 4$), bariatric surgery ($n = 5$), cholecystectomy ($n = 1$), appendectomy ($n = 1$) and general abdominal surgery ($n = 1$). Preoperative HAART duration ranged from newly started to 11.7 years. No NRCs and only minor non-NRCs occurred in bariatric surgery. The NRC rates of more than 44.4% occurred in bowel surgeries and 13.3% in appendectomies. Septic complications accounted for 50% or more of NRCs reported. Five studies compared outcomes between HAART-treated patients and other groups. Significantly lower any-cause complications, LOS,

septic complications and mortality (nonsignificant) occurred in comparison to treatment-naive HIV. Significantly higher any-cause complications, LOS and reoperation occurred in comparison to HIV-negative patients. **Conclusion:** Use of HAART was associated with improved NRC outcomes, LOS and septic complications in GI system surgery; however, despite treatment, complication rates remained higher than in HIV-negative patients. More studies are needed to examine GI system surgery outcomes in HIV patients who are well managed on HAART, and the impact of disease parameters and preoperative HAART duration on surgical complications.

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Joint rounds as a method to partner surgical residency programs and enhance global surgical training. *Betty Wen, Joshua Bhudial, Anise Barton.* From the University of British Columbia (Wen, Barton), Georgetown Publish Hospital Corporation (Bhudial), and Royal Inland Hospital (Barton).

Background: Within global surgery, partnerships between low- and middle-income countries (LMICs) and high-income countries (HICs) are often used to improve surgical capacity by enhancing surgical training. These may vary from one-time interventions to comprehensive residency programs. Although educational rounds are widely employed within residency training, joint rounds between LMIC and HIC programs are not commonly used. **Methods:** General surgery residents from Guyana (LMIC) and a Canadian (HIC) program participated in bimonthly online joint rounds between February 2021 and February 2022. A needs assessment survey was initially distributed to residents to assess interest and determine rounds topics. Rounds comprised a resident case-based presentation from each program, with moderation by staff surgeons and discussion. After 6 joint rounds, a one-time online cross-sectional survey was distributed to and completed by residents who attended at least 1 session. Residents evaluated joint rounds in terms of perceived value, new knowledge or skills acquired and engagement with global surgery. **Results:** Thirty-one residents completed the survey (16 Guyanese, 15 Canadian). All desired the continuation of joint rounds. Nearly all agreed that rounds were valuable and relevant to their training and resulted in the acquisition of new knowledge or skills; Guyanese residents were more likely to strongly agree. Residents felt more engaged with the global general surgery community and learned about the partner institution. More than half felt they would be able to apply their new knowledge to their practice; Guyanese residents were more likely to have already done so. Residents enjoyed the ability to share experiences across resource settings and expand their global surgical perspectives. **Conclusion:** Joint rounds are a meaningful and feasible method to partner LMIC/HIC surgical residencies and augment resident learning. There are differential benefits to residents that are program- and resource-setting-specific as well as mutual ones.

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Preoperative frailty and mortality in medicare beneficiaries undergoing major and minor surgical procedures. *Jessica Lie, Chan Mi Park, Laiji Yang, Natalia Gouskova, Dae Hyun Kim.* From the University of British Columbia (Lie) and Hebrew SeniorLife (Park, Yang, Gouskova, Kim).

Background: Preoperative frailty is associated with poor surgical outcomes in older patients. Whether the association is consistent across major and minor surgical procedures of different surgical stress has not been well studied. **Methods:** This retrospective study used the 5% random sample of Medicare fee-for-service beneficiaries who underwent surgical procedures in 2014–2019 ($n = 1\,129\,055$). Surgical procedures were categorized by the Operative Stress Score (OSS; range: 1 [e.g., knee arthroscopy] to 5 [e.g., pneumonectomy]). Preoperative frailty was measured using a claims-based frailty index (range 0–1; non-frail < 0.15, pre-frail 0.15–0.24, mildly frail 0.25–0.34, and moderate to severely frail ≥ 0.35). We estimated the age and sex-adjusted risk ratio (RR) of mortality at 30 days, 6 months, and 1 year associated with frailty category stratified by OSS category. **Results:** We identified 1 885 652 surgical procedures (OSS category 1–5: 30.1%, 47.7%, 20.2%, 1.9% and 0.2%). The mean age was 76.3 years, 48.5% were female, and 90.3% were white. Overall, postoperative mortality was 1.6% at 30 days, 5.1% at 6 months and 7.8% at 1 year. Frailty was associated with increased 30-day, 6-month and 1-year postoperative mortality across OSS categories. At 1 year, patients with moderate-to-severe frailty had significantly elevated mortality after OSS category 1 minor procedures (27.4% v. 3.2%; adjusted RR 7.9, 95% confidence interval [CI] 7.6–8.1) as well as after OSS category 5 major procedures (33.3% v. 15.8%; adjusted RR 2.1, 95% CI 1.4–3.1) compared with non-frail patients. **Conclusion:** Frailty is associated with increased 30-day, 6-month and 1-year mortality after major and minor procedures. These results obtained from national data can be useful for risk stratification and shared decision-making before surgery with older patients.

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What's going on out there? Evaluating the scope of rural general surgery in British Columbia. *Rebecca Afford, Sara Bolin, Dunavan Morris-Janzen, Alastair McLellan, Abmer Karimuddin.* From the University of British Columbia.

Background: General surgeons working in rural communities have been found to perform a variety of procedures outside of the conventional scope of the specialty. Unique to British Columbia (BC), the Rural Practice Subsidiary Agreement (RSA) has a formal definition of “rural” based on community size, geography and access to specialists and higher levels of care. Our goal was to understand the scope of practice for BC general surgeons working in rural communities. **Methods:** Medical Service Plan (MSP) data were collected from 2011 to 2021 for procedures billed by general surgeons working in RSA communities. The MSP fee codes were organized into categories based on anatomic region and surgical subspecialty. For each community, we calculated the totals for these categories, taking into account what other surgical specialties exist to see how this shapes a general surgeon's practice. We used t tests for statistical analysis. **Results:** From 2011 to 2021, 222 905 procedures were performed in 23 rural communities in BC. Colonoscopies were the most frequently performed procedure ($n = 80\,114$, 35.94%), followed by colorectal procedures ($n = 23\,891$, 10.72%) and hernia procedures ($n = 20\,911$, 9.38%). The most common unconventional procedures performed were plastic surgery ($n = 8080$, 3.62%), port or pacemaker placement ($n = 4145$, 1.86%) and vascular surgery ($n = 3783$, 1.70%). When stratified by RSA classification, there was no significant difference in the percentage of nonclassical general surgery procedures per-

formed ($p = 0.37$). When another surgical specialty was present, there was a decrease in the number of that specialty's procedures performed by general surgeons. **Conclusion:** General surgeons working in rural communities perform a variety of procedures based on their local resources, community need and access to other surgical specialties. By understanding the scope of rural general surgery, this can help inform enhanced training opportunities and resource allocation.

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Short-stay compared with long-stay admissions for loop ileostomy reversals: a systematic review and meta-analysis. *Victoria Archer, Zacharie Cloutier, Annie Berg, Tyler McKechnie, Wojtek Wierciuch, Cagla Eskicioglu.* From McMaster University (Archer, Cloutier, Berg, McKechnie, Wierciuch, Eskicioglu) and St. Joseph Health (Eskicioglu).

Background: Short-stay admissions, with lengths of stay less than 24 hours, are used for various surgeries without increasing the incidence of adverse events. However, it is unclear if short-stay admissions would also be safe for loop ileostomy reversals. Therefore, this review aimed to compare outcomes between short (≤ 24 hours) and long (> 24 hours) admissions for adults undergoing loop ileostomy reversals. **Methods:** This review followed PRISMA guidelines. MEDLINE, Embase, CINAHL, Web of Science, and the Cochrane Library were systematically searched for studies comparing short- to long-stay admissions in adults undergoing elective loop ileostomy reversals. Meta-analyses were conducted for mortality, reoperation, readmission, and non-reoperative complications. The quality of evidence was assessed with the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) guidelines. **Results:** After screening, 4 observational studies enrolling 24 628 patients were included. Moderate-certainty evidence suggests there is no difference in readmissions between short- and long-stay admissions (relative risk [RR] 0.98, 95% confidence interval [CI] 0.75–1.28, $p = 0.86$). Low-certainty evidence demonstrates that short stays may reduce non-reoperative complications (RR 0.44, 95% CI 0.31–0.62, $p < 0.01$). Very-low-certainty evidence demonstrates that there is no difference in reoperations between short and long stays (RR 1.14, 95% CI 0.26–5.04, $p = 0.87$). **Conclusion:** Moderate-certainty evidence demonstrates that there is no difference in readmission rates between short- and long-stay admissions for loop ileostomy reversals. Less robust evidence suggests equivalence in reoperations and a decrease in non-reoperative complications. Future prospective trials are required to evaluate the feasibility and efficacy of short-stay admissions for loop ileostomy reversals.

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General surgeons' right hemicolectomy costs proficiency and preferences. *Joëlle Labonté, Pascale Bisson, André Bégin, Sonia Gabriela Cheng-Oviedo, Yves Collin.* From the Université de Sherbrooke.

Background: Reducing the economic burden of health care in Canada should be a concern for every practising physician. Surgeons can play an active role by optimizing their surgical equipment choice. This research studied general surgeons' equipment cost mastery. A compilation of right hemicolectomy costs was also done to draw a portrait of our current expenses. **Methods:** A paper

format questionnaire was answered by 20 surgeons from 2 medical centres. The survey asked respondents to estimate the prices of 10 commonly used surgical devices and to indicate personal preferences for surgical approaches and materials. Also, the actual cost of every right hemicolectomy was collected for 10 participating surgeons for a 6-month period. **Results:** The median number of correct price estimations (i.e., within $\pm 25\%$ of real cost) over 10 items was 2 per surgeon with a variance of 0.779. The difference between the estimated and real cost was statistically significant for 6 of 10 instruments. The mean cost of a right hemicolectomy was CAN\$3421.03 \pm standard deviation \$883.94. One surgeon had a mean total surgery cost of CAN\$1975.58 \pm SD \$389.51). **Conclusion:** Surgeons have a generally poor idea of the cost of the materials they use in the operating room. An awareness intervention could have an impact and be interesting to evaluate.

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Staple line with bioabsorbable reinforcement for gastropexy in hiatal hernia repair. *Alisha R. Fernandes, Intekhab Hossain, James Ellsmere.* From Dalhousie University (Fernandes, Ellsmere) and Memorial University of Newfoundland (Hossain).

Background: Symptomatic paraesophageal hernias (PEH) are commonly treated via a laparoscopic transabdominal approach involving 3 components: reduction of the paraesophageal hernia with establishment of adequate intra-abdominal esophageal length, tension-free cruraplasty, and gastropexy and/or fundoplication to maintain the intra-abdominal gastric position. There is clinical equipoise regarding the use of gastropexy and/or fundoplication for PEH. In the absence of gastroesophageal reflux, simple gastropexy is suitable for many PEH patients. However, historical studies show that the placement of pexy sutures under tension can result in mechanistic failure if sutures tear through the adaptive gastric musculature. Innovation in gastropexy technique is required to reduce the risk of mechanistic failure, and optimize outcomes for this population. **Methods:** We demonstrate a novel laparoscopic gastropexy technique using a staple line with bioabsorbable reinforcement as a gastric anchor to reduce mechanistic failures and enhance the durability of gastropexy. **Conclusion:** This technique may represent a low-morbidity alternative to fundoplication and a low-recurrence alternative to simple gastropexy.

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Impact of enhanced recovery pathways on patient-reported outcomes after abdominal surgery: a systematic review. *Charbel El-Kefraoui, Uyen Do, Andrew Miller, Araz Kouyoumdjian, David Cui, Elabe Khorasani, Tara Landry, Alexandre Amar-Zifkin, Lawrence Lee, Liane Feldman, Julio Fiore.* From McGill University.

Background: Evidence supports that enhanced recovery pathways (ERPs) reduce length of stay and complications; however, these measures may not reflect the perspective of patients who are the main stakeholders in the recovery process. This systematic review aimed to appraise the evidence regarding the impact of ERPs on patient-reported outcomes (PROs) after abdominal surgery. **Methods:** Five databases (MEDLINE, Embase, Biosis, Cochrane, and Web of Science) were searched for randomized controlled trials (RCTs) addressing the impact of ERPs on PROs after abdominal surgery. We focused on distinct periods of recovery:

early (within 7 days postoperatively) and late (beyond 8 days). Risk of bias was assessed using Cochrane's RoB 2.0. Results were appraised descriptively as heterogeneity hindered meta-analysis. Certainty of evidence was evaluated using Grading of Recommendations Assessment, Development and Evaluation. **Results:** Fifty-six RCTs were identified: colorectal ($n = 18$), hepato-pancreaticobiliary (HPB; $n = 11$), upper gastrointestinal (UGI; $n = 10$), gynecological ($n = 7$), urological ($n = 7$), general ($n = 3$). Most trials had "some concerns" ($n = 30$) or high risk of bias ($n = 25$). In the early postoperative period, the use of ERPs improved general health (colorectal, HPB, UGI, urological; very-low- to low-certainty evidence), physical health (colorectal, gynecological; very-low- to low-certainty evidence), mental health (colorectal, gynecological; very-low-certainty evidence), pain (all specialties; very-low- to moderate-certainty evidence), and fatigue (colorectal; low-certainty evidence). In the late postoperative period, use of ERPs improved general health (HPB, UGI, urological; very-low-certainty evidence), physical health (UGI, gynecological, urological; very-low-certainty evidence), mental health (UGI, gynecological, urological; very-low to low-certainty evidence), social health (gynecological; very-low-certainty evidence), pain (gynecological, urological; very-low-certainty evidence), and fatigue (gynecological; very-low-certainty evidence). **Conclusion:** This review supports that ERPs have a positive impact on patient-reported postoperative health status (i.e., general, physical, mental and social health) and symptom experience (i.e., pain and fatigue) after abdominal surgery; however, data were largely derived from low-quality trials. Although these findings contribute important knowledge to inform evidence-based ERP implementation, there remains a need to improve PRO assessment in studies focused on enhanced recovery.

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Evaluation of outcomes between rural, northern/remote, and urban surgical patients diagnosed with moderate to severe acute pancreatitis: a retrospective study. *Tran (Michelle) Au, Mark Oppenheimer, Sarvesh Logsetty.* From the University of Manitoba.

Background: Acute pancreatitis is a leading cause for hospital admissions in North America. Complications may result in prolonged hospital stays, intensive care unit (ICU) admission and invasive interventions. Limited literature has shown differences in outcomes for some surgical diseases between rural and urban patients. Our aim was to evaluate whether outcomes were different between rural, northern/remote and urban surgical patients diagnosed with moderate to severe acute pancreatitis. **Methods:** This retrospective cohort study included 62 patients admitted to the acute surgical service at a tertiary care centre for acute pancreatitis. The inclusion criteria were patients aged ≥ 18 years with moderate to severe acute pancreatitis admitted for ≥ 7 days or died within 7 days of admission. The primary outcome was time from initial presentation to intervention (percutaneous, surgical or endoscopic). Secondary outcomes included 30-day mortality, transfer times, length of stay (LOS), admission to a non-tertiary centre, ICU admission, interventions and loss to follow-up. Groups were compared using univariable and multivariable analysis. **Results:** Rural, northern/remote compared with urban patients had significantly longer transfer times (4.7 v. 3.3 v. 0.9 days, $p = 0.043$), higher admission rates to nontertiary

care centres before transfer to a tertiary centre (44.4% v. 50.0% v. 12.5%, $p = 0.012$), more ICU admissions in rural v. urban patients (38.9% v. 9.4%, $p = 0.020$) and lower rates of index cholecystectomies in rural and northern/remote patients compared with urban patients (22.2% v. 25.0% v. 59.4%, $p = 0.016$). No significant differences were found from time of presentation to intervention, types of interventions performed, severity and etiology of pancreatitis, LOS and loss to follow-up. **Conclusion:** Nonurban patients had higher rates of ICU admissions and were less likely to have a cholecystectomy performed than urban patients. Further study is needed to assess variables affecting patient outcomes in acute pancreatitis to ensure equitable care regardless of the region of residence.

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Outcome of preoperative percutaneous drainage of intra-abdominal abscess versus initial surgery in patients with Crohn disease. *Raghad AlShammari, Mohamad AlAbri, Abmer Karimuddin, Carl Brown, Manoj J. Raval, (Paul) Terry Phang.* From the University of British Columbia.

Background: Previous studies have compared the percutaneous and surgical drainage techniques for intra-abdominal abscesses among patients with Crohn disease (CD). However, few studies have compared the outcomes of preoperative percutaneous drainage to surgical drainage alone. **Methods:** This retrospective study included patients with CD who underwent surgical drainage of intra-abdominal abscess and bowel resection between 2006 and 2022. The outcomes of patients who underwent percutaneous drainage before surgical intervention were compared with those of patients who did not require preoperative drainage. Recurrence of an intra-abdominal abscess within 30–60 days postoperatively was the primary outcome of this study. The length of hospital stay was the secondary end point. **Results:** Among 73 patients who underwent surgical drainage, ileocecal bowel resection, right hemicolectomy and small bowel resection for CD, 17 patients (23%) underwent preoperative percutaneous abscess drainage. The postoperative abdominal abscess recurrence was higher in patients who did not have preoperative percutaneous drainage (27.4% v. 0%, $p < 0.05$). However, the length of hospital stay was not significantly different between the 2 groups. The Mean length of hospital stay was 22 days among patients who had surgical intervention first and 18 days in the preoperative percutaneous drainage group ($p = 0.08$). **Conclusion:** Although most patients with CD who develop intra-abdominal abscess appear to require surgical drainage, preoperative percutaneous drainage may reduce the rate of recurrence.

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Preliminary analysis: dexamethasone-supplemented TAP blocks may reduce opioid requirements after colorectal surgery: a multi-centre randomized controlled trial. *Samantha Bird, Zarrukh Baig, Nawaf Abu-Omar, Dilip Gill, Soumiya Suresh, Nathan Ginther.* From the University of Saskatchewan.

Background: The use of dexamethasone in conjunction with peripheral nerve blocks has been shown to increase the duration of analgesia. In this multi-centre randomized controlled trial, we sought to assess pain control and nausea in the first 48 hours after

minimally invasive colorectal surgery in patients receiving transversus abdominis plane (TAP) blocks with and without dexamethasone. **Methods:** This study was powered to include 60 patients from 2 academic hospitals where colorectal surgery is performed. Twenty-four patients undergoing laparoscopic colorectal surgery in a single centre were included in this preliminary analysis. Patients were allocated into 2 groups. Group 1 (TAP) received bilateral TAP blocks using 0.25% bupivacaine with epinephrine, and Group 2 (TAP-D) received bilateral TAP blocks using 0.25% bupivacaine with epinephrine in combination with dexamethasone. Postoperative opioid use in the postanesthesia care unit (PACU) at 24 hours and 48 hours was recorded from patient charts. Nausea or vomiting in the first 24 hours and length of stay in hospital were also recorded. **Results:** There were 14 patients in the TAP group and 10 patients in the TAP-D group. Adjusting for 9 confounders, TAP blocks with dexamethasone did not significantly change opioid requirements in PACU, at 24 hours or 48 hours postoperatively. There was a trend toward lower opioid use in the TAP-D group at 24 hours (−9.3 mg, $p = 0.36$), at 24–48 hours (−4.36 mg, $p = 0.72$) and at 48 hours (−16.0 mg, $p = 0.46$). There was no difference in the number of patients reporting nausea (−0.2, $p = 0.36$) or in length of stay in hospital (−1.1, $p = 0.33$). **Conclusion:** The preliminary analysis did not show a significant change in opioid requirements in the first 48 hours following laparoscopic colorectal surgery with the addition of dexamethasone to TAP blocks. Although it was not statistically significant, a trend toward lower opioid use was evident in the dexamethasone group.

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Preoperative skin preparation with chlorhexidine alcohol versus povidone-iodine alcohol for the prevention of surgical site infections: a systematic review and meta-analysis of randomized controlled trials. *Marta Karpinski, Amandeep Ghuman, Peter R.A. Malik.* From the University of Toronto (Karpinski), St. Paul's Hospital (Ghuman), Providence Health Care (Ghuman), University of British Columbia (Ghuman), and McGill University (Malik).

Background: Surgical site infections (SSIs) are the leading cause of unplanned hospital readmission after surgery, and effective measures for preventing SSIs are important to identify. Alcoholic preparations of chlorhexidine (CHX) and povidone-iodine (PI) are the 2 most common preoperative skin antiseptics used to prevent SSIs; however, their relative superiority has long been debated. We aimed to synthesize evidence regarding the effectiveness of these 2 treatments in preventing SSI. **Methods:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed. Five databases (MEDLINE, Embase, Cochrane Controlled Register of Trials, CINAHL, Web of Science) were searched on Feb. 29, 2020, to capture randomized controlled trials (RCTs) comparing CHX and PI as preoperative skin antiseptics for surgical procedures. The rate of SSI was collected and pooled using the inverse variance method to produce summary estimates in a meta-analysis. Risk of bias and Grading of Recommendations, Assessment, Development, and Evaluations assessments were performed. Subgroup and sensitivity analyses were conducted to evaluate the effect of wound class and studies judged to be at high risk of bias, respectively. **Results:** Eighteen RCTs were included in this

meta-analysis. CHX as a preoperative antiseptic compared with PI revealed a risk ratio (RR) of 0.70 (95% confidence interval [CI] 0.55–0.89, $p = 0.004$) for developing an SSI. This effect was not modified by clean-contaminated wound class (RR 0.71, 95% CI 0.56–0.90, $p = 0.54$) and was diminished in a sensitivity analysis that included only studies with low risk of bias (RR 0.76, 95% CI 0.55–1.06, $p = 0.10$). **Conclusion:** We report the most comprehensive summary of evidence assessing the effectiveness of CHX and PI in RCTs, to date. CHX may help reduce the rate of SSI development after surgical procedures and may be applied as a component of an effective SSI prevention bundle.

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“Why didn’t you call me?” Factors junior learners consider when deciding whether to call their supervisor. *Kameela Alibhai, Taryn Zabolotniuk, Isabelle Raïche, Nada Gawad.* From the University of Ottawa (Alibhai, Raïche, Gawad), University of British Columbia (Zabolotniuk).

Background: More than half of junior learners (JLs) feel pressure to work independently and report rarely calling their supervisor. It is unclear how JLs decide whether or not to call their supervisor. This study aimed to identify factors that JLs consider when responding to pages and deciding whether to call senior residents (SRs). **Methods:** Fifteen semistructured interviews were conducted (10 JLs, 5 SRs). JLs were given 8 sample general surgery pages and probed regarding the factors they considered when deciding whether to inform SRs. SRs were presented with 15 pages and asked how JLs should triage the clinical issue and why. Deidentified interview transcripts were independently coded and analyzed using an inductive approach. **Results:** JLs and SRs indicated a clear need to call SRs when managing high-acuity pages, which included hemodynamic instability, decreased level of consciousness, or a code (i.e., trauma, cardiac arrest). In the absence of high-acuity findings, JLs judged whether to call SRs based on 10 factors related to the patient and learner. Patient-related factors included time since surgery, patient appearance, patient requiring intervention and lack of improvement after initial independent management attempt. Learner-related factors were categorized into clinical (nurse’s level of concern, familiarity with the patient, gut feeling and prior experience managing this presentation) and social factors (time of day and interpersonal dynamic with SRs). SRs did not cite the 2 social factors JLs considered nor identified any additional factors. **Conclusion:** When pages lack high-acuity findings, JLs consider various patient and learner factors when deciding whether to inform SRs. Discussing these factors may help guide new JLs regarding when they should call their supervisor. Understanding social factors is important to create a culture that minimizes their influence on JLs’ decision-making and promotes patient safety.

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Cost savings associated with general surgical consultation within remote Indigenous communities in Quebec: a costing evaluation. *Sarah Mashal, Nathalie Boulanger, Larry Watt, Tarek Razek, Paola Fata, Jeremy Grushka, Evan G. Wong.* From McGill University (Mashal, Razek, Fata, Grushka, Wong), Régie Régionale de la Santé et des Services Sociaux du Nunavik (Boulanger), and Tulattavik Health Center (Watt).

Background: Indigenous Peoples of northern Quebec experience multiple barriers in accessing specialized health care services. Historically, most general surgery care was provided in Montreal, forcing patients to be displaced away from their communities. The cultural and financial implications of such distant and prolonged medical trips are prohibitive, yet have not been systematically documented. With limitations in telemedicine due to poor Internet bandwidth and the resulting care model involving on-site travel of the surgical specialist, we aimed to estimate its associated cost savings. **Methods:** Costing evaluation was performed at the societal level using all general surgery consults performed on site in Puvirnituq, Nunavik, between Jan. 1 and Dec. 31, 2022. Costs included surgeon remuneration, travel and living expenses for both the surgeon and patients, and indirect costs through lost wages/productivity. Net potential savings were estimated by subtracting the total cost of sending a specialist on site from the total costs of the traditional model. Cost savings were estimated per patient and extrapolated to weekly and annual savings. Sensitivity analyses were performed to account for variations in the following factors: villages of origin, lengths of stay, time off work, economic productivity and need for escort. **Results:** The annual cost associated with transferring patients to a tertiary care centre was \$2 996 142.60 compared with \$333 421.00 with on-site surgical consultations, leading to potential cost savings of \$2 662 721.60 per year. This translates to cost savings of \$6656.80 for every general surgery consultation seen onsite. Savings remained significant across all sensitivity analyses. **Conclusion:** Health expenditures associated with medical relocation for Quebec’s northern Indigenous communities are extensive. There is an urgent need for cost-effective and culturally appropriate models of care. This study shows promise in sending specialists on site as a means to overcome some of the barriers that perpetuate health disparities in these communities.

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Right lateral decubitus patient position during colonoscopy increases endoscopist’s risk of musculoskeletal injury. *Intekhab Hossain, Maxim Landry, Sarah Mackey, Nicholas Fairbridge, Alison Greene, Mark Borgoankar, Cullen Kim, Diana DeCarvalho, David Pace.* From Memorial University of Newfoundland.

Background: Colonoscopy exposes endoscopists to awkward postures and prolonged forces, with 37%–89% reporting procedure-related musculoskeletal (MSK) pain during their career. To date there has been no formal physical demands analysis of the endoscopist during colonoscopy. Therefore, this study aimed to investigate the effect of patient position on endoscopist injury risk. **Methods:** Nineteen endoscopists (12 male, 7 female, 95% right-handed, average experience 12 years, average height 1.73 m, average weight 79.26 kg), recruited from a tertiary care centre in St. John’s, NL, were followed for a 4-hour period during an endoscopy clinic. Duration of patient posture was timed for all procedures. Endoscopist injury risk was scored by a trained researcher for the first and last patient of the period using rapid upper limb assessment (RULA), an observational ergonomic tool that estimates risk of MSK injury by scoring postures of the upper body and factors such as muscle use, force and load. The total RULA score was compared using a Wilcoxon signed-rank test for patient

position (right lateral decubitus [RLD] and left lateral decubitus [LLD]) and time (first and last procedures) with significance set at $p < 0.05$. Endoscopist preferences were also surveyed. **Results:** Fifty-five colonoscopies were included in the study. RLD was associated with significantly higher RULA scores than LLD (median 5 v. 3, $p < 0.001$). RULA scores were not significantly different between the first and last procedures (median 5 v. 5, $p = 0.816$). All endoscopists preferred starting in LLD, primarily because of easier scope insertion and navigation owing to shorter reach, particularly in obese patients. This was reflected in the (total) durations recorded: average $7.30 \pm$ standard deviation (SD) 4.53 minutes per RLD procedure and $9.18 \pm$ SD 7.40 minutes per LLD procedure. **Conclusion:** RULA scores indicate a high risk of MSK injury in both patient postures, with greater risk in the RLD.

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Reducing re-visit to hospital rates among pediatric post-appendectomy patients: a quality-improvement project. *Robin Wigen, Emily Walser, Jacob Davidson, Michael Dorward, Leanne Muszynski, Celia Dann, Natasbia Seemann, Jennifer Lam.* From the Children's Hospital at Longon Health Sciences Centre (Wigen), and London Health Sciences Centre (Walser, Davidson, Dorward, Muszynski, Dann, Seemann, Lam).

Background: Data from the National Surgical Quality Improvement Program-Pediatric (NSQIP-P) indicate that pediatric postoperative appendectomy patients have a high rate of return to hospital at our institution. We hypothesized that a bundle of quality-improvement interventions would decrease the re-visit rate to hospital in this population. **Methods:** In February 2021, a working group of stakeholders was created to develop and implement a set of interventions to reduce re-visit rates. Interventions were implemented in June 2021 in a staggered fashion. Interventions included increased education provided to patients/families and nursing staff, revised discharge pamphlets for patients/families, and a postdischarge phone call from our nurse practitioner to elucidate common complaints, answer questions and provide interim follow up. **Results:** Pediatric postappendectomy re-visit rates showed a slight downward trend from 2018 to present, from 16% to 14%, corresponding to a relative reduction of 13%. After reducing readmission to a low of 6.6% during the intervention, rates gradually increased to the preintervention average by July 2023. Our nurse practitioner contacted 78% of pediatric appendectomy patients between July 2021 and July 2022. Of those contacted, 74% received the discharge pamphlet. Most (98.7%) respondents expressed that the phone call was useful. All respondents stated if they were to have another child with appendicitis, they would want the same phone call. **Conclusion:** Despite early gains associated with the bundle of interventions, sustained improvement was not identified. Ongoing efforts are required to assess the efficacy of bundle elements to determine if additional initiatives may further reduce re-visit rates.

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Exploring gender diversity in surgical residency leadership across Canada. *Kaitlyn Harding, A.J. Lowik, Caroline Guinard, Sam Wiseman.* From Memorial University of Newfoundland (Harding), University of British Columbia

(Lowik, Guinard, Wiseman), and St. Paul's Hospital (Wiseman).

Background: Studies in the United States show a deficiency of cisgender women in medical leadership, despite them making up more than half of medical graduates. These differences persist after controlling for research productivity, experience and years in practice. The absence of gender diversity in leadership results in insufficient role models and mentoring gaps. The aim of this study was to evaluate gender representation within surgical residency program leadership in Canada. **Methods:** This was a cross-sectional study assessing the relationship between leadership and gender in Canadian surgical residency training programs. Contact information was collected through the Canadian Resident Matching Service and program websites, and confirmed through program administrators. We invited 359 participants to complete an email-based survey. The survey assessed leadership position, province of work, surgical division and gender identity. Associations between gender and leadership position were calculated using χ^2 goodness of fit test. **Results:** We received 65 responses (18%). All provinces with residency programs and surgical specialties were represented. The distribution of gender was men 56.3%, women 40.6%, nonbinary 1.6%, and no gender 1.6%. Among program directors the distribution was 65% men, 30.7% women, 3.8% no gender. Among associate program directors it was 66.6% women, 33.3% men. Among division leads it was 69% men, 31% women. Goodness of fit calculations showed more women were associate program directors and remote site leads than expected ($\chi^2 = 5.76$, $p = 0.016$ and $\chi^2 = 4.66$, $p = 0.030$, respectively). More women held leadership roles within general, vascular, cardiac, plastic and neurosurgery ($p < 0.05$) than anticipated. British Columbia and Quebec had a greater distribution of women in leadership roles ($p < 0.05$). These calculations were based on the expected gender distribution of surgeons published by the Canadian Medical Association (CMA) based on surgical specialty. **Conclusion:** There are more program directors and division leads who identify as men than any other gender. These distributions were within the expected range based on the CMA's records, which do not include genders other than men or women. The proportion of woman in associate program director roles was higher than in the remaining leaderships designations.

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Operating room sustainability project: quantifying the surgical environmental footprint for a laparoscopic cholecystectomy in 2 major surgical centres. *Odelle Ma, Valentin Mocanu, Andrea Lin, Shabzeer Karmali, David Bigam.* From the University of Alberta (Ma, Mocanu, Lin, Bigam), and the Centre for Advancement of Surgical Education and Simulation, Royal Alexandra Hospital (Karmali).

Background: Human-related emissions continue to severely impact our environment, leading to climate change. Operating rooms (ORs) generate a significant amount of greenhouse gases. There is no current practice of estimating the environmental footprint for an operation in our province. Our aim was to quantify the current environmental impact of the most common general surgery operation, a laparoscopic cholecystectomy. **Methods:** Our primary objectives are to characterize the reusable and nonreusable surgical waste generated in the OR during a routine operation.

Our secondary objectives are to extrapolate the amount of waste to kilograms of carbon dioxide (CO₂) emission equivalents to quantify the estimated carbon footprint of a routine operation. The supplies and instruments used within the case carts for 24 surgeons practising in 2 major surgical centres will be compiled from OR case cart list and Connect Care. Supplies will be classified into reusable or nonreusable categories and into main material types (plastic, steel or glass) or divided into percentages of estimated material composition. These values will be multiplied by a material coefficient (MacNeill et al.) to obtain an estimate of carbon emissions. Categorical data will be analyzed via χ^2 analysis, and continuous data will be analyzed using *t* tests. Regression analysis will be done to adjust for covariates, and analysis will be done in the Stata 17 interface. **Results:** The data will be used to quantify the average reusable and nonreusable surgical waste in kilograms and extrapolated to their equivalent kilograms of CO₂ emission value. The case carts that generate the least and most nonreusable waste will be compared. **Conclusion:** Quantifying the amount of waste produced during a laparoscopic cholecystectomy will characterize current surgical sustainability practices, including usage and wastage of OR equipment. This information may guide future policy changes to reduce the environmental impact of the operating room.

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ERCP under general anesthesia compared with conscious sedation (EUGACCS) study. *Kaitlyn Harding, Grant Greaves, Brent Parker, Vu Nguyen, Azim Ahmed, Belinda Yee, Joël Perren, Mathew Norman, Morgan Grey, Rafael Perini, Fahd Jowhari, Adrian Bak.* From Memorial University of Newfoundland (Harding, Perren), University of Alberta Hospital (Greaves), Provincial Health Services Authority (Parker), University of British Columbia (Nguyen, Ahmed, Norman), University of Saskatoon (Yee), Kelowna Gastroenterology Associates (Grey), and Kelowna General Hospital (Perini, Jowhari, Bak).

Background: Endoscopic retrograde cholangiopancreatography (ERCP) is used to diagnose and treat pancreatic and biliary disease. The current standard is to conduct ERCP under conscious sedation (CS). Patient movement and agitation during ERCP under CS can result in procedure failure and complications. Aiming to reduce procedure failure rates and complications, a medium-sized hospital in Canada transitioned to performing ERCP under general anesthesia (GA) as the practice standard. We sought to determine if conducting ERCP under GA compared with CS decreases procedure complications, particularly post-ERCP pancreatitis (PEP). **Methods:** The charts of 2198 patients who underwent ERCP between 2015 and 2020 were reviewed. Before Sept. 17, 2017, ERCP was performed under CS (1316 patients). Afterwards, ERCP was conducted under GA (882 patients). Demographic, clinical and procedural data were extracted. The data were analyzed using univariate and multivariate statistical analysis. **Results:** PEP rates between cohorts varied (6% before v. 4% after, $p = 0.018$). Procedure failure rates decreased (9% before v. 3% after, $p < 0.001$). These outcomes remained near or at statistical significance after adjusting for age, sex and comorbidities. Thirty-day mortality, transfer rates to the intensive care unit, number of returns post-discharge and rates of cholangitis were similar but not statistically significant. **Conclusion:** Procedure failure and PEP rates

decreased when ERCP was performed under GA compared with CS. These findings support ERCP under GA as a valuable practice change.

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Complications requiring intervention following gastrostomy/gastrojejunostomy tube insertion: a retrospective analysis. *Jeremy Drung, Laura Allen, Daniele Wiseman, Bradley Moffat.* From Western University (Drung, Wiseman, Moffat), and London Health Sciences Centre (Allen, Wiseman, Moffat).

Background: Gastrostomy/gastrojejunostomy tube (G-tube) insertion by interventional radiology (IR) is commonly performed. While the majority of these procedures proceed without issue, significant complications can occur. Previous data suggest that major complications may occur in 1.6% of patients. When complications do arise, they are often managed by IR without involvement of general surgery. These complications can lead to significant morbidity, including potential surgical intervention. Few guidelines exist for the management of G-tube complications. The objective of this study was to determine how G-tube complications are currently managed as well as factors that may impact management of these complications. **Methods:** A list of all patients who underwent IR G-tube insertion at our site over the last 3 years was generated from the IR registry. A detailed chart review was completed, and basic data as well as G-tube complications and management were recorded. Data analysis was completed to elucidate any patient factors associated with requiring operative versus IR intervention. **Results:** In total 699 G-tubes were inserted with 78 (11.2%) complications. Sixty-eight (87%) of these were managed by IR, 7 (9%) with surgery and 3 (4%) with IR and then surgery. Fifteen (2.1%) were serious complications with 3 (0.4%) resulting in death. Overall success rate of management by IR was 92%. The only complications to require surgical intervention were free air/perforation and 2 necrotizing infections. Seventy-three percent of patients with perforation/free air ultimately required surgical management. No single patient factor was associated with requiring operative versus IR intervention. **Conclusion:** G-tube insertion by IR is a safe procedure overall. Currently the majority of complications are successfully managed by IR. Surgical intervention is required for some but not all patients with free air. Further work can help elucidate why most patients with free air required surgical intervention, but some were salvaged by IR.

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Equity, diversity and inclusion (EDI) in underrepresented in medicine (URiM) residents: Where are we and what now? *Jeremy K.H. Lee, Catherine McGuire, Isabelle Raïche, Mibaela Tudorache, Nada Gawad.* From the University of Ottawa.

Background: Individual programs and national associations have been trying to promote equity, diversity and inclusion (EDI) in medicine for many years. Despite these initiatives, it remains unclear if and how the experience of residents considered underrepresented in medicine (URiM) has improved. This study aims to describe the literature surrounding EDI with regard to URiM residents. **Methods:** MEDLINE, Embase, Web of Science, and Eric databases were searched for studies discussing EDI for URiM residents. All original research referencing “cultural diversity,”

“minority groups,” or “social inclusion” and “graduate medical education” or “residency” published between 2017 and 2022 were included. Data were qualitatively analyzed and synthesized according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses scoping review guidelines. **Results:** The search yielded 3634 studies, of which 87 were included. Thirty-nine studies examined prevalence trends in resident diversity, highlighting that surgical specialties haven’t demonstrated a rise in URiM residents proportional to the rise in URiM candidates. Twenty-six studies discussed the current climate of EDI for URiM residents, reporting discrimination and bias leading to additional adversity during residency. Twenty-two studies reported initiatives promoting URiM diversity within residency. Of these, 4 were implemented in surgical programs and 3 included residents across all specialties institution-wide. Several strategies exist to significantly increase the recruitment and retention of URiM residents, as well as enhance learning environments to promote culturally sensitive interactions between staff and URiM residents. **Conclusion:** Despite the interest in EDI, evidence to guide educators is limited and current literature mostly reports prevalence trends and experience of URiM residents. Interventions to increase recruitment have been implemented in predominantly nonsurgical programs, and very few studies describe initiatives to promote URiM resident retention or improve their experience with respect to EDI. Future research should assess these strategies in surgical programs, identify barriers to URiM resident success, and explore meaningful outcomes that reflect defined goals for EDI in residency.

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Association between complications and death within 30 days after general surgery procedures: a Vascular Events in Non-cardiac Surgery Patients Cohort Evaluation (VISION) sub-study. *Lily J. Park, Flavia K. Borges, Rabima Nenshi, Michael Jacka, Diane Heels-Ansdell, Marko Simunovic, Jessica Bogach, Pablo E. Serrano, Lebana Thabane, P.J. Devereaux.* From McMaster University (Park, Borges, Nenshi, Heels-Ansdell, Simunovic, Bogach, Serrano, Thabane, Devereaux), Population Health Research Institute (Park, Borges, Nenshi, Devereaux), and University of Alberta (Jacka).

Background: The contemporary causes of postoperative mortality among patients who undergo general surgery are not well characterized. The objective of this study was to determine the epidemiology of postoperative complications among general surgery patients, inform their relationships with 30-day mortality and determine the attributable fraction of death (AF) of each postoperative complication. **Methods:** VISION is a prospective cohort study of adult patients undergoing noncardiac surgery across 28 centres in 14 countries, who were followed for 30 days after surgery. For the subset of general surgery patients, a cox proportional hazards model was used to determine associations between various surgical complications and 30-day postoperative mortality. We adjusted for preoperative and surgical variables demonstrating associations with mortality in previous VISION analyses. Results from analyses were reported as hazard ratios (HR) with 95% confidence intervals (CI). **Results:** Among 7950 patients included in the study, 240 (3.0%) patients died within 30 days of surgery. Five postoperative complications (myocardial injury after noncardiac surgery [MINS], major bleeding, sepsis, stroke and dialysis) were independently associated with death. Complications associated

with the largest AF of postoperative mortality (i.e., proportion of deaths in the cohort that can be attributed to each complication, if causality were established) were major bleeding ($n = 1454$, 18.2%, HR 2.37, 95% CI 1.77–3.16, $p < 0.001$, AF 21.1%), sepsis ($n = 783$, 9.9%, HR 5.92, 95% CI 4.33–8.05, $p < 0.001$, AF 15.1%) and MINS ($n = 980$, 12.3%, HR 1.95, 95% CI 1.46–2.61, $p < 0.001$, AF 14.2%). **Conclusion:** The complications most associated with 30-day mortality following general surgery are major bleeding, sepsis and MINS. These findings may guide the development of mitigating strategies for these complications, including prophylaxis for perioperative bleeding.

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What is the long-term impact of gastrografin on adhesive small bowel obstruction? A systematic narrative review. *Sauleha Farooq, Erica Lester, Janice Kung, Nori Bradley.* From the University of Alberta.

Background: The gastrografin challenge (GC) is a common non-operative approach to adhesive small-bowel obstruction (aSBO), demonstrating decreased length of stay (LOS) and operative intervention during index admission. However, the impact of GC on aSBO recurrence and patient-centred outcomes in adults is unclear. A systematic narrative review was conducted to address this knowledge gap. The primary outcome was readmissions for aSBO after index treatment with GC. Secondary outcomes included patient-centred indicators (e.g., health-related quality of life [HRQoL], return to work and LOS on subsequent admissions). **Methods:** The review was registered on Prospero and guided by Preferred Reporting Items for Systematic Reviews and Meta-Analyses standards. The search strategy included MEDLINE, Embase, Scopus and Cochrane Library. Covidence was used for screening. Searches included publications between 1990 and 2022 and excluded age 85 years old, pregnant, and imprisoned patients. Bibliographies and the first 200 results from Google Scholar were also reviewed. **Results:** A total of 1019 unique results were initially identified. Of 160 abstracts screened, 9 met inclusion criteria for review. These included randomized controlled trials, retrospective and prospective cohort studies. The ROBINS-I tool indicated a moderate risk of bias. Tabulations yielded variability with reporting of recurrences. Multiple studies documented readmissions, but did not specify the reason for return to hospital. Follow-up time was unrecorded in 2 studies and ranged from 7 to 550 days in the others. The method of surveillance was undocumented in all 9 studies. Only 4 studies reported on the treatment of subsequent episodes. Comorbidities were inconsistently reported. No studies examined HRQoL or LOS for subsequent admissions. **Conclusion:** These results raise questions regarding widespread adoption of GC without longitudinal evidence of its effect on recurrence and patient-centred outcomes. Future research should include meaningful indicators with defined timelines to guide evidence-based and patient-centred approaches to aSBO management.

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TRASH-CAN: Trainee-Led Research and Sudit for Sustainability in Healthcare Canada. *Gordon Best, San Abn, Lisa Zhang, Nicole Prince, Olivia Cheng-Boivin, Nieve Seguin, Harry Wang, Liam Quartermain, Sherry Tan, Jennifer Shames, Mathilde Simard, Humberto Vigil, Isabelle Raiche,*

Mary Hanna, Husein Moloo. From the University of Ottawa (Best, Ahn, Zhang, Prince, Cheng-Boivin, Seguin, Wang, Quartermain, Tan, Simard, Vigil, Raïche, Hanna, Moloo), and The Ottawa Hospital (Shames).

Background: Health care has a large carbon footprint, and with the current climate crisis urgent action is required to reduce its environmental impact. Currently, within residency, there are limited opportunities to engage in planetary health work. To address this, Trainee-led Research and Audit for Sustainability in Healthcare Canada (TRASH-CAN) is a new initiative that has the goal of reducing the environmental impact and carbon footprint in health care while upholding the highest standards of patient care. **Methods:** Our approach has 4 pillars: 1) Quality Improvement: launching projects using QI methodology that focus on reducing waste in many areas of health care; 2) Education: this involves a web platform with curated articles and videos that provides a foundation of knowledge for trainees; 3) Knowledge Translation: supporting trainees as they review literature and evidence pertaining to planetary health so that best practices can be implemented; and 4) Leadership: we promote trainees being leaders in the field of planetary health and promote opportunities to collaborate with other institutions. To scale and facilitate these 4 pillars, we have created a web-based platform (www.trash-can.org) that allows us to connect residents and faculty to drive trainee-led action. **Results:** We have initiated the following trainee-led projects: 1) moving from 283 000 disposable to reusable gowns; 2) patients bringing in their own bags/cups; 3) examining tap water use during colonoscopy; 4) reducing bloodwork postoperatively; 5) reducing waste from paracentesis and thoracentesis; 6) developing/delivering an academic half day for internal medicine; and 7) establishing a group to incorporate planetary health into undergraduate medical curricula. **Conclusion:** TRASH-CAN has had rapid uptake with a soft launch and has residents and medical students involved with the departments of surgery, anesthesia, and medicine with multiple projects initiated. Our goal is that this scalable resident-led movement can be replicated at various institutions across North America.

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Representation and reporting of sociodemographic variables in BREAST-Q studies: a systematic review. *Riordan Azam, Gary Ko, Mayanne Zhu, Yanuga Raveendran, Christine Lam, Janet Tang, Amrit Bajwa, Marina Englesakis, Emma Reel, Jordan Cleland, Laura Snell, Gianni Lorello, Tulin Cil. From the University of Toronto (Azam, Ko, Zhu, Tang, Englesakis, Snell, Lorello, Cil), Western University (Raveendran), McMaster University (Lam), University of Galway (Bajwa), University Health Network (Reel, Cleland, Lorello, Cil), Toronto Western Hospital (Lorello), The Wilson Centre, Toronto General Hospital (Lorello), and Women's College Research Institute (Lorello).*

Background: Previous studies suggest that patient-reported outcome measures (PROMs) are underutilized among certain populations. The BREAST-Q is commonly used in breast surgery and is translated into multiple languages. However, the accessibility of the BREAST-Q for various patient populations is unknown. We sought to assess the adequacy of sociodemographic reporting and demographic representation of patients in studies using the

BREAST-Q. **Methods:** The search strategy was implemented with 12 electronic databases from January 2009 to November 2021. Studies using BREAST-Q as an outcome measure were included; validation studies, abstracts and systematic reviews were excluded. The number of studies that had inclusion/exclusion based on language, gender, translation and sociodemographic information were collected. Sociodemographic data were compared with 2021 US census data to assess representation of patient populations. **Results:** A total of 505 papers were included. Biological sex was an inclusion criterion in 225 (44.6%) papers, with differentiation from gender in only 5 (2.2%) papers. Sixty-three papers (12.5%) excluded patients based on language, and only 2 papers (0.6%) reported availability of translated versions/translators. Less than 5% of papers using BREAST-Q reported gender identity, sexual identity, health literacy, disability status, religion, immigrant status, insurance and socioeconomic status. Compared with the US population, the following groups were under-represented in BREAST-Q studies: Hispanic patients (9.3% v. 18.9% of US population), high school diploma or less as highest education (15.8% v. 38.8% of US population) and income below \$38 500 (19.4% of patients v. 25.2% of US population). **Conclusion:** Sociodemographic variable reporting is lacking in the majority of studies using the BREAST-Q. This PROM is not well used among under-represented populations, including non-English-speaking and Hispanic patients and patients with lower income and education levels. Future studies should focus on accessibility and incorporation of PROMs for diverse and marginalized populations.

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A scoping review: should tap water instead of sterile water be used for endoscopy of the colon and rectum? *Hilalion (San) Abn, Catherine Dube, Daniel McIsaac, David Smith, Alexie Leclerc, Jennifer Shames, Alaa Rostom, Natalia Calo, Kednapa Thavorn, Husein Moloo. From The Ottawa Hospital (Ahn, Dube, McIsaac, Rostom, Calo, Moloo), University of Ottawa (Ahn, Dube, McIsaac, Leclerc, Rostom, Calo, Moloo), North York General Hospital (Smith), Champlain Region Cancer Care Patient and Family Committee (Shames), and Ottawa Hospital Research Institute (Thavorn).*

Background: Compared with air insufflation, the use of water irrigation in colonoscopy is increasing, with improved adenoma detection rates, decreased sedation use and decreased patient-reported pain. Most guideline recommendations suggest sterile water for irrigation; however, the supporting evidence has not been reviewed. Sterile water in single-use plastic bottles may have significant costs compared with tap water. Our objective was to perform a scoping review via the triple bottom line approach and summarize the health, environmental and financial impacts of tap versus sterile water use in colonoscopy. **Methods:** A scoping review was performed and included all studies examining the effects of colonoscopy irrigation. Two reviewers performed all steps of the review independently and in duplicate. A quantitative analysis was performed on population and patient outcomes. Key stakeholders, including endoscopists, infection prevention and control leads, provincial quality-improvement directors, a director of planetary health, patient input, and manufacturer leads were involved. Various databases were searched from inception to July 2022 by a health information specialist using PRESS standards. **Results:** Out of 317 articles, 3 were included in the final analysis. All were

prospective studies published between 1996 and 2002 in the United States. A total of 175 colonoscopies and sigmoidoscopies were reported. In 2 studies, there were no clinical adverse events, including infections, using tap water. The remaining study did not report infectious complications. One study estimated an additional cost of USD\$35 per colonoscopy using sterile water. Environmental impacts were not reported. **Conclusion:** Based on limited evidence, there are no reported adverse events associated with tap water irrigation in colonoscopy. Though further studies are required, in the context of the public health precautionary principle, tap water in reusable bottles may be economically and environmentally more beneficial than sterile water, without patient harm.

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Laparoscopic revision of Nissen fundoplication with EndoFLIP intraoperative assistance: a video presentation. *Simon Laplante, Louis Liu, Nadia Khan, Allan Okrainec.* From the University of Toronto and University Health Network.

Background: Revisional foregut surgery involving the gastroesophageal junction can be challenging, especially when estimating the tightness of a hiatal repair. The EndoFLIP is a multi-electrode balloon catheter that shows dimensional measurements and topography in real time. This device is being used to help diagnose esophageal motility disorders and help assess the tightness of hiatal hernia repairs. However, its role in revisional surgery is less clear. **Methods:** We present the case of a 60-year-old male with a history of previous Heller myotomy for type 2 achalasia who later underwent a Nissen fundoplication for gastroesophageal reflux at another centre. This was complicated by significant regurgitation affecting his quality of life. **Results:** The patient was treated with a partial release of the Nissen fundoplication with intraoperative EndoFLIP guidance, resulting in near complete resolution of dysphagia and regurgitation without worsened gastroesophageal reflux. **Conclusion:** Intraoperative use of EndoFLIP topography and distensibility index can help the surgeon with complex revisional foregut cases involving the gastroesophageal junction. The EndoFLIP helped tailor a partial fundic release to achieve control of dysphagia without worsening reflux.

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Environmental sustainability in the operating room: perspectives and practice patterns of general surgeons in Canada. *Odelle Ma, Andrea Lin, Valentin Mocanu, Shabzeer Karmali, David Bigam.* From the University of Alberta.

Background: Environmental sustainability is an increasingly relevant yet under-researched topic when it pertains to health care, particularly in the surgical field. The current views and practice patterns impacting operating room (OR) sustainability among Canadian surgeons is not known. The aim of this study was to explore the current perspectives of Canadian general surgeons on environmental sustainability and to examine surgical choices in the OR that may impact sustainability. **Methods:** An anonymous survey will be electronically distributed to all practising general surgeons in Canada using Qualtrics. Basic demographic data collected will include year and country of medical school graduation, sex, province of practice, subspecialty and academic versus community practice. The survey will consist of open-ended and 5-point Likert-type questions pertaining to attitudes on environmentalism, barriers to sustainability in the OR and specific practice preferences

(as they relate to sustainability) when performing a laparoscopic cholecystectomy. Statistical analyses will be conducted using Stata software, and open-ended responses will be analyzed thematically. The study protocol has been approved by the research ethics board. **Results:** Pending; data collection is in process. **Conclusion:** Perceptions on environmental sustainability among Canadian general surgeons is an increasingly important research topic. Examining surgical practice patterns across the country can inform strategies for improving sustainability in the OR.

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The impact of COVID-19 on medical students applying to general surgery in the CaRMS matching process. *Gladys Bruyninx.* From the University of Saskatchewan.

Background: COVID-19 has impacted medical students across Canada. Measures were taken to protect medical students, including time away from rotations, limited exposure to patients with COVID-19, rescheduled clerkship electives, cancelled away electives and virtual interviews. Prior to the COVID-19 pandemic, fourth-year medical students would travel across the country for electives and social events to gain a better understanding of every residency program before applying and interviewing. Considering the drastic shift to online interviews and socials in 2021, new initiatives were taken, including creating social media pages for most Canadian residency programs and online social sessions, which remained in place until 2023. Few studies have reviewed the impact of this shift on incoming Canadian general surgery residents. Based on applicants' experience prior to and during COVID-19, we aimed to elucidate the impact of the pandemic's consequences on the Canadian Resident Matching Service (CaRMS) application. We plan to evaluate the pros and cons of migrating to a virtual-only process and the subsequent effect on applicants' chances of applying to their top program. **Methods:** We propose to carry out a pan-Canadian survey to review the 2020, 2021, 2022 and 2023 cohorts to assess their experience before and during COVID-19 during the CaRMS process. We will review the CaRMS website's statistics provided on the match and perform a literature review on the influence COVID-19 had on the CaRMS process. **Results:** Pending. **Conclusion:** This study will help inform Canadian residency programs on medical students' experience and perception of applying online to a residency program. It will also be beneficial to outline and discuss the pros and cons of using online resources and processes to assist Canadian residency programs make the best decision regarding the CaRMS process.

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Novel approach to laparoscopic gastrostomy tube placement. *Ilinca Georgescu, Vladislav Khokhotva.* From Dalhousie University (Georgescu), and Rose City Endoscopy (Khokhotva).

Background: Ideal insertion of a gastrostomy tube (G-tube) involves percutaneous endoscopic placement. However, in patients in whom gastroscopy is not possible, surgical means are often employed. Multiple techniques exist for the introduction of G-tubes, historically via a laparotomy with Stamm procedure and more recently via laparoscopic-assisted techniques. Here we describe a surgical technique that mitigates the risks associated with the insertion of a typical surgical G-tube and allows for the placement of standard percutaneous endoscopic gastrostomy (PEG) tubing. **Methods:** A 65-year-old woman presented with a

history of laryngectomy and thyroidectomy for a neoplasm of the neck and was unable to have enteral nutrition. Gastroscopy was not successful owing to significant stenosis. At laparoscopy, a 10-mm Haason trocar was introduced at the umbilicus, as were 3 5-mm ports in the upper abdomen. An incision was made into the distal stomach, followed by clamp introduction to a position near the fundus appropriate for tube insertion. A clamp was advanced out of the stomach through a small hole. A guidewire was then introduced through a left upper quadrant port, grasped using a clamp and pulled through the fundus and out through the umbilical port site. A standard PEG tube was then inserted along the guidewire. The insertion gastrotomy was closed using a 2-layer 3-0 PDS closure as well as an omental patch to reinforce the closure. Under direct vision, the stomach was pulled up to the abdominal wall and the G-tube was secured using the standard PEG kit. **Results:** No complications were reported at 6-month follow-up. **Conclusion:** The procedure described above represents an effective means of inserting a standard PEG tube using laparoscopic approach. Advantages include direct visualization, less propensity for leak or dislodgement and the durability of the tubing used.

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Using prucalopride for prevention of postoperative ileus in gastrointestinal surgery: a systematic review and meta-analysis of randomized controlled trials. *Gaurav Talwar, Sabil Sharma, Tyler McKechnie, Shuling Yang, Jigish Khamar, Dennis Hong, Aristithes Doumouras, Cagla Eskicioglu.* From McMaster University (Talwar, Sharma, McKechnie, Yang, Khamar, Hong, Doumouras, Eskicioglu), and St. Joseph's Healthcare (Hong, Doumouras, Eskicioglu).

Background: Postoperative ileus (POI) following abdominal surgery contributes to patient morbidity and prolonged hospitalization. Prucalopride, a highly selective 5-hydroxytryptamine receptor agonist, is proposed to enhance bowel motility. This review aimed to elucidate whether the use of prucalopride compared with placebo was associated with a reduction in POI in patients undergoing gastrointestinal surgery. **Methods:** OVID, CENTRAL and Embase were searched as of July 2022 to identify randomized controlled trials (RCTs) comparing outcomes of prucalopride versus placebo for pharmacologic prevention of POI in adult patients undergoing gastrointestinal surgery. The primary outcomes were time to stool, time to flatus and length of stay. The secondary outcomes were postoperative complications, adverse events, nasogastric tube reinsertion and overall costs. The Cochrane risk-of-bias tool for randomized trials and the Grading of Recommendations, Assessment, Development, and Evaluations framework were used to evaluate the evidence. An inverse variance random-effects model was used. **Results:** From 150 citations, 3 RCTs with 136 patients treated with prucalopride (74 patients received 2 mg 2 hours preoperatively and 2 mg/d for 6 days, 55 patients received 2 mg/d for 7 days postoperatively, and 7 patients received 2 mg 16 hours and 2 hours preoperatively) and 138 patients treated with placebo were included. Patients underwent a variety of gastrointestinal surgeries. Patients treated with prucalopride had a decreased time to stool (mean difference 36.82 hours, 95% confidence interval 59.4–14.24 hours lower, $I^2 = 62%$, moderate-certainty evidence). Other outcomes were not statistically different. Postoperative complications and adverse events could not be meta-analyzed owing to heterogeneity, yet data from individual studies suggested no significant

differences between the 2 treatment groups. **Conclusion:** Prucalopride may be an appropriate pharmacological adjunct to enhance postoperative return of bowel function. Larger prospective RCTs assessing clinically relevant outcomes and associated costs are needed before routine use of this agent.

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Assessment of environmental and economic sustainability of perioperative patient warming strategies. *Karina Spoyalo, Thais Ayres Rebello, Gyan Chhipi-Sbrestha, Kelly Mayson, Rehan Sadiq, Kasun Hewage, Andrea MacNeill.* From the University of British Columbia.

Background: Intra-operative hypothermia is associated with adverse events including surgical site infections, coagulopathy, myocardial injury and increased length of stay. Current guidelines recommend maintaining normothermia using forced air warming (FAW); however, emerging evidence indicates that alternative active warming techniques may be equally effective. In practice, passive warming with flannel blankets (FB) is commonly used leading to considerable variability in clinical practice, as well as environmental and economic impacts. Optimizing the current approach to patient warming can lower rates of excess consumable use, avoidable waste and ineffective warming. **Methods:** This study first assessed the environmental and economic performance of 4 patient warming methods through environmental life cycle assessment (E-LCA) and life cycle costing (LCC). A concomitant quality-improvement initiative characterized current warming practices, hypothermia rates and patient-reported outcomes at a tertiary hospital through an audit of urology, thoracic and general surgery patients. The results of the audit and E-LCA/LCC informed an optimized patient warming pathway, designed to deliver environmentally sustainable, cost-effective and evidence-based perioperative care. **Results:** Four warming methods were assessed: FB, FAW, resistive heating blankets (RHB) and circulating water garments. RHB was the most environmentally and economically sustainable method, while FAW represented the least sustainable option. FB use generated a considerable environmental impact stemming from cotton production and disposal, and material transportation. The LCC was mainly driven by material durability and disposable cost. The audit demonstrated that up to 11 FB were used per patient, and 25% of the time FB were used for noncore warming purposes. FAW was used only 55% of the time, and postoperative hypothermia rates were 8%–18%. **Conclusion:** An optimized patient warming pathway that explores alternative active warming methods, minimizes FB use and targets a reduced incidence of hypothermia could optimize resource use while promoting environmentally sustainable and high-quality surgical patient care.

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Development of a Canadian colorectal robotic surgery program: the first three years. *Susan Muncner, Mo Yu Li, Igor Mihajlovic, Mark Dykstra, Ryan Snelgrove, Haili Wang.* From the University of Alberta (Muncner, Mihajlovic, Dykstra, Snelgrove, Wang), and Memorial University of Newfoundland (Li).

Background: Although robotic colorectal surgery is prevalent in many American centres, Canadian uptake has been limited. Our study describes the experiences and results of establishing a

novel colorectal robotic surgery program in Canada. **Methods:** We used a prospective database to review robotic procedures for November 2018–2021 at a single Canadian tertiary centre. In the first phase, all robotic surgery patients were assessed. In the second phase, all patients receiving open, laparoscopic or robotic abdominal perineal resection (APR) and low anterior resection (LAR) were compared with laparoscopic and open patients from a retrospective database before the initiation of the robotic program. **Results:** During the study period, 136 patients underwent robotic colorectal surgery (62.5% male). The main indication was rectal adenocarcinoma (72%). Common procedures were LAR ($n = 60$, 44%) and APR ($n = 32$, 23.5%). Median operating room time (OT) per quarter significantly decreased over 3 years (Q1 310 [range 170–663] min v. Q4 255 [range 145–367] min, $p < 0.001$). Median hospital stay (LOS) decreased (Q1 5 [range 2–34] d v. Q4 4 [range 1–18] d, $p = 0.09$). In the second phase, only LAR/APR robot cases were considered ($n = 92$, 66.3% male) and compared with LAR/APR patients before 2018 (57 laparoscopic, 129 open). In the fourth quarter, mean robot OT was 265 (range 211–367) minutes in comparison to laparoscopic (225 min) and open (206 min). Median LOS for robotic patients was lower (5 d) compared with laparoscopic (6 d) and open (7 d). Readmission rate 30 days postoperatively was lower for robotic patients (7.2%) versus laparoscopic (8.8%) and open (15.5%). Most impressively, before the robotic colorectal surgery program initiation, 69% of pelvic cases were open at our institution, compared with only 11% after program initiation. **Conclusion:** Developing a colorectal robotic program with similar postoperative outcomes is feasible in the Canadian context. There is a significant decrease of OT with surgeon experience, and robotic surgery demonstrates decreased LOS and readmissions.

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Patient safety and quality improvement lessons from review of Canadian thyroid and parathyroid surgery malpractice litigation case law. *Christina Schweitzer, Sam M. Wiseman, Ivneet Garcha.* From the University of British Columbia

CANADIAN ASSOCIATION OF THORACIC SURGEONS

01

Changes in sarcopenia status predict survival among patients with resectable esophageal cancer. *Uzair Jogiati, Vickie Baracos, Simon R. Turner, Dean Eurich, Heather Filafilo, Armin Roubi, Alexandre Bédard, Eric L.R. Bédard.* From the University of Alberta.

Background: Sarcopenia is a predictor of survival in patients with esophageal cancer. Important insights may be obtained through evaluating how changes in sarcopenia status throughout treatment influence survival. The objective of this study was to evaluate the impact of changes in sarcopenia on survival in resectable esophageal cancer. **Methods:** A retrospective cohort of patients with esophageal cancer undergoing tri-modality therapy was selected. Body composition parameters from the staging, postneoadjuvant and 1-year surveillance computed tomography (CT) scans were calculated. Overall survival (OS) and disease-free

(Schweitzer, Wiseman), St. Paul's Hospital (Schweitzer, Wiseman), and Queen's University (Garcha).

Background: Malpractice litigation is a concern for all surgeons. Reviews of legal judgments identify areas to improve patient safety and satisfaction, inform consent discussions and reduce risk of litigation. Few prior studies have examined Canadian surgical malpractice litigation case law. This is the first study of Canadian thyroid and parathyroid surgery case law. The objective was to identify areas for quality improvement in surgical practice, to improve patient safety and reduce the risk of regulatory college complaints and litigation. **Methods:** The Canadian Legal Information Institute (CanLII) public database was searched for all legal judgments relating to thyroid and parathyroid surgery, in English and French. Cases were included if a surgeon was listed as the applicant or respondent, the case pertained to pre-, intra-, or postoperative management of thyroid or parathyroid disorders, and there was an allegation of malpractice. Cases were excluded if thyroid or parathyroid surgery was mentioned only incidentally, or if the case was primarily focused on nonsurgical management. **Results:** We identified 347 relevant legal judgments. Of the 14 cases meeting screening criteria, 13 related to thyroid and 1 to parathyroid surgery. Judgments were issued between 1978 and 2017. Most cases related to preoperative decision making, investigations and consent, including discussions of surgical risks with patients. Several cases pertained to intraoperative decision making and technical competence, including preservation of recurrent laryngeal nerves and hemostasis. Postoperative management issues included failure to recognize postoperative hematoma causing airway compression before respiratory arrest. Four cases involved patient mortality, and 1 patient required a permanent tracheostomy owing to bilateral recurrent laryngeal nerve injury. **Conclusion:** Quality improvement lessons from this review include the importance of documenting risks discussed in the consent process, comprehensive preoperative patient education, communicating with patients and other members of the care team, and reassessing patients in person when postoperative complications arise.

survival (DFS) were evaluated using the Kaplan–Meier method and log-rank test, as well as multivariable Cox proportional hazards models. **Results:** In total, 141 patients were included, 118 of whom had images available at all 3 time points. The median DFS was 33.2 (95% confidence interval [CI] 19.1–73.7) months, and the median OS was 34.5 (95% CI 23.1–57.6) months. Sarcopenia classified by the staging CT scan was present in 20 (17.0%) patients. This changed to 45 (38.1%) patients by the postneoadjuvant scan, and 44 (37.3%) by the surveillance scan. Sarcopenia was not associated with OS or DFS at the staging scan but was associated with worse OS and DFS at the postneoadjuvant scan. In multivariable analysis, sarcopenia at the postneoadjuvant scan was significantly associated with OS (hazard ratio [HR] 2.65, 95% CI 1.59–4.40, $p < 0.001$) and DFS (HR 1.80, 95% CI 1.03–3.13, $p = 0.038$). The net change in skeletal muscle index was significantly associated with OS (HR 0.93, 95% CI 0.90–0.97, $p < 0.001$) and DFS (HR 0.94, 95% CI 0.91–0.98, $p = 0.001$).

Conclusion: Patients who develop sarcopenia as a consequence of skeletal muscle wasting during neoadjuvant therapy are at risk for worse DFS and OS. Patients who have a net loss of muscle over time may be high-risk for early disease recurrence.

02

The feasibility of near-infrared fluorescence-guided robotic-assisted minimally invasive esophagectomy using indocyanine green dye. *Yogita S. Patel, Jacob A. Alaichi, John Agzarian, Wael C. Hanna.* From McMaster University.

Background: Robotic-assisted minimally invasive esophagectomy (RAMIE) using near-infrared fluorescence (NIF)-guided perfusion analysis with indocyanine green (ICG) dye is a novel minimally invasive technique for esophagectomy. We present the feasibility and safety of the first 6 cases performed in Canada. **Methods:** Patients with esophageal cancer who were candidates for minimally invasive esophagectomy were enrolled between March 2022 and January 2023 at 1 academic site in this prospective single-arm feasibility trial. Participants underwent RAMIE via a 2-stage approach: the first stage via a 5-port robotic approach through the abdomen, and the second stage via a 4-port robotic approach through the right chest. NIF-guided perfusion analysis with ICG was used to verify the course of the right gastroepiploic artery and the perfusion of the conduit in the abdominal phase, and to confirm the optimal location and perfusion state of the anastomosis in the thoracic stage. The anastomosis was constructed with a hand-sewn 2-layer technique. **Results:** All 6 patients screened were eligible and enrolled. Median age was 66 (range 58–74) years and 83.33% (5/6) were men. Mean procedure time was 455.33 ± 45.26 minutes. ICG was used successfully in 100% of cases: perfusion was detected with a green hue at the time of exposure to NIF in both stages of the operation with clear identification of demarcated areas of poor perfusion. There were no conversions to open technique. Median length of stay was 8 (range 7–9) days. Grade IVa complications occurred in 2 patients (33.33%): 1 patient experienced hemorrhagic shock in the immediate postoperative phase and 1 had a tracheoesophageal fistula within 90 days. **Conclusion:** NIF-guided RAMIE with ICG for esophageal cancer was feasible on the first 6 Canadian cases based on a high rate of successful completion, low rate of conversion to open, and a rate of grade IV adverse events that is concordant with published literature.

03

Does patient experience with robotic thoracic surgery influence their willingness to pay for it? *Yogita S. Patel, Jacob A. Alaichi, Esther Provost, Bobby Shayegan, Anthony Adili, Wael C. Hanna.* From McMaster University.

Background: Robotic-assisted thoracic surgery (RTS) is associated with high capital and operating costs, which are not reimbursed by Canadian health care, thus limiting patient access to this platform. We hypothesized that Canadian patients who experience RTS on research/philanthropic funds would have been willing to pay out-of-pocket to gain access to it. **Methods:** In this prospective, cross-sectional, observational study at a high-volume institution in Canada, patients undergoing RTS between July 2020 and February 2023 were invited to participate in a 2-part survey on demographics, degree of satisfaction with RTS and willingness to contribute to the cost of surgery in the absence of third-party funding. The survey

was administered before and after the surgery. Data associations and predictive factors to the change in willingness to pay were examined using the χ^2 test and logistic regression, respectively ($p < 0.05$).

Results: The response rate to the survey was 98.34% (178/181) among patients who underwent RTS. Median age at surgery was 68 (interquartile range 61–74) years, and 57.30% (102/178) were female. Prior to experiencing RTS, 52.81% (94/178) of patients stated that, in the absence of research/philanthropic funds, they would be willing to pay the additional \$2000 to supplement government health care coverage for RTS. When they took the survey after the operation, 83.15% (148/178) stated that they would be in favour of paying the additional supplement for access to RTS ($p < 0.001$). Regression analysis did not identify any predictors, including demographic/socioeconomic status or experience with RTS, to be significantly associated with participants' change in willingness to pay from before experiencing RTS to after. **Conclusion:** For Canadian patients undergoing RTS, first-hand experience with the operation was a significant driver for the change in willingness to pay a premium out-of-pocket to obtain access to the operation. These data can be used constructively in the debate around public funding for robotic surgery in Canada.

04

Artificial intelligence-augmented endobronchial ultrasound-elastography is a useful adjunct for lymph node staging for lung cancer. *Nikkita Mistry, Anthony A. Gatti, Yogita S. Patel, Forough Farrokhyar, Feng Xie, Wael C. Hanna.* From McMaster University.

Background: Endobronchial ultrasound (EBUS)-elastography produces a colour map of mediastinal lymph nodes (LNs), with the colour blue (level 60) indicating stiffness. A pilot study demonstrated that predominantly blue LNs, with a stiffness area ratio (SAR) > 0.496 , are likely malignant. This large-scale study aimed to validate this SAR compared with pathology specimens. **Methods:** This was a single-centre prospective clinical trial where B-mode ultrasound and EBUS-elastography LN images were collected from patients with suspected or diagnosed non-small cell lung cancer (NSCLC) during EBUS-transbronchial fine needle aspiration procedures. The images were fed to a trained deep neural network (NeuralSeg), which segmented the LNs, identified the percent of LN area above the colour blue threshold of level 60, and assigned a malignant label to LNs with an SAR above 0.496. Diagnostic statistics and receiver operating characteristic analysis were conducted. NeuralSeg predictions were then compared with pathology results from nodal biopsies or surgical specimens. **Results:** B-mode ultrasound and EBUS-elastography LN images ($n = 210$) were collected from 124 enrolled patients. Only LNs with conclusive pathology results ($n = 187$) were analyzed. NeuralSeg was able to predict 98/187 true negatives, 34/187 true positives, 10/187 false positives and 45/187 false negatives. This resulted in an overall accuracy of 70.59% (95% confidence interval [CI] 63.50%–77.01%), sensitivity of 43.04% (95% CI 31.94%–54.67%), specificity of 90.74% (95% CI 83.63%–95.47%), positive predictive value of 77.27% (95% CI 64.13%–86.60%) and negative predictive value of 68.53% (95% CI 64.05%–72.70%). The area under the curve for level 60 was 0.820 (95% CI 0.758–0.883). **Conclusion:** NeuralSeg was able to predict nodal malignancy based on EBUS-elastography LN images, with high accuracy and specificity. This technology can be refined further, as a potential adjunct to other clinical tests in nodal staging for lung cancer.

05

Preoperative mediastinal staging in early-stage lung cancer: targeted nodal sampling is not inferior to systematic nodal sampling. *Kerrie A. Sullivan, Forough Farrokhyar, Yogita S. Patel, Moïse Liberman, Simon R. Turner, Anne V. Gonzalez, Rabul Nayak, Kazubiro Yasufuku, Wael C. Hanna.* From McMaster University (Sullivan, Farrokhyar, Patel, Hanna), Université de Montréal (Liberman), University of Alberta (Turner), McGill University (Gonzalez), Western University (Nayak), and University of Toronto (Yasufuku).

Background: Patients with early-stage non-small cell lung cancer (NSCLC) often have triple normal lymph nodes (LNs) in the mediastinum, characterized as appearing benign on positron emission tomography, computed tomography and endobronchial ultrasound (EBUS; Canada Lymph Node Score [CLNS] ≤ 1). We hypothesized that triple normal LNs do not require routine biopsy at the time of EBUS for mediastinal staging. **Methods:** Patients with cN0-N1 NSCLC who were candidates for EBUS were enrolled in this prospective, multicentre crossover trial. All patients underwent targeted nodal sampling (TS), whereby sampling of triple normal LNs was omitted, and only LNs with a CLNS > 1 were sampled. All patients were then crossed over to receive systematic nodal sampling (SS), whereby at least 3 mediastinal LN stations (4R, 4L and 7) were routinely sampled in addition to any other LNs that were previously sampled with TS. The gold standard of comparison was pathological results. A non-inferiority margin of 6% was chosen for the incidence of missed nodal metastasis (MNM). A McNemar test on paired proportions was used to determine MNM incidence and rate of inconclusive biopsies for both TS and SS. **Results:** Between November 2020 and April 2022, 91 patients were enrolled at 6 high-volume Canadian centres. A total of 256 LNs underwent TS and SS. The incidence of MNM was 0.78% in SS and 3.12% in TS, with a difference of -2.34% (95% Newcombe confidence interval -5.61% to -0.58% , $p = 0.016$) between TS and SS. This falls within the non-inferiority margin. The rate of inconclusive biopsy was 20.0% in SS and 0% in TS. Six of 256 LNs, which were not sampled by TS, were found to be malignant when crossed over and sampled by SS. **Conclusion:** In high-volume thoracic endosonography centres, TS is not inferior to SS, when it comes to missing nodal metastases with EBUS staging in early-stage NSCLC. This results in change in clinical management in a minority of patients.

06

The application of an artificial intelligence algorithm to predict lymph node malignancy in non-small cell lung cancer. *Nikkita Mistry, Anthony A. Gatti, Yogita S. Patel, Sam Cross, Forough Farrokhyar, Feng Xie, Wael C. Hanna.* From McMaster University.

Background: Endobronchial ultrasound–transbronchial fine needle aspiration (EBUS-TBNA) for lung cancer staging is operator-dependent and results in high rates of nondiagnostic lymph node (LN) samples. We developed a deep learning–based artificial intelligence (AI) algorithm and hypothesized that it could consistently and reliably predict nodal metastases compared with pathology. **Methods:** This was a retrospective analysis of prospectively recorded B-mode images of mediastinal LNs during EBUS-TBNA. We used transfer learning to build an end-to-end ensemble of 3 pretrained deep neural networks

(ResNet152V2, InceptionV3, and DenseNet201). These models were not given any predefined features and learned to predict malignancy directly from the images. Model hyperparameters were tuned, and the optimal version(s) of each model trained using 80% of the images (training/validation set). A learned ensemble (multi-layer perceptron) of the optimal versions was applied to the remaining 20% of the images (test set). All predictions were compared with final pathology from nodal biopsies and/or surgical specimens. **Results:** A total of 3366 LN images from 943 patients were used. The training/validation and test sets of LNs consisted of 53.3% versus 54.1% benign and 22.7% versus 23.4% malignant, respectively, with the rest having inconclusive pathology ($p = 0.01$). Training/validation and testing were applied to only the benign and malignant images as, otherwise, no ground truth data would be available. The final model had an overall accuracy of 80.63% (95% confidence interval [CI] 76.93%–83.97%), 43.23% sensitivity (95% CI 35.30%–51.41%), 96.91% specificity (95% CI 94.54%–98.45%), 85.90% positive predictive value (95% CI 76.81%–91.80%), 79.68% negative predictive value (95% CI 77.34%–81.83%) and area under the curve of 0.701 (95% CI 0.646–0.755) for malignancy. **Conclusion:** Our AI algorithm can identify nodal metastases based on ultrasound images with high overall accuracy and specificity to identify nodal metastases. Further optimization with larger sample sizes would be beneficial before clinical application.

07

Pneumonectomy for non-small cell lung cancer: long-term overall survival from a 15-year experience. *Pier-Luc Haché, Geraud Galvaing, Serge Simard, Jocelyn Grégoire, Jean Bussièrès, Yves Lacasse, Sami Sassi, Catherine Champagne, Anne-Sophie Laliberté.* From the Quebec Heart and Lung Institute (Haché, Simard, Grégoire, Bussièrès, Lacasse, Champagne, Laliberté), Université Laval (Haché, Simard, Grégoire, Bussièrès, Lacasse, Champagne, Laliberté), Clermont-Auvergne University (Galvaing), and Saint-Jerome Regional Hospital (Sassi).

Background: In an era where patients are offered the most limited lung resection, including sleeve lobectomy, to achieve a complete oncologic R0 status for non-small cell lung cancer (NSCLC), pneumonectomy (PN) is sometimes the only curative option. Few studies demonstrate long-term overall survival (OS) after PN for NSCLC. The aim of this study was to evaluate long-term OS as well as perioperative morbidity and mortality for PN in NSCLC. **Methods:** We retrospectively reviewed a local database of patients who underwent PN for NSCLC performed by 6 different surgeons in a single academic institution between Jan. 1, 2005, and Dec. 31, 2019. Patient characteristics, oncologic stage, anesthetics, operative variables, postoperative complications including bronchopleural fistula (BPF) and survival data were analyzed. Kaplan–Meier curves for OS (up to 15 years) and hazards ratio (HRs) for risk factors were calculated. **Results:** A total of 278 PN were performed over 15 years. Neoadjuvant treatment was initiated in 45 patients (16.1%). A total of 223 patients (80.2%) were pN0–1. Right PN was performed in 137 patients (49.3%) and flap coverage of the bronchial stump in 190 patients (68.3%). The 5, 10 and 15 year OS was 43.0% \pm 3.1%, 29.3% \pm 3.4% and 25.7% \pm 4.0%, respectively. In multivariate analysis, the use of steroids ($p = 0.048$), blood transfusion

($p = 0.03$) and positive surgical margin ($p = 0.045$) were factors of worse prognosis. The 30-day and 90-day mortality rates were 6.5% and 11.2%, respectively, influenced by pulmonary complications ($p = 0.0001$), atrial fibrillation ($p = 0.006$), intrapericardial dissection ($p = 0.045$) and BPF ($p = 0.0001$) for the 90-day mortality. **Conclusion:** PN remains a valuable therapeutic option when treating patients with NSCLC in a curative intent regarding their OS, but it also remains a procedure with high perioperative morbidity and mortality. Achieving R0 resection and reducing perioperative complications might offer the best chance of cure and long-term OS.

09

Primary spontaneous pneumothorax occurred in pectus excavatum patients. *Jin Yong Jeong.* From the Incheon St. Mary's Hospital and The Catholic University of Korea.

Background: Primary spontaneous pneumothorax (PSP) patients are usually tall and thin young people with a body shape similar to those of pectus excavatum (PE) patients. The Haller index in patients with PSP is higher than in normal patients, as in patients with PE, suggesting that PE may be a predisposing factor in the development of PSP. **Methods:** We reviewed the medical data of patients aged 13 years or older who were diagnosed with PE and who underwent surgery for PSP or PE between July 2011 and February 2023. We excluded patients aged 12 years or younger, patients with PSP without PE, patients with recurrent PE who had previous treatments, and patients who required surgery for postoperative complications such as pectus bar displacement. **Results:** A total of 139 patients (118 male, 21 female, age range 13–40 yr) were included in this study. Eight of them (5.76%) underwent surgery for PSP, PE, or both. The average age of these patients (7 male, 1 female) was 18.8 years. They were divided into 4 groups according to the time of diagnosis: Group A ($n = 1$) was PSP diagnosed by radiology for PE; Group B ($n = 2$) was PE diagnosed at the time of evaluation for PSP; Group C ($n = 1$) was PSP diagnosed before PE surgery; and Group D ($n = 4$) was PSP diagnosed after PE surgery. **Conclusion:** Our study showed a high PSP incidence of 5.76% in patients with PE, suggesting that careful observation for PSP is necessary before PE surgery (and vice versa). In addition, we recommend careful observation of PSP unrelated to PE surgery even if there are no complications after PE surgery.

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Optimizing management for early-stage esophageal adenocarcinoma: longitudinal results from a multidisciplinary program. *Uzair Jogiati, Hillary Wilson, Alexandre Bédard, Pam Blakely, Jerry Dang, Warren Sun, Shabzeer Karmali, Eric L.R. Bédard, Clarence Wong.* From the University of Alberta (Jogiati, Wilson, Bédard, Sun, Karmali, Bédard, Wong), Alberta Health Services (Blakely), and the Cleveland Clinic (Dang).

Background: A multidisciplinary approach to early-stage esophageal cancer may optimize management through careful selection of candidates for surgical or endoscopic therapies. The objective of this research was to examine long-term outcomes of patients with early-stage esophageal cancer who undergo treatment with endoscopic resection and/or surgery. **Methods:** Data on patient demographics, comorbidities, pathology results, over-

all survival (OS) and relapse-free survival (RFS) were obtained for the endoscopic resection group and the esophagectomy group. Univariate analysis of OS and RFS was conducted using the Kaplan–Meier method with calculation of the log-rank test. Multivariate Cox proportional hazards models were created for OS and RFS using a hypothesis-driven approach. A multivariate logistic regression model was created to identify predictors of esophagectomy among patients undergoing initial endoscopic resection. **Results:** A total of 111 patients were included in the analysis. The median OS for the surgery group was 67.0 months compared with 74.0 months in the endoscopic resection group (log-rank $p = 0.93$). The median RFS for the surgery group was 109.4 months compared with 63.3 months in the endoscopic resection group (log-rank $p = 0.0127$). On multivariable analysis, patients undergoing endoscopic resection had significantly worse RFS (hazard ratio [HR] 2.55, 95% confidence interval [CI] 1.09–6.00, $p = 0.032$), but equivalent OS (HR 1.03, 95% CI 0.46–2.32, $p = 0.941$) compared with patients undergoing esophagectomy. High-grade disease (odds ratio [OR] 5.43, 95% CI 1.13–26.10, $p = 0.035$) and submucosal involvement (OR 7.75, 95% CI 1.90–31.40, $p = 0.004$) were identified as significant predictors of proceeding to esophagectomy. **Conclusion:** Through a multidisciplinary approach, patients with early-stage esophageal cancer achieve excellent RFS and OS. Submucosal involvement and high-grade disease place patients at increased risk for local disease recurrence; these patients may undergo endoscopic resection safely if treated within a multidisciplinary team framework incorporating endoscopic surveillance and surgical consultation. Further risk-stratification models may enable better patient selection and optimization of long-term outcomes.

11

Needle decompressions in post-traumatic tension pneumothorax: boon or bane. *Subail Yaqoob Hakim, Samim Azizi, Ayman El-Menyar, Sandro Rizoli, Hassan Al-Thani.* From the Hamad Medical Corporation (Hakim, Azizi, El-Menyar, Rizoli, Al-Thani), Qatar University (Hakim), and Weill Cornell Medical College Doha (El-Menyar).

Background: Tension pneumothorax is a catastrophic condition in which air progressively entraps in the pleural cavity due to a one-way valve effect. In a polytrauma patient it adds to the prevailing dramatic confusion and management. It may lead to cardiovascular arrest if not treated exigently. **Methods:** We report the case of 43-year-old man with history of fall from height who suffered polytrauma. He was intubated and ventilated for a low Glasgow Coma Scale score and developed tension pneumothorax en route to the hospital. Multiple needle decompressions were done by emergency medical services, without significant improvement in the patient's saturation and hemodynamics. On arrival in the trauma bay he had a total of 7 decompression needles in place bilaterally, saturation of 83% and borderline blood pressure. Post-resuscitation one of the needles started spouting blood. Extended focused assessment with sonography in trauma (E-FAST) was suboptimal owing to surgical emphysema. Bilateral chest tubes were inserted. The patient's saturation improved, and the needles were removed. At this point the blood pressure dropped suddenly. Repeat E-FAST showed cardiac tamponade. The patient was rushed to the operating theatre, a pericardial window successfully drained blood and relieved the pressure around the heart. His

hemodynamics improved drastically. A left anterolateral thoracotomy showed a single right ventricular puncture, which was repaired. **Results:** The patient was stabilized and shifted for pan computed tomography scan and the rest of his trauma assessment. **Conclusion:** Overzealously inserting multiple decompression needles carries a high risk of injury to the heart and major blood vessels. Whether the needle that is spouting blood should be removed immediately or should be kept until initial stabilization of the patient remains an issue of further discussion. Needle decompression is a life-saving procedure, but it has a high failure rate and the potential to cause iatrogenic harm.

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10-year follow-up of endoscopic mucosal resection versus esophagectomy for esophageal intramucosal adenocarcinoma in the setting of Barrett esophagus: a Canadian experience. *Alisba R. Fernandes, Daniel French, Chao Li, James Ellsmere.* From Dalhousie University (Fernandes, French, Ellsmere), and Centre intégré universitaire de santé et de services sociaux de l'Est-de-l'Île-de-Montréal (Li).

Background: Endoscopic mucosal resection (EMR) is an effective treatment for esophageal intramucosal adenocarcinoma (IMC), with similar recurrence and mortality rates as esophagectomy in short-term follow-up. Long-term outcomes have not been studied. This retrospective study investigated IMC eradication, recurrence, morbidity and mortality at 10 years following EMR versus esophagectomy. **Methods:** Patients with IMC treated via esophagectomy or EMR between 2006 and 2015 were included. Endoscopic follow-up after EMR occurred every 3 months for 1 year, every 6 months for 2 years, and every 12 months thereafter. Categorical variables were expressed as percentages, and continuous variables as means with standard deviations (SD) or medians and interquartile ranges (IQR). The Student *t* test, Pearson χ^2 test and Fisher exact test were used for comparisons. Survival analysis used the Kaplan–Meier estimator and log-rank test. **Results:** Twenty-four patients were included. Patient and tumour characteristics were similar between groups. Median follow-up for EMR and esophagectomy were 7.1 years (IQR 5.4) and 10.5 years (IQR 4.5). A mean of 1.3 EMR (SD 1.1) were required for eradication, which was seen in 12 patients (86%). No EMR-related complications occurred. Disease progression was seen in 2 patients (14%); local recurrence was seen in 1 patient (7%). Esophagectomy eradicated IMC in 10 patients (100%); recurrence was seen in 2 (20%, metastatic). Major, early esophagectomy-related morbidity affected 3 patients (30%), and late morbidity was documented for 9 (90%). Esophagectomy and EMR had similar recurrence rates ($p = 0.554$). Esophagectomy was associated with significantly more procedure-related morbidity ($p < 0.001$). There was no difference in mortality ($p = 0.442$) or disease-free survival ($p = 0.512$) between treatment groups. **Conclusion:** EMR and esophagectomy for the treatment of IMC are associated with comparable recurrence, disease-free survival and mortality rates in 10-year follow-up. EMR is associated with significantly lower procedure-associated morbidity. EMR can be used to treat T1a distal esophageal adenocarcinoma with minimal procedure-related morbidity and acceptable disease-related outcomes.

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Outcomes after thoracic surgery for malignancy in patients with severe and persistent mental illness. *Shilob Gossen,*

Daniel French, Jon Bailey, Phil Tibbo, Candice Crocker. From Dalhousie University.

Background: Patients with severe and persistent mental illnesses (SPMI) have high rates of tobacco smoking compared with the general population, increasing their risk of thoracic malignancies. However, there is very little literature focused on thoracic surgical outcomes in this patient population. **Methods:** To identify patients with SPMI and a thoracic malignancy, the Nova Scotia Cancer Register and Mental Health Encounter Databases were crosslinked using data from 2013 to 2018. Next, retrospective chart reviews were performed for patients who underwent surgical resection, recording patient demographics, procedure, adverse events, length of stay (LOS), discharge to higher level of care, pathologic stage and survival at 1, 2 and 5 years. **Results:** There were 53 patients identified with SPMI and a diagnosis of a thoracic malignancy. Ten (18.9%) patients underwent surgical resection, of whom 7 had a lobectomy, 1 had a wedge resection and 2 had an esophagectomy. The median LOS was 7.5 days and 25.5 days for pulmonary resection and esophagectomy, respectively. Eight (80%) patients had a grade III or higher adverse events. There were no 30-day or in-hospital deaths. One (10%) patient was discharged to a nursing home postoperatively; however, this had been arranged preoperatively. One patient (10%) was lost to follow-up at 1 year; however, the remaining 9 patients (90%) were alive at 1 year. The 2-year overall survival was 77.8% (7 of 9 patients). At 5 years another patient was lost to follow-up, but 4 (50%) of the remaining patients were alive. **Conclusion:** Patients with SPMI can tolerate resection of thoracic malignancies but may have a higher incidence of serious adverse events and increased LOS compared with other patient populations. Survival at 1, 2 and 5 years for this patient cohort with SPMI is comparable to published outcomes.

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Stage II/III esophageal cancer patients with complete clinical response after neoadjuvant chemoradiotherapy: a Markov decision analysis. *Adom Bondzi-Simpson, Tiago Ribeiro, Biniam Kidane, Michael Ko, Natalie Coburn, Girish Kulkarni, Julie Hallet.* From the University of Toronto (Bondzi-Simpson, Ribeiro, Ko, Coburn, Kulkarni, Hallet), and University of Manitoba (Kidane).

Background: Chemoradiation followed by esophagectomy is the standard of care for stage II/III esophageal cancer (EC) patients. Esophagectomy is a highly morbid procedure, and recent evidence suggests select patients may benefit from omitting or delaying surgery. This study aimed to compare upfront surgery versus active surveillance for patients with stage II/III esophageal cancer and a complete clinical response (cCR) after neoadjuvant chemoradiotherapy (nCRT). **Methods:** A decision analysis with Markov modelling was used to simulate outcomes. The base case was a 60-year-old male with stage II/III EC with cCR after nCRT. The decision was modelled for a 5-year time horizon. The measured outcomes were life years (LY) and quality-adjusted life years (QALYs). Probabilities and utilities were derived through a literature search. Deterministic sensitivity analyses were performed using ranges from literature with consideration for clinical plausibility. **Results:** Upfront surgery was favoured over active surveillance for survival, with an expected LY of 2.89 versus 2.64. After incorporating utilities, active surveillance was favoured with an expected QALY of 1.70 versus 1.56. The model

was sensitive to the probability of recurrence on active surveillance (threshold value 0.598), probability of recurrence being local (resectable; 0.318) and disutility of prior esophagectomy (-0.091). The model was not sensitive to perioperative morbidity and mortality. The model demonstrated face validity and external validity through consultation with content experts and comparative analysis with published literature. **Conclusion:** Active surveillance resulted in an incremental gain of 0.14 QALYs and an incremental loss of 0.25 LYs. The incremental change is insufficient to make broad clinical or policy-directed recommendations. However, according to the model, both choices appear reasonable and should be considered in the context of patient values and goals.

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Development of a surgical stabilization of rib fractures program at a Level I trauma centre in Qatar: initial report. *Ahmed Faidh Ramzee, Ibrahim Afifi, Musbrek Alani, Ruben Peralta, Ayman El-Menyar, Sandro Rizoli, Hassan Al-Thani, Talat Chughtai.* From Hamad Medical Corporation.

Background: Rib fractures following trauma are predominantly managed nonoperatively. Surgical stabilization of rib fractures (SSRF) has recently regained popularity, with numerous publications on this topic. However, identifying the ideal patient for fixation remains a subject of debate. We describe our experience with development of an SSRF program at the only Level 1 trauma centre in Qatar. **Methods:** In 2020, a thoracic trauma focus group was established whose aim included evaluation of all patients with rib fractures for potential fixation based on currently accepted guidelines in the literature. Between March 2020 and February 2023, 14 patients underwent rib fixation. Almost all fixations were performed using the MatrixRIB fixation system (DePuy Synthes). Comprehensive data were collected prospectively until patient discharge. **Results:** The majority of patients sustained chest injuries following a motor vehicle accident or fall from height. All patients had severe associated injuries, with a mean Injury Severity Score of 19; of these, 5 had severe traumatic brain injury. Six patients were intubated on admission. Nine of 14 patients were fixed for flail chest. Median time to surgery was 3 days. A mean of 3 ribs were fixed per patient. Thirteen patients had drainage of hemothorax, 2 underwent concomitant lung repair and 1 had sternal fixation. The average length of stay was 28 days. There were 2 complications (ventilator associated pneumonia and displaced plate). All patients survived to discharge. Only 1 of 14 patients complained of persistent pain on follow-up. **Conclusion:** We developed a system to identify patients who may benefit from SSRF and have performed 14 such surgeries without significant complications. We aim to broaden the indications for fixation and perform long-term follow-up on quality of life for these patients.

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Screening Criteria Evaluation for Expansion in Pulmonary Neoplasias (SCREEN) II. *Bright Huo, Daria Manos, Zhaolin Xu, Katerina-Maria Kontouli, Samuel Chun, John Fris, Allison M.R. Wallace, Daniel G. French.* From Dalhousie University (Huo, Manos, Xu, Chun, Fris, Wallace, French), University of Ioannina (Kontouli).

Background: Lung cancer screening can identify patients with early-stage disease. The National Lung Screening Trial (NLST)

and NELSON trials demonstrate a benefit to screening patients based on age and smoking history. However, there is a need to identify risk factors among screen-ineligible light-or-never-smokers (LONS) who may also benefit from lung cancer screening. **Methods:** A retrospective study of 1156 lung cancer cases from 2005 to 2018 was conducted comparing the molecular and immune profiles between heavy smokers and LONS. Multivariable logistic regression was used to compare the frequency of *KRAS*, *EGFR*, *BRAF* and *PIK3CA* mutations, and PD-L1 status (< 49%, ≥ 50%) while adjusting for clinically relevant factors. The geographic distribution of lung cancers was identified by county, comparing incidence to the provincial mean. **Results:** There were 45.7% (NLST, $n = 536$) and 63.5% (NELSON, $n = 745$) screen-eligible heavy smokers. Screen-ineligible LONS with non-small-cell lung cancer were more likely to have an *EGFR* (11.3% v. 2.6%, $p < 0.001$) or *PIK3CA* (4.5% v. 1.9%, $p = 0.019$) mutation. *KRAS* mutations were more common in heavy smokers with a family history of cancer (odds ratio [OR] 1.80, 95% confidence interval [CI] 1.09–3.0, $p = 0.02$), adenocarcinoma (OR 5.34, 95% CI 2.53–11.25, $p < 0.001$), and PD-L1 positive status (OR 3.23, 95% CI 1.94–5.38, $p < 0.001$). No differences in *ALK* and *BRAF* mutations were observed. The highest incidence of lung cancer was 27.4 cases per 1000 compared with the provincial average of 17.9 cases per 1000. There was a statistically significant difference in incidence of lung cancer between counties. **Conclusion:** When defined by conventional screening criteria, LONS have a higher rate of *EGFR* and *PIK3CA* mutations. Molecular profiling, particularly where targeted therapy is available, should be considered in establishing criteria for lung cancer screening. Targeted screening in geographic regions with a higher incidence of lung cancer should also be considered.

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Multi-centre study evaluating the risks and benefits of intraoperative steroids during pneumonectomy. *Catherine Giffin, Moïse Liberman, Gabriel Dayan, Anne-Sophie Laliberté, Kazubiro Yasufuku, Alexander Farivar, Biniam Kidane.* From the University of Manitoba (Giffin, Kidane), Centre Hospitalier de l'Université de Montréal (Liberman), Université de Montréal (Dayan), Centre Hospitalier Affilié Universitaire de Québec (Laliberté), Toronto General Hospital (Yasufuku), and the Swedish Medical Centre (Farivar).

Background: Pneumonectomies are the highest-risk pulmonary operation and can be complicated by respiratory failure. This complication may be reduced by intraoperative steroids; however, concerns exist about the development of bronchopleural complications. We aimed to assess if intraoperative steroids decreased respiratory failure rates and/or increased bronchopleural complications in patients undergoing pneumonectomy. **Methods:** We performed a retrospective multicentre cohort study of consecutive pneumonectomy patients from 5 high-volume thoracic surgery centres (2005–2019). Univariable and multivariable analyses were performed. Owing to the skewed nature of steroid types and dosing, values were converted to steroid-equivalent doses, and low and high doses were differentiated. **Results:** Among the 1073 pneumonectomy patients included in the analysis, the mean age of the population was 62.7 years, with a high incidence of complex cases (intrapleural 43.5%, $n = 460$; completion 7.9%, $n = 83$; extrapleural 19.4%, $n = 210$; right-sided 45.0%, $n = 482$). Respiratory

failure occurred in 8.5% of the total cohort and occurred in 8.19% ($n = 69$), 7.06% ($n = 6$) and 15.23% ($n = 16$) of those receiving no, low-dose and high-dose intraoperative steroids, respectively ($p = 0.047$). This suggests that low-dose steroids were protective and resulted in the lowest incidence of respiratory failure. Bronchopleural complications occurred in 6.3% ($n = 68$), occurring in 7.28% ($n = 54$), 7.41% ($n = 6$) and 7.69% ($n = 8$) of those receiving no, low-dose and high-dose intraoperative steroids, respectively ($p = 0.97$). Multivariable analysis identified no significant association between intraoperative steroid use and respiratory failure (all $p > 0.13$) and identified no significant independent association between steroid use and bronchopleural complications, regardless of how steroid use was modelled (all $p > 0.64$). **Conclusion:** Intraoperative steroids were not associated with decreased respiratory failure following pneumonectomy, although low-dose steroids may be protective. The inability to adjust for ventilatory exposures limits conclusions about protective effect in some subgroups; however, intraoperative steroids were not associated with bronchopleural complications and appear to be safe.

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Prediction of esophageal cancer short-term survival using a pretreatment health-related quality of life measure. *Cara Weessies, Madeline Robinson, Leeann Bednarek, Gordon Buduhan, Richard Liu, Lawrence Tan, Sadeesh K. Srinathan, Biniyam Kidane.* From the University of Manitoba (Weessies, Robinson, Bednarek, Buduhan, Liu, Tan, Srinathan, Kidane), and Cancer Care Manitoba Research Institute (Kidane).

Background: Pretreatment health-related quality of life (HRQoL) is associated with long-term survival in locally advanced esophageal cancer patients. We aimed to determine whether pretreatment HRQoL predicts short-term survival in patients with esophageal cancer of all stages. **Methods:** A prospective cohort study was performed at a tertiary thoracic centre. Consecutive esophageal cancer patients with 6-month survival data, who completed Functional Assessment of Cancer Therapy-Esophageal (FACT-E) questionnaires before treatment were included. FACT-E is a validated HRQoL measure for esophageal cancer patients, incorporating the Esophageal Cancer Subscale (ECS). Univariate analysis was performed using the Fisher exact test and analysis of variance. Multivariable logistic regression was performed to assess 6-month survival. **Results:** A total of 177 patients had 6-month data. The majority were male (76.8%) with adenocarcinoma (87.0%) presenting with clinical stage 3/4 cancer (75.7%). On univariate analysis, lower clinical stage, lower ECOG Performance Status, higher body mass index, and receipt of chemotherapy, radiotherapy or surgery were significantly associated with survival. Higher ECS ($p = 0.02$) but not overall FACT-E scores was significantly associated with survival at 6 months. On multivariable analysis, only ECS was independently associated with being alive at 6 months ($p = 0.047$). **Conclusion:** Pretreatment ECS is independently associated with short-term survival in patients with esophageal cancer. These data may be used as an adjunct to short-term risk assessment and shared decision-making pretreatment.

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Evaluating the impact of virtual care in thoracic surgery: patients' perspective. *Awrad Nasralla, Najib Safieddine, Sayf*

Gazala, Carmine Simone, Negar Abmadi. From the University of Toronto.

Background: During the COVID-19 pandemic, in-person visits were often replaced with virtual care. The literature comparing virtual to in-person visits remains limited, but a systematic review in the early days of the pandemic reported that virtual care in oncology patients was not inferior to in-person care. Although the future of virtual care remains uncertain, understanding its impact on patients can allow for optimization of the care it delivers. Our aim is to assess the patient experience with virtual care in a community thoracic centre. **Methods:** This study is currently underway. Patients seen in our thoracic clinic starting in March 2023 were given a survey to complete to evaluate their experience with virtual care (video or phone). Inclusion criteria were all adults older than 18 years who were seen in the thoracic clinic for follow up (virtual or in person) willing to participate in the study. **Results:** To date, 40 patients have participated in the study. Of those, 57% were females, and most (87%) were older than 50 years. Thirty percent of the visits were for lung cancer, followed by lung nodules (20%), esophageal cancer (10%), hiatal hernia (15%) and mediastinal mass (5%). Of all virtual visits, the majority (80%) were phone visits. Of all patients with virtual experience, 53% were satisfied with their virtual visit while 20% were neutral. Most patients (60%) felt that virtual care delivered similar level of care to in-person visits, and 53% indicated their willingness to receive further virtual care. **Conclusion:** Our preliminary results indicate that, overall, patients are satisfied with receiving virtual care. It appears to be a reasonable alternative to in-person visits. Patients can be selected appropriately to continue to receive virtual care.

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Virtual thoracic surgical outpatient encounters are non-inferior to in-person visits for overall patient care satisfaction in the post-COVID-19 era. *Roy Hilzenrat, Maurice Blitz, Shaun Deen, Michael Humer, Anand Jugnauth, Gordon Buduhan.* From the University of British Columbia (Hilzenrat), and Kelowna General Hospital (Blitz, Deen, Humer, Jugnauth, Buduhan).

Background: The COVID-19 pandemic prompted physicians to predominantly utilize virtual outpatient care. As patient satisfaction emerges as an indicator of care quality, it is important to distinguish patients' experiences with various clinician encounter platforms. We herein summarize thoracic surgery patient satisfaction and experiences with virtual care encounters compared with in-person visits in the contemporary postpandemic era. **Methods:** An online questionnaire was sent to all thoracic surgical patients seen in person or virtually (Telehealth, Zoom video teleconference or phone) between April 2022 and February 2023. The questionnaire assessed patients' experiences and overall satisfaction with their clinic encounters. **Results:** In total, 358 patients were included. We observed a 96.8% satisfaction rate in overall care among virtual care patients and 98.6% among in-person patients, with no significant difference in the odds of being satisfied based on encounter type (odds ratio 0.45, 95% confidence interval 0.02–2.65), subtype of virtual care or reason for visit (consultation v. follow-up). Among virtual care patients, 97.9% noted decreased financial burden associated with virtual visits and 91.2% agreed or strongly agreed that virtual visits were

as good as in-person visits for overall care. Patients' initial encounter type was predictive of their preference for future encounters. A greater proportion of in-person patients preferred the opposite type of encounter for their next visit; i.e., they preferred a virtual visit compared with the proportion of virtual patients who preferred an in-person visit (27% v. 9.2%, respectively, $p < 0.001$). **Conclusion:** Virtual care thoracic outpatient encounters are associated with a high degree of patient satisfaction in the post-COVID era, with a higher proportion of in-person patients preferring future virtual platform options. While in-person visits remain an important component of evaluation, virtual encounters provide a highly valued, patient-centred model of care. Eliciting patient satisfaction should help guide decisions regarding optimal provision of health services.

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Concurrent minimally invasive esophagectomy and laparoscopic right hemicolectomy. *Laura Kerr, Simon Sun.* From the Northern Ontario School of Medicine.

Background: A 75-year-old male presented with progressive dysphagia and was found to have a Siewert II esophageal adenocarcinoma that was poorly differentiated with signet ring cell morphology. Staging demonstrated uT2N0 disease. In the course of the staging work up, an endoscopically unresectable polyp was discovered in the right colon. **Methods:** After a discussion at multidisciplinary tumour boards, the patient received neoadjuvant CROSS chemoradiation and then underwent a concurrent minimally invasive esophagectomy and laparoscopic right hemicolectomy with a postgraduate year 5 resident as the primary operator. The colon specimen was passed through the pleural defect into the chest and was removed via the video-assisted thoracoscopic surgery access incision. The typical minimally invasive esophagectomy reconstruction followed. **Results:** The patient tolerated the procedure well and had an uncomplicated postoperative stay. He was ambulating on postoperative day 1, and was discharged from the intensive care unit on postoperative day 4, as is standard local procedure. He was able to be discharged home on postoperative day 6, tolerating a postesophagectomy diet without issue. At 5 months postsurgery, he had not experienced any complications. Pathology showed a tubular adenoma in the right colon. There was a complete pathologic response after CROSS, with 0/19 lymph nodes showing evidence of metastatic disease (ypT0N0). **Conclusion:** Using a combined minimally invasive approach for both the esophageal resection and right colon resection, we were able to optimize the postoperative recovery and allow early discharge for a patient after 2 major resections. These procedures are excellent teaching opportunities for senior and chief residents to allow consolidation of complex laparoscopic and thoracoscopic skills.

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Assessing the impact of robotic-assisted thoracic surgery on direct carbon dioxide emissions — a retrospective analysis of a prospective cohort. *Ikennab Browne, Yogita Patel, Wael Hanna.* From McMaster University.

Background: Climate change continues to be one of the most significant global health threats of the 21st century. Recent literature has attempted to assess the environmental impact of novel

surgical technology; however, there is a paucity of data specifically evaluating the impact of robotic thoracic surgery on direct carbon dioxide (CO₂) emissions. This study aimed to quantify the volume of CO₂ insufflation used in robotic thoracic surgery. **Methods:** Patients were identified from a prospectively maintained database from December 2017 to December 2022. Those who underwent robotic-assisted lung resection, esophagectomy and resection of mediastinal tumours with accurately documented CO₂ insufflation volumes were included. CO₂ volume (L) was used to calculate the weight (g) of CO₂ diffused into the atmosphere. Parametric and nonparametric tests were performed where appropriate, and relevant variables, such as smoking status, type of resection, use of neoadjuvant therapy, total operating room time and blood loss, were included in the analyses. **Results:** In total, 528 patients were identified, of whom 425 had complete CO₂ insufflation data. The majority underwent lung resection (402, 94.59%). The mean volume of CO₂ insufflated was 372.08 L and the mean weight of CO₂ was 730.88 g. The CO₂ equivalent per 1000 cases was 0.73 metric tonnes, which is similar to almost 4 trips from Toronto to New York City in a standard automobile, or conversely to carbon sequestered by 12 tree seedlings grown for 10 years. **Conclusion:** The impact of robotic thoracic surgery on direct CO₂ emissions is not negligible. Current practice involves CO₂ insufflation from the time of port insertion to specimen retrieval. Future clinical trials should elucidate the optimal approach to decreasing CO₂ insufflation volume without compromising visualization. To our knowledge, this is the first study to quantify direct CO₂ emissions from robotic thoracic surgery using patient-level data.

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Young's modulus of human lung parenchyma and tumours. *Brandon Losbusan, Arefin Shamsil, Michael D. Naish, Mehdi Qiabi, Rabul Nayak, Rajni Patel, Richard Malthaner.* From the London Health Sciences Centre (Losbusan, Qiabi, Nayak, Malthaner), and Western University (Shamsil, Naish, Patel).

Background: Tumor localization of small, deep subpleural lesions during video-assisted thoracoscopic surgery depends on the differential tissue stiffness between the tumour and adjacent tissue. To obtain a quantitative measure of stiffness, we catalogued the Young's modulus (YM) of in situ abnormal lung lesions and adjacent tissue from resected specimens. **Methods:** A 5- to 10-mm section of resected tumour and adjacent lung tissue was placed in a custom indenting device to measure the YM. The device applied a uniform force on the tissue samples to varying levels of tissue displacement, up to 15% of their thickness. The YM was calculated from 200 measurements of forces and displacements, and each set of measurements were repeated 3 times. The YM for each tissue histology was assessed by parametric (t test) or nonparametric (Mann-Whitney U test) analyses as appropriate. **Results:** Seventy-eight resection specimens were analyzed. This included 39 adenocarcinomas, 17 squamous cell carcinomas, 3 adenosquamous carcinomas, 11 metastases, 4 other diagnoses and 4 granulomas/fibromas. Adjacent lung tissue included 60 normal samples: 10 emphysemas, 5 fibrosis and 3 with other changes. The median YM for all lung tumours (12.73 [range 2.68–199.10], $p < 0.001$) was significantly higher than the YM of adjacent lung tissue (6.12 [range 1.65–13.19], $p < 0.001$). Adenocarcinomas,

squamous cell carcinomas, various metastases and granuloma/fibromas had YM values greater than adjacent lung histologies. There was no difference in the YM of tumours with respect to grade, T stage, N stage, or location within each lobe of the lung. **Conclusion:** This is the first study to report the elastic properties of human lung parenchyma in various disease states and abnormal lesions. There was a significant difference between the YM of human lung tumours and parenchyma. These findings may aid in developing sophisticated intraoperative localization technologies for minimally invasive pulmonary surgeries.

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Thoracic surgery trauma: nail gun v. SVC. *Patel Pooja, Ribeiro Roberto, Hirsch Greg, French Daniel.* From Dalhousie University.

Background: An otherwise healthy 20-year-old female was found to have a nail that had been discharged from a nail gun and had penetrated through her sternum and into the superior vena cava (SVC), as shown on a computed tomography scan. She was emergently transferred to the province's tertiary care centre for operative removal of the nail and video-assisted thoracoscopic surgery repair of the SVC. **Methods:** The patient was placed supine and underwent an endotracheal intubation with a block in the right mainstem bronchus. Her chest and groins were prepped and draped. A left femoral vein cordis was placed in case of need for emergency access. Three ports were placed in the right chest with CO₂ insufflation. **Results:** The nail could be visualized going through the sternum and into the SVC. The nail did appear to almost go through the back wall of the SVC, but did not completely transect it. Under direct visualization, and in steep reverse Trendelenburg position, the nail was removed with vise grips. Minimal bleeding occurred with withdrawal of the nail. A single horizontal mattress suture using 5-0 prolene was used to close the hole. The patient was placed in the Trendelenburg position, allowing the vein to fully distend. There was no bleeding appreciated. Two chest tubes were placed, and the patient was extubated in the operating room. **Conclusion:** The patient's postoperative course was complicated only by pulmonary embolism, requiring anticoagulation with apixaban.

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Thymomatous myasthenia gravis after total thymectomy at a tertiary care surgical centre: a 15-year retrospective review. *Caroline Huynh, Sobat Sharma, Arthur Vieira, Fagun Jain, Yejun Lee, Dorsa Mousa-Doust, Jonice Costa, Michelle Mezei, Kristine Chapman, Hannah Briemberg, Kristin Jack, Kyle Grant, James Choi, John Yee, Anna L. McGuire.* From Vancouver General Hospital.

Background: The landmark randomized controlled trial of thymectomy in myasthenia gravis (MGTX) confirmed improved clinical outcomes with thymectomy in patients with nonthymomatous myasthenia gravis (MG). Since then, total thymectomy with medical management has been considered the standard of care. We aimed to report our centre's incidence of thymomatous MG and thymic tumour histopathological characteristics in comparison to those without MG. Remission rates, with or without medical management, are also reported. We hypothesized that background thymic tissue and histology in thymomatous MG differs from non-

thymomatous MG. We also hypothesized that remission rates are higher in nonthymomatous MG and in patients with ongoing maintenance for MG. **Methods:** A retrospective review of a prospectively maintained database was queried for consecutive thymectomy cases performed at a large tertiary care centre from 2001 to 2017. MG medical management and follow-up data were collected. Univariate and multivariate regression analyses were used, with adjustments for patient and tumour characteristics. **Results:** In total, 297 thymectomies were conducted (mean age 53 ± 16 yr, 58% female). MG involved 120 (40.4%) cases, for an incidence of 44.2% thymomatous MG. Younger age (48.7 v. 56.4 yr, $p < 0.001$) and smaller tumour size (4.3 v. 6.0 cm, $p = 0.008$) were associated with MG. Germinal hyperplasia, cystic lesions and thymoma were also more often found with MG ($p < 0.001$, $p = 0.007$ and $p = 0.018$, respectively); as was WHO AB and B1 histopathology ($p = 0.004$ and $p = 0.047$, respectively). There was no difference in complete MG remission rate postthymectomy for thymomatous versus nonthymomatous MG (52.8% v. 45.3%, $p = 0.919$), nor in patients who completed maintenance medical regimens ($p = 0.188$). **Conclusion:** WHO AB and B1 thymoma, germinal cell hyperplasia and cystic lesions were more likely to be associated with MG. There was no difference in remission rates for thymomatous versus nonthymomatous MG, nor with complete medical treatment. Future research should focus on the role of T-lymphocyte immune response in pathophysiology of thymomatous MG.

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Effectiveness of 18F-FDG-PET/CT in the stage diagnosis of non-small cell lung cancer (NSCLC): a diagnostic test accuracy systematic review and meta-analysis. *Sami Aftab Abdul, Francois Khazoom, Katherine Aw, Rebecca Lau, Sebastien Gilbert, Sudbir Sundaresan, Daniel Jones, Andrew J.E. Seely, Patrick J. Villeneuve, Donna E. Maziak.* From The Ottawa Hospital (Abdul, Khazoom, Aw, Lau, Gilbert, Sundaresan, Jones, Seely, Villeneuve, Maziak), Carleton University (Abdul), University of Ottawa (Abdul, Khazoom, Aw, Lau, Gilbert, Sundaresan, Jones, Seely, Villeneuve, Maziak), Ottawa Hospital Research Institute (Khazoom, Aw, Lau, Gilbert, Sundaresan, Jones, Seely, Villeneuve, Maziak).

Background: Within the past 2 decades, diagnosis and staging strategies for non-small cell lung cancer (NSCLC) have shifted from positron emission tomography (PET) or computed tomography (CT) scans alone to the combined imaging modality of PET-CT as the current mainstay. The objective of the study was to investigate and update our review of the diagnostic test accuracy of 18F-fluorodeoxyglucose positron emission tomography-computed tomography (18F-FDG-PET-CT) in the clinical staging of NSCLC. **Methods:** A comprehensive search of MEDLINE, Embase and Cochrane Central Register of Controlled Trials databases was performed in July 2022. Language was limited to English, and date of publication restricted between January 2000 and July 2022. Study inclusion criteria were prospective studies of adult patients presenting with primary lung cancer who underwent preoperative PET-CT assessment, TNM staging and surgical resection, with imaging results compared with surgical or mediastinoscopy reference standards. Two reviewers independently assessed studies for inclusion criteria, and disagreements were resolved with a third author. Reporting adhered to the Preferred Reporting Items for Systematic Reviews

and Meta-analyses guidelines. Two authors independently extracted data and assessed the risk of bias using a QUADAS-2 tool. The pooled sensitivity and specificity of PET-CT for T-staging and N-staging were determined using a random-effects hierarchical summary-receiver-operating-characteristic approach. **Results:** The literature search yielded 1537 nonduplicate titles that were screened, of which 125 articles (8.1%) underwent full-text review. Nineteen studies met the inclusion criteria, repre-

senting a total of 1805 patients. Pooled estimates for T staging were 0.91 (95% confidence interval [CI] 0.57–0.99) for sensitivity and 0.93 (95% CI 0.19–0.99) for specificity. Pooled estimates for N Staging were 0.76 (95% CI 0.66–0.84) for sensitivity and 0.83 (95% CI 0.73–0.90) for specificity. **Conclusion:** Despite fluctuating TNM staging criteria and reporting, findings suggest that PET-CT is robust in preoperative diagnostic staging of tumour and nodal TNM parameters.

CANADIAN SOCIETY OF COLON AND RECTAL SURGEONS

01

Emergency colon resection in the geriatric population: the modified frailty score as a risk factor of early mortality. *Claudie-Anne Pigeon, Jonathan Frigault, Sébastien Drolet, Ève-Marie Roy, Kristopher Bujold-Pitre, Valérie Courval.* From Université Courval and CHU de Québec.

Background: Surgical interventions in the elderly are becoming more and more frequent given the aging of the population. Owing to their increased vulnerability in an emergent context, we aimed to evaluate various risk factors associated with early mortality and an unfavourable postoperative trajectory. **Methods:** We performed a retrospective, single-centre cohort study including all patients over the age of 75 who underwent emergency colon resection between January 2016 and December 2020. **Results:** Among 299 patients, the type of resection most frequently encountered was right hemicolectomy (34%), followed by sigmoidectomy (13%). Large bowel obstruction was the surgical indication for 61% of patients ($n = 182$). The surgery was performed within 24 hours of arrival at the emergency department for 45% of patients ($n = 134$). The mortality rate within 30 days of primary surgery was 14% ($n = 42$). The main factors having a significant impact on early mortality were the modified Frailty Index (mFI; $p < 0.0001$), the Charlson Comorbidity Index (CCI) ($p = 0.03$) and the final diagnosis ($p = 0.03$). No statistically significant difference was observed according to the age of the patients ($p = 0.37$). Patients with a higher mFI (≥ 3) had an increased risk of early mortality (26% v. 4% for mFI 0) with an odds ratio of 11.94 (95% confidence interval 2.38–59.88, $p < 0.0001$) in multivariate analysis. This association was also observed for the secondary outcomes, as patients with a higher mFI were less likely to return home ($p = 0.009$) and have their stoma closed at the end of the follow-up period ($p < 0.0001$). **Conclusion:** In the geriatric population, the use of the mFI is a good predictor of early mortality following an emergency colon resection. This tool, which is easy to use and quickly accessible, could be used to guide surgical decision-making.

02

Laparoscopic ovarian transposition prior to pelvic radiation in young female patients with anorectal malignancies: a systematic review and meta-analysis of prevalence. *Lea Tessier, Tyler McKechnie, Yung Lee, Lily Park, Nirupa Gangam, Cagla Eskicioglu.* From McMaster University (Tessier, McKechnie, Lee, Park, Gangam, Eskicioglu), and St. Joseph's Healthcare Hamilton (Gangam, Eskicioglu).

Background: Young women undergoing radiation therapy (RT) for pelvic malignancies are at risk of developing premature ovarian insufficiency (POI). Ovarian transposition (OT) aims to preserve

ovarian function in these patients. However, its role in gastrointestinal malignancy has yet to be firmly established. The aim of this review was to determine the effectiveness of laparoscopic OT in preserving ovarian function in premenopausal women undergoing neoadjuvant pelvic RT for gastrointestinal malignancies. **Methods:** MEDLINE, Embase and CENTRAL were systematically searched from inception through to May 2022. Articles were included if they evaluated ovarian function after OT in women with gastrointestinal malignancies undergoing pelvic RT. The primary outcome was ovarian function preservation. The secondary outcome was 3-day postoperative morbidity following OT. **Results:** From 207 citations, 10 studies with 133 patients with rectal or anal cancer who underwent OT before RT were included. Meta-analysis of pooled proportions of preserved ovarian function demonstrated an incidence of 66.9% (95% confidence interval 55.0%–79.0%, $I^2 = 43\%$). The 3-day postoperative morbidity rate was 1.2% ($n = 1$). There was heterogeneity in interventions and outcome reporting. **Conclusion:** Laparoscopic OT in premenopausal patients undergoing pelvic radiation for gastrointestinal malignancies can preserve ovarian function in two-thirds of patients. The meta-analyses must be interpreted within the context of clinical heterogeneity of the included studies. Further studies are required to fully investigate the outcomes of OT in patients undergoing pelvic radiation for gastrointestinal malignancies.

03

Using preoperative C-reactive protein levels to predict anastomotic leaks and other complications after elective colorectal surgery: a systematic review and meta-analysis. *Zacharie Cloutier, Tyler McKechnie (McMaster University), Victoria Archer, Lily Park, Jay Lee, Ashaka Patel, Dennis Hong, Cagla Eskicioglu.* From McMaster University (Cloutier, McKechnie, Archer, Park, Hong, Eskicioglu), University of Calgary (Lee), and Western University (Patel).

Background: While monitoring of postoperative C-reactive protein (CRP) is routinely used as an early indicator of potential anastomotic leak (AL), preoperative CRP remains to be established as a potential predictor of AL and other infectious complications for elective colorectal surgery. This systematic review and meta-analysis aimed to examine the association between preoperative CRP levels and short-term postoperative complications, including AL, to determine if preoperative CRP could aid surgeons in preoperative decision-making. **Methods:** MEDLINE, Embase, Web of Science, PubMed, Cochrane Library and CINAHL databases were searched up to October 2021. Studies with reported preoperative CRP values before elective colorectal surgery for benign and malignant disease were included and assessed using methodological index for non-randomized studies

criteria. A pairwise meta-analysis was performed using an inverse variance random effects model for all meta-analyzed outcomes, to determine if patients with or without complications and AL differed in their preoperative CRP levels. **Results:** From 1555 citations, 19 studies evaluating 5426 patients were included, grouped and analyzed based on reported postoperative outcomes. Patients experiencing postoperative infectious complications had significantly greater preoperative CRP values (8 studies, 2421 patients, mean difference [MD] 6.26, 95% confidence interval [CI] 2.89 to 9.64, $p < 0.01$, $I^2 = 93\%$). There was no association between preoperative CRP values and the occurrence of AL (5 studies, 2176 patients, MD 3.59, 95% CI -5.39 to 12.57 , $p = 0.43$, $I^2 = 82\%$) and with overall postoperative morbidity (7 studies, 2375 patients, MD 4.63, 95% CI -4.38 to 13.64 , $p = 0.31$, $I^2 = 99\%$) after elective colorectal surgery. Sensitivity analyses according to disease type (i.e., inflammatory bowel disease) and risk of bias did not significantly change the results. **Conclusion:** Higher preoperative CRP levels are associated with increased rates of overall infectious complications, but not with AL alone or with overall morbidity in patients undergoing elective colorectal surgery, for both benign and malignant indications. This suggests that preoperative CRP could be a useful but limited tool to predict and counsel patients preoperatively about postoperative infective complications, but not AL specifically.

04

Perioperative intravenous dexamethasone for patients undergoing colorectal surgery: a systematic review and meta-analysis. *Simarpreet Ichhpuniani, Tyler McKechnie, Geoffrey Elder, Andrew Chen, Kathleen Logie, Aristithes Doumouras, Dennis Hong, Randy Benko, Cagla Eskicioglu.* From McMaster University (Ichhpuniani, McKechnie, Elder, Chen, Benko), and St. Joseph Healthcare (Logie, Doumouras, Hong, Eskicioglu).

Background: Dexamethasone is a glucocorticoid that is often administered intraoperatively as prophylaxis for postoperative nausea and vomiting (PONV). Several randomized controlled trials (RCTs) have examined its use in colorectal surgery. No study to date has aggregated these data. This systematic review aims to assess the postoperative impacts of dexamethasone use in colorectal surgery. **Methods:** MEDLINE, Embase and CENTRAL were searched from database inception to June 2022. Articles were included if they compared perioperative intravenous dexamethasone to a control group in patients undergoing elective colorectal surgery in terms of postoperative morbidity. The primary outcomes were prolonged postoperative ileus (PPOI) and PONV. Secondary outcomes included postoperative infectious morbidity and return of bowel function. A pair-wise meta-analysis was performed using a Mantel-Haenszel model. The Grading of Recommendations, Assessment, Development, and Evaluations approach was conducted to assess quality of evidence. **Results:** After reviewing 3476 relevant citations, 7 articles (5 RCTs, 2 retrospective cohorts) met the inclusion criteria. Overall, 1568 patients received perioperative dexamethasone and 1459 patients received a control. Patients receiving perioperative dexamethasone experienced significantly less PPOI based on moderate-quality evidence (3 studies, odds ratio [OR] 0.46, 95% confidence interval [CI] 0.28–0.74, $p < 0.01$). There was no difference between groups in

terms of PONV (4 studies, OR 0.90, 95% CI 0.64–1.27, $p = 0.55$) or rate of 30-day postoperative infectious complications (7 studies, OR 0.74, 95% CI 0.55–1.01, $p = 0.06$). **Conclusion:** This review presents moderate-quality evidence that perioperative intravenous dexamethasone may reduce PPOI and enhance return of bowel function following elective colorectal surgery. There was no significant effect observed on PONV or postoperative infectious complications.

05

Population-based study comparing time from presentation to diagnosis and treatment between younger and older adults with colorectal cancer. *Matthew Castelo, Lawrence Paszat, Bettina Hansen, Adena Scheer, Neil Faught, Lena Nguyen, Nancy Baxter.* From the University of Toronto (Castelo, Paszat, Hansen, Scheer, Baxter), and ICES (Faught, Nguyen).

Background: Colorectal cancer (CRC) patients younger than 50 years of age may experience delays to diagnosis and treatment that are associated with adverse outcomes, such as advanced stage or poor survival. We aimed to compare delay intervals by age for CRC patients in a large population using health administrative databases. **Methods:** We conducted a population-based study of adults diagnosed with CRC in a Canadian province between 2003 and 2018. We measured the time between presentation and diagnosis (diagnostic interval), diagnosis and treatment start (treatment interval) and the time from presentation to treatment (overall interval). Using multivariable quantile regression, adjusted for confounders, we compared interval lengths between adults younger than 50 years, 50–74 years and 75–89 years. **Results:** A total of 90225 patients diagnosed with CRC were included. Of these, 6853 patients (7.6%) were younger than 50 years at the time of diagnosis. Younger patients were more likely to be female, present on an emergent basis, have metastatic CRC and have rectal cancer compared with patients aged 50–74 years. Factors associated with significantly longer overall intervals included female sex (8.7 d, 95% confidence interval [CI] 6.6 to 10.9) and rectal cancer compared with proximal colon cancer (9.8 d, 95% CI 7.4 to 12.2). After adjustment for confounders, adults younger than 50 had significantly longer diagnostic intervals (4.3 d, 95% CI 1.3 to 7.3) and significantly shorter treatment intervals (-4.5 days, 95% CI -5.3 to -3.7) compared with patients aged 50–74 years. However, there was no significant difference in the overall interval (-0.6 days, 95% CI -4.3 to 3.2) between these 2 groups. In stratified models, younger adults with stage IV disease who presented emergently and patients older than 75 years had longer overall intervals. **Conclusion:** Younger adults are more likely to present with metastatic CRC but have overall similar times from presentation to treatment as screening-eligible older adults.

06

The role of warmed-humidified CO₂ insufflation in colorectal surgery: a meta-analysis. *Sabil Sharma, Tyler McKechnie, Jigish Khamar, Kathy Wu, Cagla Eskicioglu.* From McMaster University.

Background: Dry-cold CO₂ insufflation used in laparoscopic surgery and ambient air in negative-pressure operating theatres can lead to peritoneal desiccation and hypothermia. These are

associated with adverse perioperative clinical outcomes. Preclinical studies report that warmed-humidified CO₂ may alleviate these detrimental effects. Randomized controlled trials (RCT) in colorectal surgery evaluating the effect of intraoperative warm-humidified CO₂ have been underpowered. Therefore, the aim of this review was to evaluate perioperative clinical outcomes for patients undergoing colorectal surgery with warmed-humidified CO₂ compared with dry-cold or ambient air in operating theatres. **Methods:** A search of MEDLINE, Embase and Cochrane Central Register of Controlled Trials was performed. We included randomized controlled trials (RCTs) that compared patients receiving warm-humidified CO₂ with either ambient air or dry-cold CO₂ insufflation during colorectal surgery. The primary outcome was length of stay. Secondary outcomes included time to flatus, time to diet, rates of wound infection and postoperative pain. A pairwise meta-analysis was performed using inverse variance random effects. **Results:** Following screening, 6 RCTs fit the inclusion criteria. In total, 208 patients received warmed-humidified CO₂ (42.3% female, mean age 65.8 yr) and 210 patients received standard care with dry-cold CO₂ (46.2% female, mean age 66.1 yr). From the total 418 patients, 315 (75.4%) had an oncologic indication for surgery and 103 (24.6%) underwent surgery for benign disease. No significant difference was found in rates of postoperative wound infection (relative risk [RR] 0.6, 95% confidence interval [CI] 0.28 to 1.29, $p = 0.19$), time to diet (mean difference [MD] 0.00, 95% CI -0.14 to 0.16, $p = 0.91$), time to flatus (MD -0.05, 95% CI -0.29 to 0.19, $p = 0.69$), or length of stay (MD -0.75, 95% CI -1.61 to 0.11, $p = 0.09$). **Conclusion:** Insufflation temperature is likely inconsequential in terms of postoperative clinical outcomes in colorectal surgery. Further studies may benefit from reporting all facets of postoperative course including nausea, emesis and quality of life using standardized scoring systems.

07

Total abdominal colectomy versus diverting loop ileostomy and antegrade colonic lavage for fulminant *Clostridioides colitis*: analysis of the national inpatient sample 2016–2019. Tyler McKechnie, Jigish Khamar, Yung Lee, Léa Tessier, Edward Passos, Aristithes Doumouras, Dennis Hong, Cagla Eskicioglu. From McMaster University.

Background: When surgery is indicated for fulminant *Clostridioides difficile* infection (CDI), total abdominal colectomy (TAC) is the most common approach. Diverting loop ileostomy (DLI) with antegrade colonic lavage has been introduced as a colon-sparing approach. Prior analyses of National Inpatient Sample (NIS) data suggested equivalent postoperative outcomes between groups but did not evaluate health care resource utilization. As such, we aimed to analyze a more recent NIS cohort to compare these 2 approaches in terms of both postoperative outcomes and health care resource utilization. **Methods:** A retrospective analysis of the NIS from 2016 to 2019 was conducted. The primary outcome was postoperative in-hospital morbidity. Secondary outcomes included postoperative in-hospital mortality, complications, total cost and length of stay (LOS). Univariable and multivariable regressions were used to compare both approaches. **Results:** In total, 886 patients underwent TAC and 409 patients underwent DLI with antegrade colonic lavage. Adjusted analyses demonstrated no difference

between groups in postoperative in-hospital morbidity (adjusted odds ratio [aOR] 0.96, 95% confidence interval [CI] 0.64–1.44, $p = 0.851$) or in-hospital mortality (aOR 1.15, 95% CI 0.81–1.64, $p = 0.436$). Patients undergoing TAC experienced significantly decreased total admission cost (mean difference [MD] \$79 715.34, 95% CI 133 841–25 588, $p = 0.004$) and shorter postoperative LOS (MD 4.06 d, 95% CI 6.96–1.15, $p = 0.006$). Younger patients and those receiving care at a teaching hospital were significantly more likely to undergo DLI with antegrade colonic lavage. **Conclusion:** There are minimal differences between TAC and DLI with antegrade colonic lavage for fulminant CDI in terms of postoperative morbidity and mortality. Health care resource utilization, however, is significantly improved when patients undergo TAC, as evidenced by clinically important decreases in total admission cost and postoperative LOS. The choice of surgical approach should still be based on patient comorbidities, patient expectations, surgeon preference and resource availability.

08

Cutting seton for the treatment of cryptoglandular fistula-in-ano: a systematic review and meta-analysis. Tyler McKechnie, Jigish Khamar, Anjali Sachdeva, Yung Lee, Dennis Hong, Cagla Eskicioglu. From McMaster University (McKechnie, Khamar, Lee, Hong, Eskicioglu), and University of Toronto (Sachdeva).

Background: To date, there is no consensus regarding the optimal treatment modality for fistula-in-ano of cryptoglandular origin. One of the common management strategies is the use of cutting seton (CS), which has remained controversial among colorectal surgeons owing to reports of fecal incontinence, recurrence of fistula and extended healing time. This review aims to provide the first synthesis of studies investigating the use of CS for the treatment of cryptoglandular fistula-in-ano. **Methods:** A search was performed in MEDLINE, Embase and CENTRAL from database inception to July 2022. Articles were eligible for inclusion if they were single-arm or multi-arm randomized controlled trials (RCTs) or cohort studies analyzing patients with fistula-in-ano of cryptoglandular etiology who underwent CS. The primary outcome was recurrence of fistula. Secondary outcomes included incontinence, healing time and operative time. Inverse variance random effect meta-analyses were used to pool effect estimates. **Results:** After full-text screening, 29 studies fit the inclusion criteria with a total of 1513 patients undergoing CS (20.3% female, mean age 41.7 yr). The most common type of fistula was transsphincteric (73.6%), followed by intersphincteric (18.8%), extrasphincteric (3.9%) and suprasphincteric (3.7%). Patients with CS had a 3% (95% confidence interval [CI] 2%–4%) chance of recurrence and a 13% (95% CI 10%–15%) risk of incontinence. When compared with fistulotomy, these outcomes were insignificant. Gas incontinence was most frequently observed (53%), followed by liquid (38.5%) and then solid (8.5%). Patients with CS had a pooled operative time of 40 minutes (95% CI 26.98–52.31) with an average healing time of 13 weeks (95% CI 8.82–17.77). **Conclusion:** Our analysis shows that CS is non-inferior to fistulotomy in terms of recurrence and incontinence. However, these conclusions are based on limited prospective comparative analyses. Further RCTs comparing CS with other interventions are required.

09

Prognostic value of routine stain versus elastic trichrome stain in identifying venous invasion in colon cancer. *Linda Y.N. Fei, Antonio Caycedo, Sunil Patel, Teodora Popa, Lee Boudreau, Andrea Grin, Tao Wang.* From Queen's University (Fei, Patel, Popa, Boudreau, Grin, Wang), and the Orlando Health Colon & Rectal Institute (Caycedo).

Background: Venous invasion (VI) in colorectal cancer (CRC) has been associated with increased risk of local metastasis and cancer death. In Ontario, there has been a historical under-reporting of VI with detection rates below 10%, which contrasts with European pathology guidelines that VI should be detected in at least 30% of CRC resection specimens. There is growing evidence that increased pathologist awareness coupled with elastic trichrome (ET) staining technique increases detection of VI several fold. However, the impact of increased detection on prognostic value is not well understood. Furthermore, the use of ET among pathology departments is not yet considered standard of care. This study aimed to understand if ET improves detection rate of VI and its role in prognostication compared with routine hematoxylin-phloxine saffron (HPS). **Methods:** Patients undergoing surgical resection for stage I–IV colon cancer between 2014 and 2017 were included. Cases negative for VI by HPS slide review were then stained with ET. A retrospective chart review and obituary search was performed. The primary outcomes were survival, development of metastasis and local recurrence. Univariate and Cox regression analysis were performed. **Results:** VI was detected in 57% of 281 total cases, while HPS alone detected only 36%. In stage III disease, VI negativity with addition of ET predicted 95% probability of being metastasis-free at 5 years, whereas VI negativity on HPS alone predicted 82% probability of being metastasis-free at 5 years. In stage I colon cancer cases, the addition of ET staining improved prediction of overall survival and progression-free survival (ET $p = 0.04$ v. HPS alone $p = 0.54$). **Conclusion:** ET staining in addition to HPS results in overall higher detection of VI and may offer improved prognostication of overall survival and progression-free survival, especially in early (stage I) colon cancer.

10

Anastomotic leak rate following the implementation of a powered circular stapler in elective colorectal surgeries. *Jessica Lie, Abmer Karimuddin, Carl Brown, Terry Phang, Manoj Raval, Amandeep Ghuman.* From the University of British Columbia (Lie), and St. Paul's Hospital (Karimuddin, Brown, Phang, Raval, Ghuman).

Background: Anastomotic leaks remain a major complication following colorectal surgery. A few retrospective studies have shown that powered circular staplers have the potential to reduce anastomotic leak rate compared with manual staplers; however, there has been no RCT to date and the available data have limitations. Our centre agreed to trial the stapler at no cost difference with the agreement to track our data. The objective of this study was to compare the anastomotic leak rate between the powered and manual circular staplers in left-sided colorectal cases. **Methods:** This was a retrospective cohort study of elective left-sided colorectal resections before and after implementation of a powered circular stapler at a tertiary care centre. The manual stapler group consisted of consecutive resections performed

between January 2016 and December 2016, and the powered stapler group consisted of resections performed between September 2021 and December 2022. The primary outcome was 30-day anastomotic leak rate. A multivariate logistic regression analysis adjusting for confounding was performed to compare leak rates. **Results:** A total of 248 patients were included: 154 patients in the manual stapler group and 94 patients in the powered stapler group. Mean age was 60 ± 15 years, 37.9% were female, and 72.2% of resections were performed for malignancy. Both groups were similar in terms of patient characteristics and surgical technique. The overall leak rate was 2.0% in the manual stapler group and 10.6% in the powered stapler group. After adjusting for confounders, powered staplers were found to have 7.77 times the odds of leak compared with manual staplers (95% confidence interval, 1.86–32.48, $p = 0.01$). **Conclusion:** Patients who had left-sided colorectal anastomosis had higher anastomotic leak rates with powered compared with manual circular staplers. This finding is contrary to previous retrospective studies that found lower leak rates with powered staplers. Future randomized controlled trials are needed to clarify the findings to date.

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Surgical technique and recurrence of Crohn disease following ileocolic resection. *Sydney Candy, Kareena Nanda, Christine Li, Ryan Snelgrove, Mark Dykstra, Karen Kroeker, Haili Wang.* From the University of Alberta.

Background: Crohn disease is characterized by transmural bowel inflammation, with 15%–20% of patients requiring surgery within the first year of diagnosis. The most common procedure is an ileocolic resection, and the variations in surgical approach may impact recurrence as endoscopic recurrence is most often located at the anastomosis site. The objective of this study was to determine if surgical technique would alter the rate of recurrence. **Methods:** This study was designed as a retrospective study, analyzing adult patients 18 years or older with a diagnosis of Crohn disease who underwent ileocolic resection at a single academic hospital site between Jan. 1, 2013, and Dec. 31, 2020. The data collected for chart review were patient factors, such as sex, age at surgery, smoking status, body mass index, prior surgery, irritable bowel disease medications, emergency or elective procedure, type of anastomosis and surgical details. Postoperative data included C-reactive protein, fecal calprotectin and follow-up colonoscopy report using a Rutgeert score. Data analysis was completed using descriptive statistics and multinomial regression analysis. **Results:** Ultimately 150 patients were included: 51% of patients had signs of endoscopic recurrence (defined as Rutgeert score of i2 or above) within 2 years of surgery. Open surgery was associated with i3 and 4 disease on regression analysis ($p < 0.01$). Smoking or being an ex-smoker was close to significance ($p = 0.07$) for endoscopic recurrence. Patients who were not taking biologic medications were more likely to have no recurrence on scope ($p < 0.01$). Of note, the type of anastomosis (sewn, orientation, intra- or extracorporeal) showed no association with recurrence. **Conclusion:** In our small study, a combination of patient factors, such as presence of biologic medications and surgical approach (open), were associated with endoscopic recurrence. Although more data remain to be gathered, laparoscopic approaches should become first line for patients with Crohn disease who require ileocolic resection.

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Implementation of synoptic reporting for endoscopic localization of complex colorectal neoplasms: Can we reduce rates of repeat preoperative colonoscopy? *Haven Roy, Ramzi M. Helewa, Garrett Johnson, Harminder Singh, Eric Hyun, Dana Moffatt, Ashley Vergis. From the University of Manitoba.*

Background: Lack of tattooing and incomplete documentation of colorectal neoplasms at index endoscopy results in high rates of repeat preoperative colonoscopy. In response, national consensus recommendations for endoscopic localization were developed. An electronic synoptic reporting template based on those recommendations was piloted. This study aims to examine the implementation and use of synoptic reporting of the endoscopic localization of advanced colorectal neoplasms. **Methods:** We implemented the new synoptic template within our endoscopy reporting system and ran a multimedia infographic education campaign. We then conducted a follow-up email-based interview of all regional endoscopists, discussing synoptic template use, quantitative functionality and impact assessments, and qualitative narrative feedback opportunities. Modified content and thematic analysis approach was employed for qualitative data. **Results:** The response rate was 54% (28/52 endoscopists). Most respondents (61%) completed more than 100 colonoscopies and identified 6–20 neoplasms requiring tattooing (71%) since template introduction. The synoptic template was used by 50% of respondents. Of those who did not, the majority were either not aware of the template (43%) or preferred using narrative text (18%). Users reported modest mean functionality scores (ease of use 3.3, intuitiveness 3.56, efficiency 3.7), high relevance to practice scores (4.41) and a strong belief that the template was appropriate (4.22), credible (4.22) and capable of providing necessary information for surgical planning (4.21). However, perception of the synoptic template's ability to ultimately reduce the repeat preoperative colonoscopy rate was more circumspect (3.76). **Conclusion:** Endoscopists in this study believed the synoptic template was a functional, impactful tool that will improve communication and may reduce the repeat preoperative colonoscopy rate. However, much work is required to streamline uptake and awareness of its presence. The impact of these changes on repeat preoperative endoscopy is an area of ongoing research.

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Effects of diet and antibiotics on anastomotic healing: a mouse model study with varied dietary fibre and fat, and preoperative antibiotics. *Patricia Balmes, Terry Phang, Michael Guo, Jerry Liu. From University of British Columbia (Balmes, Phang, Guo, Liu), and St. Paul's Hospital (Phang).*

Background: The gut microbiome plays a role in anastomotic healing, with gut dysbiosis potentially contributing to anastomotic leakage (AL). Preoperative antibiotics and high-fat-low-fibre western diet (WD) are associated with gut dysbiosis, increasing pathogenic bacteria, such as *Enterococcus faecalis*, shown to degrade collagen and impair healing. We aimed to study the effects of diet and preoperative antibiotics in anastomotic healing using mice models. **Methods:** Male C57BL/6J mice were randomized to either low-fat-high-fibre (SD) or WD for 4 weeks, then randomized to preoperative antibiotics or

control before an operation to model creating a colonic anastomosis. After 7 days, the in vivo anastomosis was judged using an established anastomotic healing score. Microbiota from anastomotic tissue and surrounding stool pellets were analyzed for composition and biodiversity. **Results:** Mice fed WD had a shorter postsurgery survival (5.2 ± 2.3 v. 6.9 ± 2.3 d, $p = 0.022$), greater weight loss (5.546 ± 3.796 g v. 2.654 ± 2.355 g, $p = 0.03$) and decreased biodiversity in anastomotic tissue and stool samples compared with mice fed SD. Mice receiving antibiotics had improved anastomotic healing scores (1.33 ± 0.65 v. 2.08 ± 0.79 , $p = 0.02$) and decreased growth of *E. Faecalis* in tissue and stool ($p = 0.022$ for tissue, $p = 0.018$ for stool) compared with mice without antibiotics. **Conclusion:** Diet and preoperative antibiotics affect anastomotic healing in mice. Mice fed a SD had improved measures of postoperative recovery and increased biodiversity in surrounding microbiomes. Preoperative antibiotics improved anastomotic healing and decreased growth of *E. Faecalis*. These results provide in vivo evidence of the beneficial effects of SD and preoperative antibiotics, encouraging further human studies to substantiate these hypotheses.

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Assessment of rectal surgery-related physical pain and conditioning: a national survey of Canadian rectal surgeons. *Haven Roy, Sandra Webber, Farhana Shariff, Ramzi M. Helewa, Dave Hochman, Jason Park, Garrett Johnson, Eric Hyun. From the University of Manitoba (Roy, Webber, Shariff, Helewa, Hochman, Johnson, Hyun), and University of British Columbia (Park).*

Background: Pelvic surgery is physically demanding on the surgeon. There are minimal published data to quantify the pain experienced by rectal surgeons. We examined the baseline state of physical discomfort and its consequences through a preintervention survey before initiation of a rectal surgeon-focused physical exercise program. **Methods:** An Internet-based survey was distributed by email to colorectal surgeons and surgical oncologists across Canada. Rectal case volume, practice pattern, musculoskeletal pain and physical training-related data were collected. **Results:** Forty-eight respondents completed the survey. The median age was 43 years. Most surgeons were in practice 5–10 years (40%) and performed more than 20 rectal surgeries per year (56.3%). Among the highest-volume surgeons, 77% performed most of their rectal surgeries using a minimally invasive (MIS) approach. During both open and MIS rectal surgery, more than 95% of surgeons experienced physical pain during a case, and more than half reported that pain occurred at least once a week. The neck, shoulders and back were the 3 most commonly identified locations for pain. The greatest provokers were laparoscopic equipment, the headlight and the pelvic retractor. Half of respondents (53%) had sought therapy for pain or injury related to rectal surgery, 53% exercised to improve their surgical conditioning and 47% practised intraoperative stretching. Most surgeons (60%) reported being less than satisfied with their current ability to perform rectal surgery free from pain or injury. On multivariate analysis, older age (odds ratio [OR] 1.118) and more MIS surgeries performed (OR 2.610) were significant predictors of increased pain, and vigorous exercise participation was a protective factor (OR 0.137). **Conclusion:** Canadian rectal surgeons report high rates of rectal surgery-related pain/injury, resulting in work and

personal activity limitations. Our results show a need to improve the safety of rectal surgery for surgeons. They justify an exercise program intervention as a strategy for outcomes improvement.

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Does specimen extraction incision and transversus abdominis plane block affect opioid requirements after laparoscopic colectomy? *Stephan Robitaille, Anna Wang, Michael Maalouf, Naser Alali, Hiba Elhaj, Sender Liberman, Patrick Charlebois, Barry Stein, Liane Feldman, Julio F. Fiore Jr., Lawrence Lee.* From McGill University.

Background: Transversus abdominis plane (TAP) block has been associated with decreased opioid use following colorectal surgery. Furthermore, incision type in open surgery has reported differences in postoperative opioid use, but there are few data in laparoscopic surgery. We sought to evaluate the effect of TAP block and specimen extraction incision (SEI) on opioid requirements after laparoscopic colectomy. **Methods:** Patients undergoing elective laparoscopic colectomy without a new stoma creation at a single university-affiliated colorectal referral centre between 2017 and 2022 were included. All patients were managed with an enhanced recovery pathway. Patients were grouped according to whether they received an intraoperative TAP block (40 mL 0.25% bupivacaine + 10 mg dexamethasone) and by SEI type (midline, Pfannenstiel or transverse). Opioid use was measured by postoperative day (POD) up to POD3 and reported in morphine milligram equivalents (MME). **Results:** Overall, 485 patients were included: 42% with TAP block versus 58% without. SEIs were midline (11%), transverse (11%) and Pfannenstiel (78%). Almost half (47%) of patients were female, and the mean age was 65 ± 14 years. There was no difference in patient characteristics between the TAP and no TAP groups. Patients undergoing right-sided resections were more likely to have a midline SEI when compared with left-sided and/or rectal resections (80% v. 46%, $p < 0.001$). There were no differences in MME or proportion opioid-free patients between SEIs on any POD. The TAP block group also had a higher proportion of opioid-free patients on POD0 (13% v. 4%, $p < 0.001$) and POD1 (39% v. 24%, $p = 0.001$), but not beyond. On multiple linear regression, TAP block was independently associated with -6.32 MME (95% confidence interval -12.46 to -0.17) on POD1 after adjusting for confounders. SEI was not independently associated with a difference in MME on any POD. **Conclusion:** SEI did not affect postoperative opioid consumption following laparoscopic colectomy. TAP blocks were independently associated with a significant decrease in opioid use on POD1, but not beyond.

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Colorectal and therapeutic GI working together: What is the role for TAMIS for benign lesions? *Richard Hu, Ariane Lacaille-Ranger, San Abn, Mibaela Tudorache, Husein Moloo, Lara Williams, Isabelle Raïche, Reilly Musselman.* From the University of Ottawa (Hu, Ahn, Tudorache, Moloo, Williams, Raïche, Musselman), and Université de Montréal (Lacaille-Ranger).

Background: Transanal minimally invasive surgery (TAMIS) provides a valuable alternative to radical surgery for resecting both

benign and malignant diseases of the rectum. With the evolution of advanced endoscopic techniques such as endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD), more complex lesions are being treated endoscopically. **Methods:** A retrospective cohort study was conducted of patients who underwent transanal endoscopic surgery between 2009 and 2020 at a single centre. The primary outcome was indication for TAMIS over time, and they were analyzed on a per-year basis. Secondary outcomes included pathologies from both preoperative endoscopic biopsy and surgical specimen. A descriptive analysis was performed; results were presented graphically. **Results:** A total of 253 patients were included (40% female, mean age 65 yr). Forty percent of all lesions had attempted endoscopic removal, 12% were assessed by the advanced gastroenterology therapeutics group. Malignancy represented 56.8% of all cases. The most common indication for TAMIS was rectal cancer (including malignant polyp) at 42%, followed by endoscopically unresectable polyp at 31%. There has been a shift toward more malignancy-related indications for TAMIS over time, where 81% were performed for malignant causes in 2019 and 100% in 2020, compared with a range of 29.4%–59% from 2009 to 2018. The most common histology on post-TAMIS pathology was invasive adenocarcinoma (36%), followed by adenoma without high grade dysplasia (28%). **Conclusion:** Since the introduction of TAMIS and transanal endoscopic microsurgery in 2009 at our centre, accompanied by the evolution of endoscopic techniques, the use for this platform has shifted from benign to more malignant indications. A cooperative approach has led to fewer patients requiring TAMIS for benign lesions. Further studies are needed to validate this trend in other centres, as well as to analyze the impact of an advanced gastrointestinal therapeutics team on the role and indication of TAMIS.

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Impact of the COVID-19 pandemic on readmission rates following colorectal surgery. *Maddy Lemke, Laura Allen, Nadeesha Samarasinghe, Kelly Vogt, Muriel Brackstone, Terry Zwiep.* From Western University (Lemke, Allen, Vogt, Brackstone, Zwiep), and University of British Columbia (Samarasinghe).

Background: The COVID-19 pandemic generated pressure to discharge patients early; this could have resulted in patients being rushed to discharge, requiring them to return to hospital and be readmitted. The impact of the pandemic on readmission for patients undergoing colorectal surgery is unknown. **Methods:** The American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP) database was used to compare patients undergoing elective colorectal surgery in 2019 and 2020, before and during the COVID-19 pandemic. Patient characteristics and outcomes were compared between the 2 cohorts. Multivariable logistic regression was used to examine variables associated with readmission. Propensity score matching was then used to compare matched patients in the pre-pandemic and pandemic cohorts. **Results:** A total of 72 869 colorectal cases were included, with 39 974 in 2019 and 32 895 in 2020. There were 17.7% fewer cases in 2020. The rate of readmission did not differ between the groups (9.6% in 2019 v. 9.4% in 2020, $p = 0.404$) nor did average length of stay (6.2 v. 6.3 days, $p = 0.864$). There were fewer patients discharged to a facility such as nursing facility (4.7% v. 3.3%) or rehabilitation

centre (1.8% v. 1.4%) in 2020, with more patients discharged home (92.9% v. 93.9%). Year was not associated with readmission on multivariable analysis. In the matched cohort, readmission rates did not differ (9.7% v. 9.3% $p = 0.129$). **Conclusion:** No difference in readmission rates before or during the COVID-19 pandemic was observed, suggesting increased pressure to have patients out of hospital during the pandemic did not result in rushed discharges requiring repeat admissions. More patients were discharged home, with fewer to rehabilitation or nursing facilities in 2020, suggesting the environment in the pandemic avoided more transitional services. Lack of increase in readmission or length of stay demonstrates success with avoidance of these services for select patients.

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More than the sum of its parts: the benefits of multidisciplinary conferences extend beyond patient care. *Elizabeth Clement, Claire Lange, Armaghan Alam, Anu Ghuman, Abmer Karimuddin, Terry Phang, Manoj Raval, Carl Brown.* From the University of British Columbia.

Background: Multidisciplinary conferences (MDC) for rectal cancer yield more accurate clinical staging, individualization of multimodality treatment and coordinated surgical planning. While this confers a benefit for patients, the more subtle impact on clinicians has not been explored. Contextually, physicians' professional satisfaction is tied to feeling respected and appreciated in the workplace, and it is theorized that MDCs foster opportunities for academic advancement and professional relationship development. This study set out to explore the experiences of clinicians who attended rectal cancer MDCs and determine the impact on their practice. **Methods:** Participants included medical, radiation and surgical oncologists; radiologists; pathologists; and physician trainees who participated in our local rectal cancer MDC. Semistructured interviews were conducted, recorded and transcribed. Qualitative analysis using NVivo was completed, and major themes, minor themes and subthemes were coded and tabulated using a constant comparative method. **Results:** Twenty-one clinicians participated in the study, representing all 5 disciplines from our local MDC. The major theme was benefits, discussed by all 21 participants (P) with a total of 438 references (R). Subthemes in this category were benefits to clinicians (21 P, 310 R), including academic opportunities (21 P, 198 R) and strengthening of interdisciplinary communication (20 P, 103 R), as well as benefits to patients (21 P, 128 R). Minor themes included challenges (21 P, 99 R), improvements (16 P, 42 R) and successes (21 P, 65 R). Subthemes in the challenges category included timing of meetings (10 P, 15 R) and workload (15 P, 49 R). Subthemes in the successes category included administrative support (7 P, 11 R), adequate representation (13 P, 18 R) and accessibility with a virtual platform (17 P, 26 R). **Conclusion:** MDCs impact participating clinicians in ways not previously understood. Benefits include academic and educational opportunities as well as improvements in interdisciplinary communication. This contributes to clinicians' ease of work and collegiality. These data demonstrate added value of MDCs, underscoring their significance to our profession in a novel way.

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Multidisciplinary conference for rectal cancer — measuring patient care impact. *Elizabeth Clement, Jerry Liu, Anu Ghuman,*

Abmer Karimuddin, Terry Phang, Manoj Raval, Carl Brown. From the University of British Columbia.

Background: Multidisciplinary conferences (MDCs) are considered standard of care in the management of rectal cancer. Improved clinical staging and individualized multimodality treatment are key goals of MDCs. The current literature suggests pre-conference plans are changed by MDC discussion in 22%–29% of cases. This objective of this study was to determine the impact of MDCs on clinical staging, investigations and management plans for rectal cancer patients treated at a quaternary care colorectal surgery centre. **Methods:** At our institution, pre- and postconference data as well as specialist attendance were prospectively collected. Plans were categorized based on treatment category. Postconference plans were considered “changed” when patients had moved from one treatment category to another and “deferred” if the MDC had recommended additional investigations or consults before establishing a definitive plan. Descriptive analysis was performed for tabulation and summarization of data points. **Results:** Between May 2021 and April 2022, pre- and postconference plans were prospectively recorded for 44 consecutive meetings. Pathology, radiology, medical oncology and surgery were present for 100% of meetings, and radiation oncology was present for 93% of meetings. In total, 276 patients were reviewed. Imaging was reviewed in 95%, pathology in 24% and endoscopic images in 41% of cases. Of the patients reviewed, 137 were new diagnoses of rectal adenocarcinoma. Radiology reports were changed in 26% (35/137) of patients, pathology reports in 4% (5/137) and overall treatment plans were deferred in 15% (20/137) and changed in 27% (37/137) of patients. **Conclusion:** MDCs recommended changes to preconference plans 27% of the time. Further, MDCs recommended additional investigations or consults 15% of the time. Our study suggests comprehensive review by a team of treating physicians changes the patient care plan in a consequential percentage of rectal cancer patients. Further investigation of the impact of MDCs on patient outcomes is needed.

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Patient outcomes in emergency colorectal cancer resections: a 15-year cohort analysis. *Hanaa N. Mughal, Mubammed A. Gok, Usman A. Khan.* From the East Cheshire NHS Trust.

Background: In the United Kingdom, colorectal cancer (CRC) is the second leading cause of cancer mortality. Independent of disease stage, emergency CRC presentation results in considerable postoperative morbidity and mortality. Obstruction, perforation and associated symptoms such as hemorrhage, abdominal pain and sepsis are frequently present in emergency CRC presentations. This study aimed to evaluate patient outcomes following emergency CRC resections. **Methods:** Cohort analysis was performed, including descriptive demography and postoperative patient outcomes for all emergency CRC resections performed between January 2008 and February 2023. Elective CRC resections during this period were considered as controls. **Results:** A total of 1621 CRC resections were performed over 15 years. Emergency cases accounted for 21.3%. Indications for emergency resection included perforation ($n = 85$), obstruction ($n = 234$) and other causes ($n = 26$). Emergency CRC resection patients were

older ($p < 0.0001$), multicomorbid with high American Society of Anaesthesiologists scores ($p < 0.0001$) and had lower body mass index ($p < 0.005$). Elective resections ($n = 1276$) had shorter postoperative length of stay (7.5 d, $p < 0.0001$) despite having prolonged operating times (184.3 min, $p < 0.0001$). As a result emergency CRC patients had worse 90-day mortality ($p < 0.0001$) and 15-year survival (Log-rank $p < 0.05$) compared with their elective counterparts. **Conclusion:** Despite the implementation of national bowel cancer screening programs, emergency presentation remains an independent risk factor for adverse patient outcomes following curative CRC resection. Although causes of emergency presentation are multifactorial, prompt diagnosis with planned early surgical intervention can reduce postoperative mortality in the short term and improve long-term survival.

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Enhanced Recovery after Surgery (ERAS) protocols in colorectal cancer resection: a 15-year analysis of patient outcomes. *Hanaa N. Mughal, Mubammed A. Gok, Usman A. Khan.* From the East Cheshire NHS Trust.

Background: Enhanced Recovery After Surgery (ERAS) protocols facilitate early recovery following major surgery. By employing multifaceted rehabilitation methods, ERAS reduces postoperative organ dysfunction and minimizes the physiologic stress response to surgery by prioritizing early return to feeding, mobilization and aggressive management of pain. This study evaluated patient outcomes and the effectiveness of ERAS protocols following colorectal cancer (CRC) resection. **Methods:** A cohort analysis including descriptive demography and patient outcomes following CRC resection between January 2008 and February 2023 was performed. CRC resections without ERAS were used as controls. **Results:** A total of 1268 CRC resections were performed over the 15-year period. In total, 1012 cases implemented ERAS protocols, with 6.9% of cases having delayed initiation of ERAS. Most (73.5%) ERAS CRC resections were performed laparoscopically and had shorter length of postoperative stay (7 d, $p < 0.0001$) despite prolonged operating times in this group (194.2 min, $p < 0.0001$). CRC resections without ERAS protocols implemented ($n = 256$) had greater laparoscopic to open conversion rates (17.7%, $p > 0.05$). Use of ERAS did not affect 90-day mortality following CRC resection, but did have improved 15-year survival rates (Log rank $p < 0.05$) compared with the non-ERAS group. **Conclusion:** Adherence to ERAS protocols were greater in laparoscopic CRC resections. Delayed initiation or absence of ERAS occurred in the presence of major postoperative complications such as anastomotic leak and ileus. Targeted rehabilitation programs such as ERAS are effective in shortening postoperative length of stay and improving long-term survival.

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Laparoscopic to open conversion in colorectal cancer resection: a 15-year analysis of postoperative outcomes. *Hanaa N. Mughal, Mubammed A. Gok, Usman A. Khan.* From the East Cheshire NHS Trust.

Background: Colorectal cancer (CRC) remains the leading cause of cancer mortality worldwide. Laparoscopic surgery is a widely accepted operative approach for curative CRC resection. Laparo-

scopic to open surgery conversions are uncommon, and they can occur for a variety of reasons, including patient demographics, poor preoperative functional status, tumour-related variables and intraoperative factors. The purpose of this study was to evaluate the postoperative outcomes in patients undergoing CRC resection via conversion from laparoscopic to open surgery. **Methods:** A cohort analysis including patient demography and operative outcomes in all laparoscopic to open conversion CRC resections between January 2008 and February 2023 was performed. Laparoscopic and open CRC resections were used controls. **Results:** In total, 1618 CRC resections were performed over 15 years, 1274 were elective and 344 were emergency cases. Laparoscopic to open conversion ($n = 108$) was prevalent in males ($p < 0.01$), and patients with a high body mass index (27.3 kg/m², $p < 0.05$), multi-comorbidities and high American Society of Anesthesiologists scores ($p < 0.0001$). Conversion to open surgery patients had prolonged operating times (221.6 min, $p < 0.0001$), longer postoperative length of stay (8 d, $p < 0.0001$), and conversion was more common in elective cases (94.4%, $p < 0.001$). Open CRC resections were more common in emergency presentations ($n = 281$, $p < 0.0001$). Conversion to open surgery did not adversely affect 90-day mortality or 15-year survival (Log rank $p < 0.0001$). **Conclusion:** Conversion to open surgery occurred in 6.7% of cases over 15 years but did not result in worse postoperative mortality or survival. Conversion to open surgery demonstrates safe surgical practices in the face of patient, tumour and intraoperative challenges rather than a failure of laparoscopic surgery.

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Management of postoperative ileus in colorectal cancer resections: a 15-year evaluation of patient outcomes. *Hanaa N. Mughal, Mubammed A. Gok, Usman A. Khan.* From the East Cheshire NHS Trust.

Background: Postoperative ileus (POI) is a transient impairment of bowel motility following surgery. POI often leads to increased postoperative morbidity associated with colorectal cancer (CRC) resection due to delayed return to oral feeding, prolonged hospital stay and increased risk of anastomotic leak. This study evaluated the management of POI following CRC resection. **Methods:** Cohort analysis of POI cases occurring following CRC resection between January 2008 and February 2023 was performed. CRC resection without ileus was used as the control. **Results:** In total, 1618 CRC resections were performed in the 15-year analysis period, with POI occurring in 252 cases. The incidence of POI was unaffected by presentation of the CRC (emergency v. elective), operative technique (laparoscopic v. open) or anatomic site of surgery (right v. left colon). Patients with POI had prolonged operating times (183.4 min, $p < 0.05$) and length of postoperative stay (14 d, $p < 0.0001$). The average onset of POI was 5 days and was diagnosed clinically or radiologically. POI did not affect 90-day mortality or 15-year survival (Log rank $p > 0.05$, uncensored). **Conclusion:** A total of 15.6% of CRC resections resulted in POI but did not adversely affect postoperative morbidity or mortality despite the longer operating times and length of stay in this group. Early clinical and radiological diagnosis of POI and interventions including nasogastric tube decompression, fasting, intravenous fluids, gastrografin contrast and prokinetic agents are key to reducing the complications associated with POI.

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Timing of ostomy reversal and associated outcomes: a systematic review. *Nicholas James, Terry Zwiep, Julie Ann Van Koughnett, Dora Laczko.* From Western University.

Background: Temporary colostomy or ileostomy is indicated at the time of surgery for various reasons. The timing of ostomy reversal surgery is controversial, with limited consensus regarding the optimal timing after the primary surgery to minimize postoperative complications and optimize outcomes. This systematic review examined the recent literature for studies investigating the impact of the timing of ostomy reversal on postoperative outcomes. **Methods:** A literature search was conducted using PubMed, Scopus and the Cochrane Library to identify relevant studies published between January 2018 and January 2023. Abstracts were screened for inclusion and exclusion criteria by 2 independent reviewers. Included full-text manuscripts were subsequently reviewed and analyzed. **Results:** A total of 24 studies were identified, including 5 studies on the timing of colostomy reversal and 19 on ileostomy reversal (2 studies examined both). Five recent retrospective analyses and 1 small randomized controlled trial (RCT) examining the timing of colostomy reversal suggested optimal reversal surgery at less than 5 months. There is a similar trend toward earlier ileostomy reversal, with delays longer than 5–7 months associated with a higher risk of postoperative complications in multiple retrospective analyses and RCTs. However, 2 recent trials were stopped early because of concerns about adverse outcomes in patients undergoing very early loop ileostomy reversal at 8–14 days in patients who underwent resection for rectal cancer. **Conclusion:** The decision on timing of ostomy reversal is currently largely guided by surgeon preferences, institutional practices and various patient factors. Since 2018, a trend has emerged toward earlier ostomy reversal, though few studies have analyzed the impact of the timing of colostomy reversal compared with ileostomy reversal. Further RCTs or database analyses are required to establish specific recommendations regarding the optimal timing of ostomy reversal, and the impacts of both very early timing and extended delays on surgical outcomes.

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Fragility of statistically significant outcomes in colonic diverticular disease randomized trials. *Tyler McKechnie, Shuling Yang, Kathy Wu, Sabil Sharma, Yung Lee, Lily Park, Aristitbes Doumouras, Dennis Hong, Sameer Parpia, Mobit Bhandari, Cagla Eskicioglu.* From McMaster University.

Background: The p value has been criticized for oversimplifying the concept of determining whether a treatment effect truly exists. An alternative is the Fragility Index (FI), which is the minimum number of patients with nonevents that would need to be converted to events to increase the p value above 0.05. This review aimed to determine the FI of randomized controlled trials (RCTs) assessing the efficacy of interventions for patients with colonic diverticular disease since 2010 to assess the robustness of the current evidence. **Methods:** MEDLINE, Embase, and CENTRAL were searched from January 2010 to June 2022. Articles were eligible for inclusion if they were RCTs with parallel, superiority designs evaluating interventions in patients with colonic diverticular disease. Only RCTs with

dichotomous primary outcomes with an associated p value of less than 0.05 were considered for inclusion. The FI was determined by adding events and subtracting nonevents from the groups with the smaller number of events and larger number of events, respectively. Events were added until the p value exceeded 0.05. The smallest number of events required was considered the FI. **Results:** Following review of 1271 citations, 15 RCTs met inclusion criteria. Nine of the RCTs evaluated surgical interventions and 6 evaluated medical interventions. The mean number of patients randomized and lost to follow-up per RCT was 92 (standard deviation [SD] 35.3) and 9 (SD 11.4), respectively. The median FI was 1 (range 0–5). The FIs for the included studies did not correlate significantly with any RCT characteristics (e.g., sample size, risk of bias). **Conclusion:** Currently available RCTs evaluating surgical and medical interventions for colonic diverticular disease are not robust. Future RCTs should consider FI in the sample size calculation process. This review is limited by the small number of included RCTs, heterogeneity of the included studies and the lack of inclusion of RCTs with continuous outcomes.

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Postoperative day 1 and 2 C-reactive protein values for predicting postoperative morbidity following colorectal surgery. *Tyler McKechnie, Léa Tessier, Stephanie Lee, Tania Kazi, Praveen Sritbaran, Yung Lee, Aristitbes Doumouras, Dennis Hong, Cagla Eskicioglu.* From McMaster University.

Background: C-reactive protein (CRP) has been extensively studied as a biomarker for predicting morbidity following colorectal surgery. Prior publications have focused on postoperative days (POD) 3–5. With the growing prevalence of early postoperative discharges, validated CRP values for predicting postoperative morbidity on POD 1 and 2 would have significant clinical utility. The aim of this retrospective cohort study was to evaluate the prognostic value of POD 1 and POD 2 CRP values in predicting postoperative morbidity and determine predictive cut-off values. **Methods:** This retrospective cohort study included patients undergoing colorectal surgery with primary anastomosis for colorectal disease between 2019 and 2022. The primary outcome was 30-day postoperative morbidity. Secondary outcomes included prevalence of anastomotic leak (AL). The diagnostic accuracy of CRP was analyzed with receiver operating curve (ROC) analysis and optimal cut-off values were estimated using the Youden index. **Results:** In total, 206 patients (mean age 63.3 yr, 48.3% female) were included. The most common indications for surgery were colorectal neoplasia (62.1%) and diverticular disease (17.0%). The most common operations were right hemicolectomy (33.2%) and anterior resection (24.9%). Operations were completed laparoscopically in 91.3% of cases. The 30-day postoperative morbidity was 27.2%, and 3.4% experienced AL. Optimal cut-off values for POD 1 and 2 CRP values for predicting postoperative morbidity were 40.1 mg/L (sensitivity 66%, specificity 69%, area under the ROC curve [AUC] 0.67, negative predictive value [NPV] 84%, positive predictive value [PPV] 44%) and 53.8 mg/L (sensitivity 85%, specificity 46%, AUC 0.65, NPV 89%, PPV 37%), respectively. **Conclusion:** CRP values on POD 1 and 2 following colorectal surgery may be predictive of 30-day postoperative morbidity. Values of 40.1 mg/L and 53.8 mg/L have

high NPVs and may be used to rule out postoperative morbidity when drawn on POD 1 and 2, respectively. This study was limited by sample size, and a future adequately powered study is required to confirm these findings.

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Bariatric surgery before colorectal surgery reduces postoperative morbidity and health care resource utilization: a propensity score matched analysis. *Tyler McKechnie, Yung Lee, Dennis Hong, Joanna Dionne, Aristithes Doumouras, Sameer Parpia, Mohit Bhandari, Cagla Eskicioglu.* From McMaster University.

Background: Bariatric surgery is the most effective and sustainable form of weight loss. Bariatric surgery before elective operations for colorectal pathology may improve postoperative outcomes. To investigate this further we designed a retrospective database cohort study comparing patients with and without prior bariatric surgery undergoing surgery for colorectal cancer in terms of postoperative morbidity and health care utilization. **Methods:** Adult patients undergoing resection for colorectal cancer between 2015 and 2019 were identified from the National Inpatient Sample (NIS). Patients were stratified into groups according to their history of bariatric surgery. Propensity-score matching (PSM) with 4:1 nearest-neighbour matching was performed according to demographic, operative and hospital characteristics. The primary outcome was overall in-hospital postoperative morbidity. Secondary outcomes included system-specific postoperative complications, postoperative mortality, postoperative length of stay, total admission health care cost and postdischarge disposition. The McNemar test and Wilcoxon matched-pairs signed rank test were performed. **Results:** After PSM, 1197 patients without prior bariatric surgery and 376 patients with prior bariatric surgery were included. Patients with prior bariatric surgery had an absolute reduction of 6.5% in overall in-hospital postoperative morbidity (19.1% v. 25.6%, $p < 0.0001$) and a \$5256 decrease in hospitalization cost (\$70 344 v. \$75 600, $p = 0.034$). Analysis of system-specific morbidity demonstrated significant reductions in gastrointestinal morbidity (6.6% v. 11.6%, $p < 0.0001$), genitourinary morbidity (13.8% v. 15.3%, $p < 0.0001$) and respiratory morbidity (2.1% v. 5.5%, $p < 0.0001$) in patients with a prior history of bariatric surgery. Patients with prior bariatric surgery were more likely to be discharged home after their index operation (72.9% v. 63.9%, $p < 0.0001$). **Conclusion:** Bariatric surgery before surgery for colorectal cancer may be associated with decreased postoperative morbidity and health care utilization. Bariatric surgery as well as other forms of rapid and effective weight loss, such as very-low-energy diets, should be evaluated further for optimization of obese patients before nonbariatric abdominal surgery.

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Ileocolic Crohn disease: a video vignette of the Kono-S anastomosis. *Olivia Hershorn, Amandeep Gbuman, Abmer Karimuddin, Carl Brown, Manoj Raval, P. Terry Phang.* From the University of British Columbia.

Background: Ileocolic Crohn disease accounts for a large proportion of patients who require operative intervention. Unfortunately, clinical, endoscopic and surgical recurrence remains high

postoperatively and is influenced by a number of modifiable factors. Although there is no consensus on the best approach to prevent surgical recurrence, anastomotic technique may reduce recurrence of Crohn disease. **Methods:** We present the case of a 25-year-old female with ileocolic Crohn disease refractory to medical management. Abdominal imaging revealed terminal ileitis with a small collection adjacent to the terminal ileum. Intraoperatively, laparoscopic mobilization was undertaken and the bowel was exteriorized for resection. A hand-sewn, end-to-end Kono-S anastomosis was performed (<https://youtu.be/MHTVsmNMerg>). **Results:** The patient underwent an uncomplicated laparoscopic-assisted ileocolic resection with extracorporeal resection and hand-sewn, end-to-end Kono-S anastomosis. She was discharged home on postoperative day 4. The patient has recovered well, with no postoperative complications or return of symptoms at 5-month follow-up. **Conclusion:** The Kono-S anastomosis is a novel technique for anastomotic reconstruction. Compared with conventional side-to-side stapled anastomosis, Kono-S allows for ease of postoperative endoscopic surveillance. More robust data are still needed to determine if long-term decreased recurrence rates persist.

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Association between patient activation and postoperative outcomes in rectal cancer survivors. *Alex Chen, Marylise Boutros, Natasha Caminsky, Teodora Dumitra, Sarah Faris-Sabboobeh, Marie Demian, Georgia Rigas.* From the Sir Mortimer B. Davis Jewish General Hospital (Chen, Boutros, Faris-Sabboobeh, Demian, Rigas), and McGill University Health Centre (Caminsky, Dumitra).

Background: Patient activation (PA), a modifiable behavioural concept referring to a patient's confidence/motivation to participate in health care, is poorly understood in cancer patients. **Methods:** This was a single-institution cross-sectional study of adult rectal cancer survivors operated on between 2018 and 2021. Exclusion criteria were inability to consent and cases of recurrent cancer. The main exposure was PA, as determined by the Patient Activation Measure-13 (PAM-13), a 13-item questionnaire that assigns 1 of 4 possible scores, further categorized into high (PAM 3–4) or low scores (PAM 1–2). Covariates are predefined demographic and clinical characteristics. Primary outcome was unplanned health care use up to 30 days postdischarge, defined as emergency department visits, readmissions or unscheduled clinic visits. Secondary outcomes were postoperative complications, length of hospital stay and patient-reported quality of life using the EuroQol-5 Dimension (EQ5D) questionnaire. Descriptive statistics, Fisher exact/ t tests and simple regression were used to compare high to low PA. **Results:** Of 167 patients contacted, 81 were recruited (mean age 61 ± 12 yr, body mass index 27 ± 6 kg/m², Charlson Comorbidity Index score 3.9 ± 1.3). Forty-eight patients (59%) were male, median preoperative clinical stage was 3 (39 [48%]), and 52 (64%) received neoadjuvant treatment. Most patients (58 [72%]) had more than high-school education, and were employed (41 [51%]) with a household income $> \$35\,000$ (52 [64%]). Thirty-one were classified as low PA and 50 as high PA, with otherwise no significant differences in covariates. There was significantly more (odds ratio 5.76, 95% confidence interval 1.08–30.6, $p = 0.049$) outpatient clinic use in the low PA group (5/31 [19%]) as compared with high (2/50 [4%]), but no difference in

overall unplanned health care use. Patient-reported quality of life was lower ($p = 0.015$) in low PA patients than high, with differences in EQ5D anxiety/depression dimensions. **Conclusion:** Low PA patients had more unplanned outpatient clinic use and lower patient-reported quality of life. Efforts to increase PA in patients with rectal cancers may improve their survivorship care.

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Understanding surgeon and nurse perspectives on the use of patient-generated data in the management of low anterior resection syndrome. *Olivia Monton, Allister Smith, Jeongyoon Moon, Marie Demian, Richard Garfinkle, Carol-Ann Vasilevsky, Fateme Rajabiyazdi, Marylise Boutros.* From McMaster University (Monton), Western University (Smith), McGill University (Moon, Garfinkle), Mortimer B. Davis Jewish General Hospital (Demian, Vasilevsky, Boutros), and Carleton University (Rajabiyazdi).

Background: Management of low anterior resection syndrome (LARS) requires patient engagement and self-management. While patient-generated data (PGD) are currently used in the management of LARS, health care practitioners' (HCPs) perspectives and experiences remain largely unexplored. The aim of this study was to explore surgeon and nurse perspectives on the use of patient-generated LARS data. **Methods:** After institutional ethics board approval, we used snowball sampling to recruit international LARS experts (LARS Data Visualization Collaborative). We conducted semistructured interviews to understand the use of patient-generated LARS data in managing LARS, then used grounded theory to thematically analyze the transcribed interviews using the MAXQDA software. **Results:** We interviewed 8 colorectal surgeons and 6 nurses. Saturation was achieved after 5 interviews. Four themes emerged from analysis: 1) data collection (LARS experts ask patients to collect various types of LARS PGD using different means; most HCPs feel that the early months are the most important time for patients to collect data); 2) data review (both surgeons and nurses review PGD during clinical encounters with patients, but find it difficult to interpret PGD owing to time constraints, legibility and completeness); 3) data utility (HCPs feel that data collection helps engage patients in their care through self-reflection and self-management; it also helps HCPs identify trends, understand symptoms and their impact, and guide treatment); 4) future innovations (most LARS experts feel that an electronic clinical tool, such as an app or website, would be useful to enhance data collection and produce data visualizations that are easy to interpret). Patient buy-in and compliance were highlighted as important considerations. **Conclusion:** This study highlights many gaps in PGD collection and review in the management of LARS. A clinical tool including various data collection templates and data visualization prototypes could help to address these gaps. Future research will focus on incorporating the patient perspective.

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Characteristics of interval colorectal cancer: a Canadian retrospective population-level analysis from Newfoundland and Labrador. *Emily Courage, Danielle LeBlanc, Matthew Benesch, Kala Hickey, Katia Hartwig, Casey Armstrong, Reniel Engelbrecht, Mitchell Fagan, Mark Borgeonkar, David Pace, Jessica Shanaban.* From the Memorial University of Newfoundland.

Background: Interval colorectal cancers (I-CRCs) arise during the interval time period between scheduled colonoscopies. Predicting which patients are at risk of I-CRCs remains an elusive undertaking, but evidence would suggest that most I-CRCs arise from lesions missed on index endoscopy. The procedural factors that lead to missed lesions are numerous and lack consensus in the literature. In Canada, Province X [redacted for blinding] has the highest incidence of CRCs. **Methods:** This study examined I-CRCs (3–60 months after last colonoscopy) in the province through a population-level retrospective analysis covering 67% of the province from 2001 to 2018. We estimated the I-CRC rate to be up to 9.3%. **Results:** Median age at I-CRC diagnosis was 67.1 years with an interval time of 2.9 years. About 57% of these tumours occurred proximal to the splenic flexure, with 53% presenting as local disease. No temporal differences were observed in interval time or tumour distribution. On univariate and multivariable logistical regression, risk of right-sided I-CRC did not correlate to the index colonoscopy indication, bowel preparation quality, size of largest polyp removed, colonoscopy completion rate, or stage at presentation. **Conclusion:** Improvements in synoptic reporting utilization and national registries are needed to identify risk factors and reduce I-CRC frequency.

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Current rectal cancer survivorship care: unmet patient needs and fragmented specialist and family physician care. *Jeongyoon Moon, Ebram Salama, Anna Wang, Mylène Arsenaault, Nathalie Leon, Carmen Loiselle, Fatemeh Rajabiyazdi, Marylise Boutros.* From the McGill University Health Centre (Moon), McGill University (Salama, Wang, Arsenaault, Leon, Loiselle, Boutros), and Carleton University (Rajabiyazdi).

Background: With advances in rectal cancer management, there is a growing number of rectal cancer survivors. We hypothesize that current rectal cancer survivorship care is limited in terms of communication among health care professionals, access to family physicians (FP) and targeted, dedicated care. **Methods:** In part 1, a retrospective cohort study was performed on rectal cancer survivors who underwent proctectomy between 2005 and 2021 in a Canadian tertiary care practice. The main outcome was survivorship-related emergency department (ED) visits, defined as those related to functional impairment, chemotherapy-related complications and stoma/wound-related complications not requiring an admission. In part 2, a qualitative study was performed with 5 colorectal surgeons, 2 medical oncologists, 1 radiation oncologist and 4 FPs with rectal cancer patients in their practice. **Results:** For part 1, out of 441 rectal cancer survivors, 156 (35.4%) did not have an FP. Out of 673 ED visits for all individuals, 60 visits were related to survivorship-related unmet needs. The most common reason for ED visit was bowel dysfunction ($n = 36$), followed by chemotherapy-related neuropathy ($n = 14$) and ostomy/wound-related complications ($n = 9$). On Cox proportional hazards analysis, lack of access to an FP was associated with a higher probability of having survivorship-related ED visits ($p = 0.003$). For part 2, interviews revealed 5 overarching themes: 1) several unmet needs specific to rectal cancer survivors exist; 2) specialists experience lack of resources in providing ancillary care to survivors; 3) FPs feel limited in providing survivorship-related care owing to lack of formal training; 4) there is no formal process to transition care from specialists to FPs during the survivorship

phase; and 5) a survivorship care document and dedicated nursing support have the potential to improve communication among specialists, FPs and patients. **Conclusion:** Existing rectal cancer survivorship care is fragmented. Lack of access to FPs or their limited involvement in survivorship care likely contribute to unmet needs. Rectal cancer survivors could benefit from individualized follow-up, coordinated among specialists and FPs.

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Local excision for T1 rectal cancer: a population-based study of practice patterns and oncological outcomes. *Kelly Brennan, Mandip Rai, Ameer Farooq, Chad McClintock, Weidong Kong, Sunil Patel.* From Queen's University.

Background: Local excision (LE) for T1 rectal cancer may be recommended in those with low-risk disease, while resection is typically recommended in those with high risk of luminal recurrence or presence of lymph node metastasis. The objective of this study was to assess practice patterns and outcomes of those with T1 rectal cancer in Ontario, Canada. **Methods:** All individuals with T1 rectal cancer between 2010 and 2014 in Ontario, Canada, were included. Detailed histopathology records were obtained from the Ontario Cancer Registry. Histopathology details (including risk factors), patient characteristics, staging investigations, stage of disease, treatments and long-term outcomes were determined using linked administrative databases. **Results:** In total, 719 patients were identified, including 359 who underwent resection only, and 113 with LE and immediate surgery (< 90 days) and 247 with LE. The groups were similar in baseline characteristics (sex, age group, socioeconomic status, comorbidities, $p > 0.10$). The majority of LE was performed via colonoscopy. Piecemeal excision was high in both LE groups (96% v. 89%, $p = 0.02$), while poorly differentiated (4% in each group, $p = 0.70$) and lymphovascular invasion (14% in each group, $p = 0.80$) was rare. In those with LE without immediate resection, 21% ultimately underwent resection (median 150 days, interquartile range [IQR] 114–181), and 4% received radiation (median 211 days, IQR 174–242). There was no difference in 5-year overall survival between groups on unadjusted (resection 83.2% v. LE and immediate resection 82.3% v. LE 83.3%, $p = 0.33$) or adjusted analysis (ref v. hazard ratio [HR] 0.97, 95% confidence interval [CI] 0.60–1.56 v. HR 0.97, 95% CI 0.70–1.35). **Conclusion:** There was no observed difference in overall survival between those who underwent resection, LE and immediate surgery, or LE only. A lack of survival difference is notable, considering that many in the LE without immediate surgery group had risk factors for local recurrence. The need for early resection in some patients warrants close surveillance, especially in the first year after local excision.

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Can nonoperative management of acute complicated diverticulitis be successfully treated with a future hospital at home program? A retrospective cohort study. *Neyla Boukhili, Natasha Caminsky, Sarab Faris-Sabboobeh, Marie Demian, Marylise Boutros.* From McGill University (Boukhili, Caminsky, Boutros), and the Mortimer B. Davis Jewish General Hospital (Faris-Sabboobeh, Demian).

Background: A hospital at home (HaH) program offering virtual monitoring and timely access to diagnostic/interventional

procedures was developed at our institution during the COVID-19 pandemic. To this day, no HaH program has included patients with acute complicated diverticulitis (ACD). We sought to retrospectively evaluate the proportion of ACD admissions that solely required care that could be offered by a future HaH program. **Methods:** This institutional review board-approved retrospective cohort study included adults admitted for ACD at our institution between 2018 and 2022 who met criteria for our future HaH program on presentation to the emergency department with hemodynamic stability, tolerating oral intake, and adequate analgesia. Admissions with peritonitis or those requiring urgent surgery at presentation were excluded. Primary outcome was the proportion of admissions that only required care available within HaH. Secondary outcomes were total hospital bed-days, including idle bed-days (spent in hospital with no diagnostic/interventional procedures), HaH bed-days (out-patient procedures available within HaH), and inpatient bed-days (surgery, total parenteral nutrition). **Results:** Of 242 admissions for ACD during the study period, 59 (24.4%) were excluded. The study cohort included 183 HaH-eligible ACD admissions: 53.6% male, mean age 59.7 ± 14.7 years, and mean Charlson Comorbidity Index score 2.2 ± 2.2 . Imaging showed 49.2% had abscesses (82% pericolic, 18% distant) and 47.0% extraluminal gas (79.3% pericolic, 20.7% distant). Percutaneous drainage was performed in 12.6%. Overall, 177 (96.7%) admissions only required care available with HaH. Of 1066 total hospital bed-days for HaH-eligible ACD admissions, 827, 185 and 54 were idle, HaH and in-patient bed-days, respectively. An HaH program for nonoperative management of ACD could have saved 1012 hospital bed-days during the study period. **Conclusion:** Most admissions for nonoperative management of ACD can be treated in novel HaH programs. In light of our findings, we intend to perform a prospective feasibility trial of HaH for nonoperative management of ACD.

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Does patient activation impact remote digital health follow-up and same-day discharge after elective colorectal surgery. *Tiffany Paradis, Stephan Robitaille, Teodora Dumitra, A. Sender Liberman, Patrick Charlebois, Barry Stein, Julio F. Fiore Jr., Liane. S. Feldman, Lawrence Lee.* From the McGill University Health Centre.

Background: Patient activation (PA) is a patient's ability to manage their own health conditions. Low PA is associated with worse postoperative outcomes. We have previously demonstrated that remote postdischarge follow-up using a mobile-health application decreased unnecessary emergency department (ED) visits after colorectal surgery, which is now a component of our same-day discharge (SDD) program. We sought to determine the impact of PA on the effectiveness of remote postdischarge follow-up among patients undergoing elective colectomy. **Methods:** This study included a digital application cohort (DAC) of patients undergoing elective colorectal surgery between March 2019 and August 2022, including a subset of SDD patients. The application included educational material, health checks, questionnaires and patient-physician communication. The control cohort (CC) included patients undergoing elective colorectal surgery

between October 2017 and April 2018 without access to the application. The Patient Activation Measure (PAM) was administered to all patients preoperatively. PAM scores (0–100) categorized patients into low (≤ 55.1) or high (> 55.1) PA. The main outcome measure was 30-day ED visits. **Results:** In total, 164 patients were included (89 DAC [50 SDD], 75 CC), with no difference in patient demographics. The DAC had a higher proportion of procedures for stoma reversals (21% v. 4% for CC), and the CC had more procedures for colorectal cancer (75% v. 65% for DAC, $p = 0.01$). Eighty percent of patients in the DAC were highly activated and 73% in the CC ($p = 0.25$). The CC had more complications (37% v. 20% for DAC, $p = 0.015$). There was no difference in 30-day ED visits or readmissions. Among SDD patients, those with low PA had more 30-day ED visits (37.5% v. 7.14% for high PA, $p = 0.015$). On multiple regression, low PA remained independently associated with ED visits. **Conclusion:** PA did not impact the effectiveness of remote monitoring on outcomes after colectomy. Among SDD patients, low PA was associated with a higher incidence of ED visits and complications. Therefore, PA may impact the success of SDD and should be considered as a selection criterion.

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Parastomal hernia prevention, assessment and management: best practice guidelines. *Terry Zwiép, Deborah Abner, Tarik Alam, Elaine Beyer, Michele Evans, Mary Hill, Debra Johnston, Karla Lohnes, Svea Menard, Nicole Pitcher, Kelly Sair, Bev Smith, Bonita Yarjau, Kimberly LeBlanc.* From Western University (Zwiép), CIUSSS de l'Ouest-de-l'Île-de-Montréal (Abner), Hollister Canada (Alam), Health Sciences Centre Winnipeg (Beyer, Yarjau), Misericordia Community Hospital (Evans), Alberta Health Services (Hill, Sair, Smith), Toronto General Hospital (Johnston), IWK Health Centre (Lohnes), Interior Health Authority (Menard), Central Newfoundland Regional Health Centre (Pitcher), and Nurses Specialized in Wound, Ostomy and Continence Canada (LeBlanc).

Background: Those living with an abdominal ostomy are at risk of developing a parastomal hernia. Parastomal hernias impact an individual's psychosocial well-being, activities of daily living and quality of life. A parastomal hernia is a potentially avoidable, yet frequent complication, associated with the creation of a fecal or urinary ostomy. Several studies have shown that preventative measures may reduce the incidence of parastomal hernia development. A multidisciplinary expert panel from across Canada developed a best practice statement to aid health care professionals who assess and treat patients with parastomal hernias. **Methods:** Structured virtual meetings were held from November 2021 until March 2023 with 14 expert panellists across Canada, including Nurses Specialized in Wound, Ostomy and Continence Canada, a colorectal surgeon and a physiotherapist. Before consensus statement development, the following research question was used to guide a scoping review: What are the best practices for the prevention and management of parastomal hernias for nurses and surgeons in Canada? The scoping review results were used for the development of the recommendations and to provide evidence to support them. Additional studies were identified from references and reviewed. A smaller group wrote proposed consensus statements to aid in an

expert panel discussion and consensus voting. After the proposed statements were reviewed, a Delphi methodology was implemented to achieve consensus (80%). **Results:** The scoping review identified 187 articles during screening, and 65 were included after full review to guide consensus statement development. There was a lack of quality systematic reviews and guidelines available internationally. After 3 rounds of voting, consensus was achieved on 15 statements. These were categorized into 4 general categories: risk assessment, prevention, parastomal hernia assessment, and management. **Conclusion:** The consensus document provides recommendations for nurses and other health care professionals to support individuals who have or anticipate having an ostomy on the prevention, assessment and management of parastomal hernias.

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Anastomotic leak rates in circular powered staplers versus manual circular staplers in left sided colorectal anastomoses: a systematic review. *Nadeesha Samarasinghe, Abmer A. Karimuddin, Carl J. Brown, P. Terry Phang, Manoj J. Raval, Karen MacDonell, Amandeep Ghuman.* From the University of British Columbia (Samarasinghe, Karimuddin, Brown, Phang, Raval, Ghuman), and College of Physicians and Surgeons of British Columbia (MacDonell).

Background: Anastomotic leaks in colorectal surgery lead to increased mortality, local cancer recurrence and hospital readmission rate. The Echelon Circular Powered Stapler (ECP) is becoming popular in colorectal surgery, as they are marketed to reduce anastomotic leaks by minimizing operator errors through powered systems. We reviewed current evidence on use of ECP in left-sided colorectal anastomoses to determine if there is a reduction in anastomotic leak rates compared with manual circular staplers (MCS). **Methods:** MEDLINE, Embase, CINAHL and EBM reviews databases were searched to March 2023. Broad search strategy for the use of ECP versus MCS in colorectal surgery was used. Abstracts were reviewed for our primary outcome of anastomotic leaks and data extracted from full text review. **Results:** Ninety-seven articles were screened, and 4 studies and 1 unpublished abstract involving 2225 patients were included. No randomized control trials (RCTs) were found. Of the 2 studies that compared staplers, there was a reduced anastomotic leak rate in ECP versus MCS (1.7% v. 11.2% and 1.8% v. 6.9%); however, data from the unpublished abstract showed higher leaks in the ECP group (10.6% v. 1.9%). In the 2 single armed ECP-only studies, no anastomotic leaks on intraoperative testing reported, but 1 study found a 2.4% postoperative leak rate. **Conclusion:** There are conflicting results among studies comparing anastomotic leak rate in ECP versus MCS for left-sided colorectal anastomoses. The study reporting increased leak rate in ECP was matched for known anastomotic leak risk factors, whereas the other 2 did not account for many known factors. The ECP also has reported performance issues. In addition, a high risk of bias was found, as the majority of studies reported conflicts of interest with Johnson and Johnson. Further evidence from RCTs is required to fully investigate colorectal anastomotic leaks with ECP versus MCP.

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The Gips procedure for pilonidal disease: a video presentation. *Alexandra Harvey, P. Terry Phang, Abmer Karimuddin, Carl J. Brown, Manoj J. Raval, Amandeep Ghuman.* From the

University of British Columbia (Harvey, Phang, Karimuddin, Brown, Raval, Ghuman), and St. Paul's Hospital (Phang, Karimuddin, Brown, Raval, Ghuman).

Background: Pilonidal disease is a disease of chronic foreign body reaction whereby hair follicle distortion in the natal cleft leads to the entrapment of hair and debris beneath the skin and an associated epithelialized sinus. For patients, this can manifest as recurrent abscesses or inflammation. The peak incidence is among young males with hair-bearing natal clefts. For patients who have failed conservative management, the traditional practice has been a wide local excision combined with delayed, primary, or flap closure. This approach is complicated by high recurrence rates, delayed healing, infection, poor cosmesis and other wound-related morbidity. **Methods:** We present the case of a 24-year-old healthy male with a 2-year history of pilonidal disease causing intermittent pain, erythema, swelling and serosanguinous discharge. A targeted sinus tract excision using the Gips technique was performed under general anesthetic. **Results:** The patient underwent an uncomplicated pilonidal sinus tract excision. He was discharged home on the day of surgery with minimal oral analgesics. He recovered well, with no surgical wound complications and has had no recurrence of his disease. **Conclusion:** This easy-to-perform method has been validated to have a low recurrence rate with a disease-free probability of 93.5% at 1 year and 86.5% at 5 years, an excellent cosmetic result and, with a willing patient, can even be performed under local anesthetic. For this predominantly young patient population this allows for minimal pain and disruption to regular work and other activities.

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Local recurrence-free survival after transanal total mesorectal excision: a Canadian institutional experience. Olivia Hershorn, Amandeep Ghuman, Abmer Karimuddin, Manoj Raval, P. Terry Phang, Carl Brown. From the University of British Columbia.

Background: Transanal total mesorectal excision (TaTME) is a novel surgical treatment for mid to low rectal cancers. Norwegian population data have raised concerns about local recurrence in patients treated with TaTME. Our objective was to analyze local and distant recurrence-free survival in patients treated with TaTME for rectal adenocarcinoma at a high-volume tertiary centre. **Methods:** This was a retrospective study using a prospectively maintained institutional TaTME surgery database conducted at a single academic institution. All patients treated with TaTME for rectal adenocarcinoma between 2014 and 2022 were included. Patient demographics, treatment and outcomes data were analyzed. Local recurrence, disease-free and overall survival were analyzed using Kaplan–Meier analysis. **Results:** Between 2014 and 2022, 306 patients were treated with TaTME. Of these, 280 patients met inclusion criteria. Median age was 62 years (range 30–90) and 67% of patients were male. The majority of patients had restorative resection (98%) with a conversion rate to open of 6.9%. Composite optimal pathological outcome was 93.4% (253/271), reflecting a negative circumferential resection margin and distal margin, as well as a complete or near-complete mesorectal specimen. Average follow-up was 30 months (standard deviation 20.4 months), and 78% achieved reestablishment of gastrointestinal continuity to date. Crude local recurrence rate

was 5% (14/280) with a distant recurrence rate of 11% (31/280). **Conclusion:** Recent European data have challenged the presumed oncologic safety of TaTME. However, the learning curve for this procedure is challenging, and poor outcomes are associated with low volume. This is the largest single-centre study to date and confirms an acceptable local recurrence rate consistent with the current standard.

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The impact of operative approach for obese colorectal cancer patients: analysis of the national inpatient sample (2015–2019). Kathleen Logie, Tyler Mckechnie, Yung Lee, Dennis Hong, Cagla Eskicioglu. From McMaster University.

Background: Obesity is an independent risk factor for both colorectal cancers and perioperative morbidity, making treatment in this population particularly challenging and necessitating efforts to improve outcomes. We examined the impact of surgical approach on the in-hospital morbidity and mortality of obese patients undergoing colorectal cancer resections. **Methods:** A retrospective population-based cohort study was performed using data from the Healthcare Cost and Utilization Project National Inpatient Sample from 2015 to 2019. The primary outcome was postoperative in-hospital morbidity. Secondary outcomes included postoperative in-hospital mortality, total admission health care cost and length of stay (LOS). Multivariable logistic and linear regressions were used. **Results:** In total, 4742 patients underwent open surgery and 3231 patients underwent laparoscopic surgery. We observed a significant decrease in overall postoperative morbidity (17.5% v. 31.4%, odds ratio [OR] 0.56, 95% confidence interval [CI] 0.50–0.64, $p < 0.001$), gastrointestinal morbidity (8.1% v. 14.5%, OR 0.59, 95% CI 0.50–0.69, $p < 0.001$) and genitourinary morbidity (10.1% v. 18.6%, OR 0.61, 95% CI 0.52–0.70, $p < 0.001$) with the use of laparoscopy. The mean postoperative length of stay was 1.73 days shorter (95% CI 1.47–1.98, $p < 0.001$) and the mean cost of admission was \$9106 less (95% CI 4638–13573, $p < 0.001$) with the use of laparoscopy. Factors associated with a decreased likelihood of undergoing laparoscopic surgery included increasing Charlson Comorbidity Index score (OR 0.93, 95% CI 0.91–0.94, $p < 0.002$), nonteaching hospital status (OR 1.20, 95% CI 1.058–1.35, $p = 0.004$), and nonurban location (OR 1.56, 95% CI 1.25–1.97, $p < 0.001$). **Conclusion:** This study identified decreased short-term in-hospital morbidity as well as health care utilization associated with the use of minimally invasive surgical techniques for the treatment of colorectal cancer in obese patients, supporting its use in this patient population. Additionally, multiple factors were identified as positively or negatively predicting a patient's likelihood of undergoing minimally invasive surgery, offering potential targets for policy-makers and researchers to improve uptake in obese patients.

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Safety and feasibility of discharge within 24 hours of colectomy: a systematic review and meta-analysis. Mirna Matta, Laura Baker, Jessica Hopkins, Ryan Rochon, Donald Buie, Anthony MacLean. From the University of Calgary.

Background: The concept of ambulatory colectomy has been posed and initial experience appears promising. The aim of this study was to determine the safety, feasibility and acceptance of

early discharge (ED), within 24 hours following colon resection. **Methods:** MEDLINE, Embase, CINAHL, and Cochrane Central Registry of Controlled trials were searched to identify interventional and observational studies on experience with ED following colon resection. This review was conducted in accordance Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines. The primary outcome was safety. Secondary outcomes included feasibility, resource utilization, patient and practitioner acceptance. Meta-analysis was performed using random-effects methods to compare postoperative adverse events in the ED cohort to standard of care. Dichotomous outcomes were calculated as odds ratios (ORs) with 95% confidence intervals (CIs). **Results:** A total of 17 studies (83 675 patients) published between 2009 and 2022 were included. In total, 1029 (4.1%) patients were discharged within 24 hours of surgery. Ten studies were comparative (1 RCT, 2 prospective cohort, and 7 retrospective cohort). The remaining studies were prospective, single-arm studies reporting on ED following colectomy. The incidence of readmission (6.2% v. 9.3%, OR 0.66, 95% CI 0.56–0.79) was lower in the ED cohort than standard of care ($n = 8$ studies). There was no significant difference in the incidence of 30-day morbidity ($n = 6$), anastomotic leak ($n = 4$), mortality ($n = 6$) or reoperation ($n = 6$) between the 2 groups. Discharge on postoperative day (POD) 0 was reported in 7 studies and was feasible in 94% ($n = 189$) of patients in prospective studies ($n = 3$). In 1 study, 100% of patients would request ED again and recommend it. In another study, there was no difference in patient satisfaction at POD 30 between the ED cohort and standard of care. **Conclusion:** Initial experience with early discharge following colectomy is safe, feasible and acceptable in appropriately selected patients may lead to an increase in adoption.

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Laparoscopic lateral lymph node dissection for an advanced rectal cancer: a video abstract. *Amandeep Ghuman, Jason Park, Abmer A. Karimuddin, P. Terry Phang, Manoj J. Raval, Carl J. Brown.* From the University of British Columbia.

Background: The treatment of lateral lymph nodes (LLNs) in locally advanced rectal cancers is varied. Some favour routine LLN dissection, as they consider these nodes to be regional, while others have advocated for selective LLN dissection for persistently suspicious nodes after standardized (chemo)radiotherapy. There is yet to be an international consensus on standard of care of these nodes. **Methods:** A 32-year-old patient with locally advanced rectal cancer and a solitary liver metastasis (T4aN2bM1) underwent total neoadjuvant treatment followed by radical resection. The patient was found to have a 17-mm left obturator node on pretreatment magnetic resonance imaging (MRI), which was 5 mm on post-treatment MRI. The patient was discussed at our multidisciplinary rectal cancer conference, and consensus was to perform a radical resection of the primary tumour and concurrent left LLN dissection. Here we present a video of our laparoscopic LLN dissection (<https://youtu.be/wt47rQDM40g>). **Results:** The patient underwent a concurrent laparoscopic low anterior resection with total mesorectal excision and left LLN dissection with no complications. The patient was discharged home on postoperative day 3. Final pathology confirmed 2 benign nodes from the LLN harvest. No complications have been reported to date, and the patient has recovered well and is awaiting liver resection. **Conclusion:** LLN dissection in select patients and at high-volume tertiary centres has

been shown to be safe and effective in reducing local recurrence rates. We have introduced this surgical technique into our practice in a systematic fashion to ensure the highest patient safety and surgical quality, and we continue to build on our learning curve.

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“Dear diary”: challenges in adopting routine operative recording in surgical training. *Ameer Farooq, Amandeep Ghuman, Sunil Patel, Hugh Macdonald, Abmer Karimuddin, Manoj Raval, P. Terry Phang, Carl Brown.* From Queen’s University (Farooq, Patel, Macdonald), and St. Paul’s Hospital (Ghuman, Karimuddin, Raval, Phang, Brown).

Background: Gaining proficiency in surgery requires deliberate practice. Reviewing operative video has been demonstrated to improve proficiency for both trainees and attending surgeons. In this study, we attempted to record every operative case for a colorectal surgery fellow during his fellowship. Our objectives were to identify the percentage of cases that were recorded and barriers to routine video recording. **Methods:** A single colorectal surgery fellow attempted to record every operative case during colorectal surgery fellowship. Minimally invasive (MIS) cases were recorded using the Stryker SDC3 recorder. Open cases were recorded using the Ordoro EP7 4K camcorder. Cases were downloaded at the end of every week and uploaded to our institution’s cloud storage. Descriptive statistics were obtained for the total number of cases recorded, types of cases recorded and frequency of video review. Barriers for video recording and video review were identified. **Results:** Of the 609 operative cases performed by the colorectal fellow, 60 cases were recorded, of which 44 were uploaded to the cloud. The majority of recordings were MIS (32), with 8 perianal/perineal cases and 4 open cases. Open cases were most difficult to record owing to storage and battery life limitations. Cases were individually reviewed on a weekly basis by the fellow and formally reviewed with faculty during quarterly reviews. Barriers to review included time required for download/upload, storage space, battery life for the camcorder as well as initial institutional policies. **Conclusion:** Despite efforts to record every case, only a small percentage of cases were ultimately available for review. Open cases were particularly difficult to capture. Limitations include the single-institution and retrospective nature of the study. Future studies should focus on quality of video recording, integration of seamless recording and structured methods of incorporating video review into training.

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Rectal cancer in the very young (age < 40) — more treatment, worse survival: a population-based study. *Vanessa Wiseman, Kelly Brennan, Sunil Patel, Ameer Farooq, Shaila Merchant, Weidong Kong, Chad McClintock, Chris Booth, Tim Hann.* From Queen’s University.

Background: The very young (age < 40) are a group of particular interest, as they may have more aggressive rectal cancer. This group has typically been understudied owing to very low incidence. Our objective was to describe treatment and outcomes in the very young with rectal cancer from a population-based study from Ontario. **Methods:** The Ontario Rectal Cancer Cohort includes those with an incident case of rectal cancer diagnosed

between 2010 and 2019 in Ontario, Canada. This comprehensive database includes patient and care provider factors, treatment details and clinically relevant outcomes. **Results:** Between 2010 and 2019, a total of 575 individuals aged 18–39 years were diagnosed with rectal cancer, representing 3% of the total number of diagnoses ($n = 18\,631$). Within this group, 368 (64%) underwent curative-intent treatment, including local excision only ($n = 88$, 24%), resection for early stage disease ($n = 56$, 15.2%), resection for locally advanced disease ($n = 203$, 55.1%) and resection for missing stage ($n = 21$, 5.7%). In those with locally advanced disease, 68% received preoperative radiation and 81% received postoperative chemotherapy. Five-year overall survival was 92% in those with early stage disease (v. 96% in those aged 40–49 yr, 93% in those aged 50–59 yr, 91% in those aged 60–69 yr, $p < 0.001$) and 81% in those with locally advanced disease (v. 85% in those aged 40–49 yr, 85% in those aged 50–59 yr, 79% in those aged 60–69 yr, $p < 0.001$). **Conclusion:** The very young represent a small minority of those diagnosed with rectal cancer. The majority of those diagnosed had locally advanced disease with higher rates of radiation and chemotherapy than the rest of the cohort. Despite more aggressive treatment, survival in those with early stage disease and locally advanced disease was worse than in those aged 40–49 years or 50–59 years.

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Surveillance following treatment for stage I–III rectal cancer in Ontario — a population-based descriptive study. *Alessandro Ricci, Sunil Patel, Kelly Brennan, Vanessa Wiseman, Chad McClintock, Weidong Kong, Ameer Farooq.* From the Kingston Health Sciences Centre (Ricci, Patel, Brennan, Farooq), and Queen's University (Wiseman, McClintock, Kong).

Background: Surveillance following rectal cancer treatment aims to identify patients who would benefit from further intervention for recurrent or metastatic disease. Ontario guidelines recommend chest, abdominal and pelvic imaging and colonoscopy. Adherence to these recommendations and predictors of adherence are unknown; thus, the objective of this work was to describe rectal cancer surveillance in Ontario. **Methods:** This is a population-based study of all individuals who underwent curative-intent treatment for stage I–III rectal cancer in Ontario (2010–2019), as identified using the Ontario Cancer Registry. Linked administrative databases were used to determine patient characteristics, treatment details and outcomes. Complete surveillance was defined as receiving both chest (computed tomography [CT] or radiography) and abdominal/pelvic imaging (CT, magnetic resonance imaging, ultrasonography) and colonoscopy within 18 months of surgery. **Results:** In total, 12 399 patients were included in the study; 18% received local excision and 82% underwent resection (early stage 21%, locally advanced 54%, missing stage 7%). Mean age was 65 ± 12.9 years and 62% of patients were male. Approximately half of early stage (46.1%) and locally advanced (55.9%) rectal cancer patients achieved complete surveillance at 18 months. This did not significantly change from 2010 to 2019. Chest (87%), abdominal (86%) and pelvic (83%) imaging was completed commonly, while colonoscopy was not (53%). Older age ($p < 0.001$) and comorbidity burden ($p < 0.001$) were associated with incomplete surveillance. Higher surgeon volume, but not cancer centre designation, was associated with complete surveillance ($p < 0.001$). **Conclusion:**

Although surveillance following curative-intent treatment is widely recommended, only half of those in Ontario with curative intent treatment had completed surveillance by 18 months after surgery. Access to colonoscopies and improved surveillance for older, sicker patients are 2 specific areas of concern.

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A 15-year institutional experience of trananal endoscopic microsurgery for local excision of benign and malignant rectal neoplasia. *Roban Kakkar, Olivia Hershorn, Manoj Raval, P. Terry Phang, Abmer Karimuddin, Amandeep Ghuman, Carl Brown.* From the University of British Columbia (Kakkar, Hershorn, Raval, Phang, Karimuddin, Ghuman, Brown), and St. Paul's Hospital (Hershorn, Raval, Phang, Karimuddin, Ghuman, Brown).

Background: As a high-volume academic institution, transanal endoscopic microsurgery (TEM) has been performed at our referral centre since 2007. This project presents the largest single-institute study of outcomes for patients who underwent TEM for benign and malignant rectal neoplasia. **Methods:** TEM cases performed between November 2007 and January 2022 were identified from a prospective database. Cases were subgrouped into malignant and benign based on final pathology. Patient demographic, pathologic and intraoperative characteristics were summarized and compared between groups. Postoperative complications were also detailed. Disease-free survival was assessed using Kaplan–Meier analysis for patients with T1, T2 and T3 rectal adenocarcinomas who did not receive immediate salvage radical surgery. **Results:** Between 2007 and 2022, 932 TEM procedures were performed on 862 patients at St. Paul's Hospital: 391 malignant and 541 benign cases. Mean age was 67 (standard deviation [SD] 12) years and 61% ($n = 565/932$) of patients were male. Mean duration of surgery was 51 (SD 31) minutes. The defect was closed in 63% ($n = 584$) of patients, and conversion rate to open was 2% ($n = 15$). The majority of patients underwent the procedure as a day surgery ($n = 692$, 74%). Postoperative complications were recorded in 20% ($n = 188$) of all cases. The most frequent complications were bleeding ($n = 60$ [6%]), urinary retention ($n = 42$ [5%]) and pelvic pain ($n = 47$ [5%]). Mean duration of follow-up was 29 (SD ± 20) months for all malignant lesions. Cumulative disease-free survival at 1 year was 92%, 94%, and 86% for T1, T2, and T3 adenocarcinomas, respectively. **Conclusion:** This project highlights the largest single-centre experience with TEM, demonstrating its utility, low morbidity and safety for both benign and select malignant neoplasia.

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Robotic approach to reoperative pelvic surgery. *Vanessa Wiseman, Ameer Farooq, Sunil Patel.* From Queen's University.

Background: Reoperative pelvic surgery is very challenging owing to limiting working space and close proximity of structures including ureters, vagina/prostate, pelvic sidewalls, nerves and fibrotic tissue. This is often performed because of a challenging process such as anastomotic leak or recurrent cancer. The video shows a reoperative robotic abdominoperineal resection in a patient with a previous low anterior resection who underwent long course chemoradiation and had recurrence at her anastomosis

(<https://youtu.be/g3wHk3CT9KU>). **Methods:** Our approach to reoperative pelvic surgery includes several important considerations. First, it is crucial to review imaging and previous operative reports including confirmation of the previous anastomosis. Already knowing this will likely be difficult, use the surgical assistant often to aid in retraction and suctioning. **Results:** We recommend using a standard robotic confirmation with an assist port including a 12-mm assist trocar and the remainder being 8-mm ports. With adequate exposure, establish a safe access and begin at more unviolated planes, using blunt and sharp dissection. It is often quite helpful to use a posterior approach to expose the pelvic floor, which can make the remainder of the lateral and anterior dissection easier. Last, we recommend to not disconnect the previous anastomosis until the dissection is complete. After the robotic portion of the dissection is complete, the patient is prone to complete the perineal dissection. The dissection planes are joined posteriorly first and then laterally followed by the anterior dissection, which is not challenging. **Conclusion:** Our general principles for reoperative pelvic surgery include reviewing of imaging and previous operative reports, establishing a safe access with use of unviolated planes with sharp and blunt dissection, using the posterior approach to expose the pelvic floor and not disconnecting the previous anastomosis until dissection is complete. These principles will help with successful completion of the robotic approach in reoperative pelvic surgery.

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A mucosa-adherent bacterium impairs colorectal anastomotic healing by upregulating interleukin-17: the role of low-grade inflammation as a driver of anastomotic leak. Roy Hajjar, Emmanuel Gonzalez, Gabriela Fragoso, Manon Oliero, Ahmed Amine Alaoui, Hervé Vennin Rendos, Souad Djedjai, Thibault Cuisiniere, Patrick Laplante, Claire Gerkins, Ayodeji Samuel Ajayi, Khoudia Diop, Nassima Taleb, Sophie Thérien, Frédérique Schampaert, Hefzi Alratrout, François Dagbert, Rasmay Loungnarath, Herawaty Sebahang, Frank Schwenter, Ramses Wassef, Richard Ratelle, Éric Debroux, Jean-François Caillier, Bertrand Routy, Borhane Annabi, Nicholas J.B. Brereton, Carole Richard, Manuela M. Santos. From the Centre de recherche du Centre hospitalier de l'Université de Montréal (Hajjar, Fragoso, Oliero, Alaoui, Vennin Rendos, Cuisiniere, Laplante, Gerkins, Ajayi, Diop, Routy, Santos), the Centre hospitalier de l'Université de Montréal (Hajjar, Alaoui, Taleb, Thérien, Schampaert, Alratrout, Dagbert, Loungnarath, Sebahang, Schwenter, Wassef, Ratelle, Debroux, Richard), Université de Montréal (Hajjar, Alaoui, Caillier, Brereton, Santos), McGill University (Gonzalez), and Université du Québec à Montréal (Djedjai, Annabi).

Background: Anastomotic leak (AL) is a major complication in colorectal surgery. We have previously shown that preoperative gut microbiota are causally linked to AL and identified a beneficial probiotic, *Parabacteroides goldsteirii*, which improves anastomotic healing by promoting the restoration of the gut barrier. Bacterial species impairing anastomotic healing, and their mechanisms of action, are still poorly understood. The objective of this project was to assess if — and how — gut microbiota promote AL. **Methods:** Fecal samples and mucosal biopsies were collected before and during surgery from patients with colorectal cancer. Fecal microbiota transplantation (FMT) was performed using human samples in

mice subjected to colonic surgery. Fecal and mucosal microbiota composition was assessed. Bacterial species of interest were isolated and reassessed in mice and in vitro. **Results:** Mice transplanted with the preoperative microbiota of AL patients presented a weaker gut barrier and a higher rate of AL. A strain of *Alistipes onderdonkii* was found to be more abundant in the colonic mucosa of mice and patients that later developed AL. This strain was detectable even after the administration of prophylactic antibiotics and mechanical bowel preparation. When administered to mice, *A. onderdonkii* kh33 led to poor anastomotic healing, higher bacterial translocation and a reduced collagenization of the anastomosis. Mechanistically, this strain increased the levels of interleukin-17 (IL-17) in the gut before surgery in mice and led to an excessive and deleterious inflammatory response after surgery. When measured in a cohort of 77 patients, the levels of IL-17 and other inflammatory markers were found to be higher in mucosal biopsies of patients who later developed AL. **Conclusion:** *A. onderdonkii* promotes low-grade inflammation in the gut and AL after colorectal surgery. Patients with microbiota-driven low-grade — subclinical — inflammation in the gut seem to be at a higher risk of developing AL after colorectal surgery.

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High uptake of total neoadjuvant therapy for rectal cancer in Canada despite surgeon concerns for possible overtreatment and treatment-related toxicity. Tamara Gimon, Helen MacRae, Anthony de Buck van Overstraeten, Mantaj Brar, Sami Chadi, Erin Kennedy. From the University of Toronto (Gimon, MacRae, de Buck van Overstraeten, Brar, Chadi, Kennedy), Mount Sinai Hospital (MacRae, de Buck van Overstraeten, Brar, Kennedy), and University Health Network (Chadi).

Background: While total neoadjuvant therapy (TNT) has been increasingly used for the management of locally advanced rectal cancer, little is known about how TNT is being implemented outside of clinical trials. The objective of this study was to survey Canadian surgeons who manage rectal cancer to explore the uptake and utilization of TNT into clinical practice. **Methods:** The survey, consisting of 18 multiple choice questions, was developed by expert consensus and created with SurveyMonkey. Distribution was via the Canadian Society of Colon and Rectal Surgeons email listserv and snowball sampling. Descriptive statistics were used to summarize the data. **Results:** The survey response rate was 42% (67/159 surgeons). All respondents reported using TNT in their practice, and 96% were fellowship trained. An institutional protocol for TNT was reported by 48%, and nonoperative management following complete clinical response was offered by 82%. Consolidation chemotherapy only was used by 27%, while both induction or consolidation chemotherapy was used by 72%. RAPIDO and STELLAR trials were reported by 58% to most strongly influence their practice, followed by OPRA (31%) and PRODIGE-23 (11%). Increased pelvic fibrosis and increased technical difficulty after TNT was reported by 64% and 40%, respectively, while 24% identified no technical concerns. The proportion of locally advanced rectal cancer patients managed with TNT among respondents was high. At least 1 concern about the use of TNT in their practice was reported by 85% of respondents, including indication creep (36%), overtreatment (61%), poorer surgical outcomes (21%)

and treatment toxicity (36%). **Conclusion:** While there has been high uptake of TNT among surgeons in Canada, the majority of survey respondents reported concerns about over-treatment and treatment-related toxicity with TNT. Given the recent locoregional failure results of RAPIDO, these concerns may be justified. Future work, including the development of national guidelines for TNT, prospective tracking of oncologic outcomes with TNT, and exploring patient preferences for TNT are necessary.

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Safety and feasibility of discharge within 24 hours of ileostomy reversal: a systematic review and meta-analysis. *Laura Baker, Jessica Hopkins, Ryan Rochon, Donald Buie, Anthony MacLean.* From the University of Calgary.

Background: Limited inpatient resources contribute to delays in ileostomy reversal (IR). Delays are associated with increased morbidity and health care resource utilization. Ambulatory IR has been reported on, yet widespread adoption has yet to occur. The aim of this study was to determine the safety, feasibility, resource utilization and acceptance of discharge within 24 hours following IR. **Methods:** Electronic databases and clinical trial registries were queried for studies reporting on experience with early discharge (ED) following IR. The primary outcome was safety. Secondary outcomes included feasibility, resource utilization, and patient and practitioner acceptance. Meta-analysis was performed using random-effects methods. Dichotomous outcomes were calculated as odds ratios (OR) with 95% confidence intervals (CI). **Results:** In total, 24908 patients across 8 studies (5 comparative) published between 1997 and 2021 were included. Eighty-eight percent of patients selected for ED following IR were successfully discharged within 24 hours of surgery. Early discharge was associated with a reduction in post-operative adverse events (7.8% v. 13.1%, OR 0.47, 95% CI 0.36 to 0.63, $n = 5$) and cumulative length of stay (mean difference -4.4 days, 95% CI -2.6 to -6.2, $n = 2$). There was no significant difference in major adverse events, mortality, anastomotic leak, ileus, emergency department visits, admission or reoperation between the 2 groups. Two studies reported on patient perspective: in the first study, 87% of patients reportedly had no anxiety regarding being discharged within 23 hours, and in the other study 1 of 6 patients felt they were being discharged too early. One study reported a 30% reduction in cost in the ED group. **Conclusion:** Discharge within 24 hours of IR was found to be safe and feasible in healthy patients with adequate social support. Initial experience supports patient acceptance and cost-effectiveness of ED programs. Further investigation is warranted to establish health care provider acceptance and barriers to implementation.

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Safety and efficacy of intravenous antifibrinolytic use in colorectal surgery: systematic review and meta-analysis. *Lily J. Park, Victoria Archer, Tyler McKechnie, Yung Lee, Daniel McIsaac, Pavel Roshanov, Cagla Eskicioglu, Husein Moloo, P.J. Devereaux.* From McMaster University (Park, Archer, McKechnie, Lee, Eskicioglu, Devereaux), Population Health Research Institute (Park, Devereaux), University of Ottawa (McIsaac, Moloo), and Western University (Roshanov).

Background: Emerging evidence suggests safety and efficacy of antifibrinolytics in the perioperative setting. However, its use in specific subspecialty contexts, including colorectal surgery, is unclear. The objective of this study was to investigate the safety and efficacy of perioperative antifibrinolytic use in colorectal surgery patients. **Methods:** MEDLINE, Embase and Cochrane Library databases were searched from inception to October 2022. All comparative studies involving colorectal surgery patients and perioperative use of intravenous antifibrinolytic agents were included. Outcomes of interest included blood loss, allogenic red blood cell transfusion, anastomotic leaks, venous thromboembolism, and other safety parameters. Meta-analyses were performed using random-effects models. The Mantel-Haenszel method was used to report odds ratio (OR) values for dichotomous variables, and inverse variance weighting was used to calculate difference in means (MD) for continuous variables. Grading of Recommendations, Assessment, Development, and Evaluations assessments were conducted. **Results:** Five randomized controlled trials (RCTs), a pilot RCT, and 2 retrospective studies involving 550 colorectal surgery patients and 12632 noncardiac surgery patients were identified for inclusion. Very-low-certainty evidence demonstrated no differences in perioperative transfusion (OR 0.78, 95% CI 0.20 to 2.98, $p = 0.72$, $I^2 = 42%$, $n = 2$ studies, 257 patients) nor blood loss (MD -380.01 mL, 95% CI -1111.88 to 351.87, $p = 0.31$, $I^2 = 92%$, $n = 2$ studies, 104 patients), although there were general trends favouring antifibrinolytic use. Low-certainty evidence suggests antifibrinolytic use does not impact risk of anastomotic leaks (OR 0.73, 95% CI 0.34 to 1.59, $p = 0.43$, $I^2 = 28%$, $n = 3$ studies, 528 patients). The 12632 noncardiac surgery patients were excluded from meta-analyses because data pertaining to colorectal surgery patients were not available. Safety outcomes could not be pooled, but there were no differences that were independently reported by the included studies. **Conclusion:** Current very-low- to low-certainty evidence suggests no differences in perioperative transfusion, blood loss and anastomotic leaks with prophylactic antifibrinolytic use. The trends favouring antifibrinolytics support future large-scaled trials dedicated to colorectal surgery populations.

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Impact of ileal pouch anal anastomosis on fertility in female patients with ulcerative colitis: a systemic review. *Rebab Alsayari, Tyler McKechnie, Simarpreet Icbhpuniani, Yung Lee, Cagla Eskicioglu.* From McMaster University.

Background: Ulcerative colitis remains a common disorder that affects females during their reproductive years. Younger individuals with strong baseline continence who understand and accept the concomitant changes in bowel function following the procedure are typically advised to undergo ileal-pouch anal anastomosis (IPAA). For certain patient populations, IPAA can significantly improve quality of life (QoL). This systemic review was conducted to ascertain the likelihood of infertility and the success of pregnancy in these patients, particularly after there has been an increase in the use of minimally invasive methods for these operations, which may be linked to a decreased risk of infertility and a shorter time to childbirth. The aim of this review was to study the impact of IPAA on fertility in females with ulcerative colitis. **Methods:** MEDLINE, Embase and

CENTRAL were systematically searched for studies investigating females with ulcerative colitis undergoing IPAA. The primary outcome was infertility. The secondary outcome was pregnancy. Meta-analyses were performed with inverse variance random effects. **Results:** From 124 citations, 9 studies were included. According to this study's results, which are in line with prior reviews, females' infertility risk is 29% (95% confidence interval [CI] 19%–40%, $I^2 = 82.2\%$), while chances of becoming pregnant following IPAA are 32% (95% CI 22%–42%, $I^2 = 83\%$). These numbers are lower than previously reported, although studies have high levels of heterogeneity. **Conclusion:** Infertility continues to be an issue for females with ulcerative colitis who undergo IPAA. It is necessary to conduct larger, prospective comparative studies to assess the true effect of the procedure and the role of minimally invasive methods in reducing the effect.

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Modulation of the gut microbiota with fermentable fibres and 5-aminosalicylate to prevent peri-anastomotic and metastatic recurrence of colorectal cancer. *Roy Hajjar, Manon Oliero, Gabriela Fragoso, Ayodeji Samuel Ajayi, Ahmed Amine Alaoui, Hervé Vennin Rendos, Annie Calvé, Thibault Cuisinière, Claire Gerkins, Sophie Thérien, Nassima Taleb, François Dagbert, Herawaty Sebahang, Rasmy Loungnarath, Frank Schwenter, Richard Ratelle, Ramses Wassef, Eric Debroux, Carole Richard, Manuela M. Santos.* From the Centre de recherche du Centre hospitalier de l'Université de Montréal (Hajjar, Oliero, Fragoso, Ajayi, Alaoui, Vennin Rendos, Calvé, Cuisinière, Gerkins, Santos), Centre hospitalier de l'Université de Montréal (Hajjar, Alaoui, Thérien, Taleb, Dagbert, Sebahang, Loungnarath, Schwenter, Ratelle, Wassef, Debroux, Richard), and Université de Montréal (Hajjar, Alaoui, Santos).

Background: Colorectal cancer (CRC) recurrence is a leading cause of mortality worldwide. Poor healing and anastomotic leakage (AL) after surgery may allow residual cancer cells to escape the gut, thereby increasing the risk of local cancer recurrence and metastatic spread. In previous work, we showed that inulin, a prebiotic fibre, improves anastomotic healing by increasing the concentration of the beneficial bacterial metabolite butyrate. This metabolite is also an activator of the anticarcinogenic peroxisome proliferator-activated receptor- γ (PPAR- γ). Here, we further investigated the relationship between the promotion of postoperative intestinal healing using inulin and 5-aminosalicylate (5-ASA), a PPAR- γ activator, and anastomotic cancer recurrence and metastatic dissemination. **Methods:** A retrospective review of AL and non-AL cases after CRC surgery was performed. The effect of dietary supplementation with inulin and 5-ASA on the occurrence of local anastomotic tumours was assessed in a mouse model inoculated with tumour cells directly in the gut lumen during surgery. We also investigated in mice whether inulin and 5-ASA may prevent CRC liver metastasis. **Results:** Over a period of 10 years, patients experiencing AL displayed significantly lower overall survival and more cancer recurrence and progression compared with non-AL patients. Poor anastomotic healing in mice led to larger anastomotic tumours and peritoneal cancer dissemination. Oral supplementation with inulin and 5-ASA significantly inhibited local tumour implantation, peritoneal car-

cinomatosis and liver metastasis in mice. This supplementation improved the gut barrier and prevented the microscopic escape of cancer cells, and increased the production of butyrate, which was shown to directly inhibit the proliferation of cancer cells in vitro. **Conclusion:** AL was associated with worse oncological outcomes in patients and mice. Inulin and 5-ASA were shown to reinforce the gut barrier, decrease the implantation of cancer cells at the anastomosis and prevent tumour dissemination and progression of liver metastasis.

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Patients with locally advanced rectal cancer and a non-threatened circumferential resection margin may go straight to surgery and avoid radiation toxicities: the QuickSilver Trial. *Erin Kennedy, Marko Simunovic, Selina Schmocker, Carl Brown, Anthony MacLean, Sender Liberman, Sébastien Drolet, Katerina Neumann, Peter Stotland, Kartik Jhaveri, Richard Kirsch.* From Mount Sinai Hospital (Kennedy, Schmocker, Jhaveri, Kirsch), University of Toronto (Kennedy), Juravinski Hospital Cancer Centre (Simunovic), McMaster University (Simunovic), St. Paul's Hospital (Brown), Providence Health Care (Brown), Foothills Medical Centre (MacLean), University of Calgary (MacLean), McGill University Health Centre (Liberman), Centre Hospitalier Universitaire de Québec (Drolet), QEII Health Sciences Centre (Neumann), North York General Hospital (Stotland), and University Health Network (Jhaveri).

Background: Stakeholders increasingly encourage total neoadjuvant therapies (TNT) for patients with locally advanced rectal cancer. This approach exposes patients to significant toxicities of radiation with no consistent evidence for local tumour recurrence or overall survival benefit. The QuickSilver Trial tested if rectal cancer patients with a nonthreatened circumferential resection margin (CRM) can go straight to surgery and avoid radiation toxicities, while still achieving excellent outcomes. **Methods:** This pan-Canadian prospective, nonrandomized phase II study included 12 high-volume colorectal surgery centres. Patients enrolled in the trial had magnetic resonance imaging (MRI)-predicted good prognosis rectal cancer and proceeded directly to primary surgery. Criteria for good prognosis tumours included 1) distance to the mesorectal fascia $> 1\text{mm}$; 2) definite T2, T2/early T3, or definite T3; and 3) absent or equivocal extramural venous invasion. The main outcome was the proportion of participants who had a positive CRM. Secondary outcomes included the 2-year rate of local recurrence (LR) and overall survival. Individual surgeons made recommendations on adjuvant treatments. **Results:** We accrued 139 patients (69% male), including 80 patients (57%) with stage II (28%) or III (29%) disease. Median follow-up was 26 (range 1–86) months. For all cases, 4 patients had a positive CRM (3%), 1 patient developed a local recurrence (1%), and 4 patients died (1 due to metastatic cancer, 3 unrelated to cancer). For stage II or III patients, only 6 received adjuvant chemoradiation (8%), 33 received adjuvant chemotherapy alone (41%), and 41 avoided any adjuvant therapies (51%). **Conclusion:** These results suggest that patients with MRI-predicted good prognosis rectal cancer can go straight to surgery with minimal risk of a positive CRM or local tumour recurrence, and nearly always avoid the risk of radiation toxicities. Further research should evaluate the generalizability of these results.

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Colonoscopies during the COVID-19 pandemic recovery period: Are we caught up on colorectal cancer detection and prevention? A single-institution experience. *Hafssab Alnajem, Huseen Alibrabim, Christian Giundi, Alex Chen, Georgia Rigas, Haroon Munir, Ali Safar, Sarah Sabboobeh, Jessica Holland, Marylise Boutros.* From the Sir Mortimer B. Davis Jewish General Hospital.

Background: Purpose The COVID-19 pandemic caused an endoscopy shutdown in many hospitals, followed by a ramp-up period. Our recent publication on the impact of the shutdown and ramp-up periods (March–June 2020, and July–August 2020, respectively) showed a decrease in colonoscopies performed, cancers detected and adenomas removed. This follow-up study aims to assess the efficacy of the recovery period (September–December 2020) on colorectal cancer (CRC) detection and screening. **Methods:** We queried the endoscopy database at a Canadian tertiary care centre to include all colonoscopies performed during the pandemic recovery period. We compared the recovery period (September–December 2020) to its equivalent in 2019 (pre-pandemic) to assess how close to prepandemic norms we were in terms of indications, CRC and adenoma detection rates, as well as the prioritization of urgent procedures. We also compared the entire pandemic year (March–December 2020) to the prepandemic year (March–December 2019). **Results:** In the recovery period, 1968 colonoscopies were performed, compared with 2481 in 2019, a 20.7% reduction. Urgent and inpatient colonoscopies increased (238 [12.2%] v. 122 [5.1%], $p = 0.04$) while surveillance and high-risk screening colonoscopies remained significantly lower (750 [38.6%] v. 1249 [52.7%], $p < 0.01$). However, during the recovery period, cancer (47 [2.4%] v. 71 [2.9%], $p > 0.05$) and adenoma (633 [26.4%] v. 533 [27.4%], $p > 0.05$) detection rates were preserved, resulting in lack of adenoma removal in 138 patients. Overall, 3273 colonoscopies were performed in the pandemic year compared with 6324 prepandemic, a 51.7% reduction. Urgent and in-patient colonoscopies increased, while surveillance and high-risk screening colonoscopies remained significantly lower (1126 [34.4%] v. 3118 [49.3%], $p = 0.03$). This represents undetected adenomas and cancers in 860 and 52 patients, respectively. **Conclusion:** Reduced access to colonoscopy during the pandemic resulted in a significant reduction in screening and surveillance of high-risk patients and CRCs diagnosed. Despite all efforts to ramp up and recover, detection and prevention has not caught up to prepandemic levels.

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Interim results of a phase II study evaluating the safety of nonoperative management for locally advanced low rectal cancer. *Erin Kennedy, Carole Richard, Marko Simunovic, Selina Schmocker, Carl Brown, Anthony MacLean, Sender Liberman, Sébastien Drolet, Katerina Neumann, Peter Stotland, Kartik Jhaveri, Richard Kirsch.* From Mount Sinai Hospital (Kennedy, Schmocker, Jhaveri, Kirsch), University of Toronto (Kennedy), Centre Hospitalier de l'Université de Montréal (Richard), Juravinski Hospital Cancer Centre (Simunovic), McMaster University (Simunovic), St. Paul's Hospital (Brown), Providence Health Care (Brown), Foothills Medical Centre (MacLean), University of Calgary (MacLean), McGill University Health Centre (Liberman), Centre Hospitalier Universitaire de Québec (Drolet), QEII Health

Sciences Centre (Neumann), North York General Hospital (Stotland), and University Health Network (Jhaveri).

Background: Recently, there has been increasing use of nonoperative management (NOM) for locally advanced, low rectal cancer (LALRC) when a clinical complete response is achieved following chemoradiotherapy (CRT). This study reports the interim results of a phase II study to assess the safety of NOM in Canada. **Methods:** This study is a nonrandomized, prospective study that includes 12 high-volume centres in Canada. Patients with LALRC are eligible to participate if they achieve a clinical complete response based on digital rectal examination (DRE), endoscopy and magnetic resonance imaging (MRI) within 8–14 weeks following the completion of CRT. Eligible patients are placed in a NOM program that includes surveillance with DRE, MRI, endoscopy, computed tomography scans and carcinoembryonic antigen at 3–6 month intervals for 24 months. The primary outcome is the rate of local regrowth 2 years following CRT. A sample size of 90 patients is planned to provide a 95% confidence interval with precision of $\pm 9.5\%$ around the base estimate of 30% for local regrowth. The NOM approach will be considered safe (i.e., as effective as surgery to achieve local control) if the rate of local regrowth is $< 30\%$. **Results:** Over a 3-year period, 57 patients from 7 centres (75% male, mean age 68 yr) have enrolled in the study, with a median follow-up of 12 (range 1–24) months. Seven (12%) patients developed a local regrowth, and this occurred within 3–9 months following CRT. Eighty-six percent (6/7) of patients underwent salvage surgery (4 abdominoperineal resection, 2 low anterior resection, 1 declined surgery). **Conclusion:** These results suggest that NOM is likely safe in the context of a study. While the local regrowth rate was low, relatively few patients met the study criteria for NOM during the study period and, therefore, this represents a highly select group of patients.

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Assessing a tailored curriculum for endoscopic simulation for general surgery residency programs in Canada. *Gladys Bruyninx, Dilip Gill.* From the University of Saskatchewan.

Background: Gastrointestinal (GI) endoscopy is the standard method for the detection and treatment of GI cancers as well as other diseases. However, typical endoscopic practices are technically challenging and necessitate advanced visuospatial skills and considerable hands-on practice. Simulators (e.g., plastic phantoms, computer simulators and biosimulation models) have been put into use for endoscopic training. As such, there is a need to develop a tailored curriculum to be used in conjunction with these simulators. The goal of this project is to develop and implement a curriculum tailored for the needs of and resources available to general surgery residency programs across Canada. The efficiency of this curriculum will then be assessed to show whether this training improves endoscopic skills in novice surgical residents. **Methods:** An endoscopic curriculum, which focuses on upper endoscopy and colonoscopy, has been developed. Junior residents in general surgery will be recruited to participate in the study, where they will perform a pre-test and a post-test before and after the training sessions, which will include a written and practical section (measured using the Global Assessment of Gastrointestinal Endoscopic Skills). The tool scores skills including patient management and comfort; ability to navigate the scope; proficiency in

using irrigation, suction and insufflation to maximize endoscopic field; advancement/withdrawal of the scope; the decision making behind performing a biopsy; efficiency; and a complete and appropriate mucosal evaluation. The assessment will also include a subjective section to gauge residents' perceptions on their comfort performing the evaluated endoscopic skills. **Results:** Pending. **Conclusion:** The introduction of an endoscopy training curriculum using a simulator will be a risk-free alternative for working on skills in medical procedures at the trainee's speed. Assessing the efficiency of this training curriculum will allow for the implementation of a tailored training for Canadian training programs and for all future trainees.

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Modified Frailty Index for patients undergoing surgery for colorectal cancer: analysis of the National Inpatient Sample (2015–2019). *Rehab Alsayari, Tyler McKechnie, Yung Lee, Dennis Hong, Cagla Eskicioglu.* From McMaster University.

Background: Frailty has become increasingly recognized as a perioperative risk factor for numerous surgical diseases. Tools such as the modified Frailty Index (mFI-11) have been developed to capture these factors and provide important prognostic information preoperatively. Given the age distribution of colorectal cancer incidence, this patient population is at high risk of preoperative frailty. This study aimed to apply the mFI-11 to the National Inpatient Sample (NIS) for patients undergoing surgery for colorectal cancer. **Methods:** A retrospective analysis of the NIS from 2015 to 2019 was conducted, including patients who had elective or emergent surgery for colorectal cancer (identified using *International Classification of Diseases, 10th edition* — Clinical Modification codes). Individuals were classified into frail and robust categories using the mFI, which is a composite of 11 variables based on an mFI cut-off of 0.27. The primary outcome was postoperative in-hospital morbidity. Secondary outcomes included postoperative in-hospital mortality, system-specific postoperative complications, total admission health care cost, and length of stay (LOS). Univariable and multivariable regressions were used to compare the 2 operative approaches. **Results:** Of the 58 326 patients with colon cancer who had elective or emergency surgery, 11 178 (19.1%) were determined to be frail (i.e., mFI > 0.27). Frail patients were at higher risk of postoperative mortality during hospitalization (3.1% v. 1.0%, odds ratio [OR] 1.96, 95% confidence interval [CI] 1.68–2.30, $p < 0.001$), postoperative overall morbidity (OR 1.75, 95% CI 1.66–1.83, $p < 0.001$), prolonged postoperative LOS (OR 1.78, 95% CI 1.69–1.88, $p < 0.001$), and discharge to a skilled nursing facility (OR 1.93, 95% CI 1.82–2.05, $p < 0.001$). After adjusting for factors such as age, gender, procedure type, hospital status and insurance, frailty remained a significant predictor of hospitalization-related morbidity and poor outcome at discharge. **Conclusion:** Frail patients undergoing surgery for colorectal cancer are at increased postoperative complications. Screening patients for frailty before colon cancer surgery can potentially improve outcomes and allow for detailed and individualized preoperative counselling.

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Reducing postoperative bloodwork in elective colorectal surgery: a quality-improvement initiative. *Lisa Zhang, Sean Abtahi, Allison Chhor, Gordon Best, Isabelle Raïche, Reilly*

Musselman, Lara Williams, Husein Moloo. From the University of Ottawa.

Background: Daily postoperative bloodwork is routinely ordered after elective colorectal surgery despite a lack of evidence to support this practice. Previous retrospective studies show that only 4% of laboratory values are abnormal in postoperative colorectal patients, and only 1% result in any kind of intervention. There are high economic and environmental costs to unnecessary bloodwork. The goal of this quality-improvement (QI) initiative was to reduce the amount of postoperative bloodwork after elective colorectal surgery and to examine the financial and planetary health impacts. **Methods:** Patients undergoing elective colorectal surgery with planned postoperative admission between February and June 2023 will receive bloodwork (complete blood count, electrolytes, creatinine, urea) on postoperative days 1 and 3 only, unless otherwise clinically indicated. The primary outcome will be the number of days of bloodwork and number of total laboratory tests taken. Secondary outcomes include 30-day emergency department visit and readmission, rate of blood transfusion and anastomotic leak, financial cost and carbon footprint cost. All outcomes will be compared with a control group that underwent elective colorectal surgery before February 2023, when daily laboratory testing was routinely performed. **Results:** In the pre-intervention period, patients received an average of 6.6 days of postoperative bloodwork. Nearly all patients (97%) received bloodwork on a daily basis until discharge or until they were designated alternate level of care. The estimated cost of bloodwork per person is approximately \$25.79 per day. Twenty-three patients have been recruited to the study to date, and enrollment and data collection is ongoing. **Conclusion:** A significant volume of postoperative bloodwork after elective colorectal surgery is unnecessary. This QI project examines the patient, economic, and environmental impacts of reducing postoperative bloodwork.

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A Nationwide Readmission Database (NRD) analysis assessing timing of readmission for complications following emergency colectomy: why limiting follow-up to postoperative day 30 underserves patients. *Natasha Grace Caminsky, Jenny (Jeongyoon) Moon, Daniel Marinescu, Allison Pang, Carol-Ann Vasilevsky, Marylise Boutros.* From the Sir Mortimer B. Davis Jewish General Hospital.

Background: Emergency procedures are associated with an increased risk of complications than when performed electively. A critical assessment of complications occurring beyond postoperative day (POD) 30 is lacking. We aimed to describe emergency readmissions for surgical complications and associated factors in the 6 months following emergency colectomy. **Methods:** A retrospective cohort study using the Nationwide Readmissions Database of adult patients who underwent emergency colectomies (2010–2018) was performed. Cases from January to June were retained, allowing 6 months follow-up. The cohort was divided into no readmission and emergency readmission(s) for colectomy-related complications (*International Classification of Diseases 9/10* codes). Readmissions were categorized as either “early” (POD 0–30) or “late” (> POD 30). Differences between patients admitted for early versus late complications after colectomy were described, and multivariable regression controlling for relevant

covariates defined a priori was used to identify factors associated with timing of readmission and cost. **Results:** Of 141 481 eligible cases, 13.2% ($n = 18\ 699$) were emergency readmissions for colectomy-related complications and 61.6% ($n = 11\ 524$) of these were “late” (\geq POD 30), with a median time to readmission of 16.7 (interquartile range [IQR] 11–22) days. Compared with early readmissions, late readmissions were more likely to occur following sigmoidectomy (33.1% v. 30.0%), a longer hospitalization for index surgery (11 [IQR 7–18] v. 8 [IQR 6–12] days, $p < 0.0001$), and in patients with extreme loss of function from their comorbidities (28.9% v. 17.8%). The most common reasons for late readmission were infection, stoma-related and renal complications (36.1%, 15.0%, and 14.9%, respectively). On multiple logistic regression, open procedures (odds ratio [OR] 1.12, 95% confidence interval [CI] 1.01–1.24) and sigmoidectomies (OR 1.51, 95% CI 1.39–1.65) were the strongest predictors of late readmission. On multiple linear regression, late readmissions were associated with a \$USD 1717.09 (95% CI \$1717.05–1717.12) increased cost of readmission compared with early readmissions. **Conclusion:** Most colectomy-related readmissions following emergency colectomy occur beyond POD 30. Given the associated increased cost of care, mitigation of such readmissions by close follow-up beyond POD 30 is advisable.

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The same but different: clinical and Enhanced Recovery After Surgery outcomes in right hemicolectomy for colon cancer versus ileocecal resection in Crohn disease. *Mohammed Al-Abri, Elliott Gee, Abmer Karimuddin, P. Terry Phang, Carl Brown, Manoj Raval, Amandeep Ghuman.* From the University of British Columbia (Al-Abri, Gee, Karimuddin,

Phang, Brown, Raval, Ghuman), and St. Paul’s Hospital (Gee, Karimuddin, Phang, Brown, Raval, Ghuman).

Background: Enhanced Recovery After Surgery (ERAS) protocols have been well established for colorectal surgery. However, few studies have focused on postoperative outcomes in inflammatory bowel disease (IBD) distinct from cancer diagnoses. The objective of this study was to assess possible differences in clinical and ERAS outcomes in right hemicolectomies for colon cancer (CC) versus ileocecal resection in Crohn disease (CD). **Methods:** A large retrospective study was conducted using the National Surgical Quality Improvement Program (NSQIP) database from January 2016 to December 2020. Demographic data, total length of hospital stay (LOS) and rates of complications were compared between the 2 groups. **Results:** A total of 29 453 patients were included; 17 980 (61.0%) patients underwent right hemicolectomy for CC and 11 473 (39.0%) patients underwent ileocecal resection for CD. The mean age of CD patients was younger than that of CC patients (42.2 v. 69.4 yr). There was a similar proportion of males in both groups (46.0% v. 45.8%). Total LOS was 5.96 days in CD v. 5.31 days in CC ($p < 0.001$). Readmission rate within 30 days was 10.6% in CD v. 8.5% in CC ($p < 0.001$). The rate of reoperation was 4.0% in CD v. 3.3% in CC ($p = 0.002$). There was a significant difference in the rate of superficial skin infection (3.3% CD v. 2.2% CC, $p < 0.001$). There was no significant difference in the rate of deep venous thrombosis (0.9% CD v. 1.0% CC, $p = 0.560$). **Conclusion:** Our study, the largest to date comparing these groups, reveals a significant increase in postoperative complications in CD patients compared with CC patients. Therefore, we recommend designing IBD-tailored ERAS protocols to overcome this significant increase in complications.

CANADIAN SOCIETY OF SURGICAL ONCOLOGY

01

How reliable are postmastectomy breast reconstruction videos on YouTube? *Nina Morena, Libby Ben-Zvi, Victoria Hayman, Mary Hou (University of Calgary), Diana Nguyen, Carrie A. Rentschler, Ari N. Meguerditchian.* From McGill University (Morena, Ben-Zvi, Hayman, Rentschler), University of Calgary (Hou), McGill University Health Centre Research Institute (Nguyen), and St. Mary’s Research Centre (Meguerditchian).

Background: Social media are a significant source of information for young women with breast cancer undergoing postmastectomy breast reconstruction (PMBR). This study aimed to assess the quality of YouTube videos about PMBR, identify themes related to the PMBR experience and quantify perceptions of PMBR as an option. **Methods:** YouTube was searched incognito with terms “young women breast cancer reconstruction” in August 2022, in order from most to least viewed. Title, upload date, length, poster identity, number of likes and comments were collected. The Patient Education Materials Assessment Tool (PEMAT) was used to evaluate understandability and actionability. The DISCERN instrument was used to assess quality and reliability. Presence of sponsorship, intended audience, patient and health care professional narratives, and perceptions of PMBR

were collected. Reviewers noted whether PMBR was shown. Themes were collected inductively and deductively for thematic analysis. **Results:** In total, 193 videos were identified. Mean video length was 14.6 minutes (standard deviation [SD] 20.0 minutes). Of these, 87.1% included sponsorships, 95.9% of videos were posted by an organization, 60.6% were information-based and 45.6% were experience-based. Mean PEMAT scores for understandability and actionability were 71.3% (SD 13.4) and 35.7% (SD 41.8), respectively. Mean DISCERN score was 2.6/5 (SD 1.2). Patient narrative was present in 52.6% and health care professionals’ perspective in 68.4%. PMBR was visually presented 22.8% of the time, and 13.5% of videos explicitly recommended PMBR, whereas 2.6% explicitly discouraged it. Patients (77.7%) represent the majority of the intended audience. Most common deductively identified themes included treatment (87.1%), family relationship (17.1%), motherhood (15.5%), and fertility (11.9%). Inductively identified subthemes included differentiating between various options for PMBR surgery, *BRCA* genetic testing, psychosocial effects of breast cancer and PMBR, and recovery from surgery. **Conclusion:** PMBR videos are highly understandable but have moderate levels of actionability, quality and reliability. Videos are highly sponsored, demonstrating significant institutional bias. Themes are overwhelmingly treatment- and surgery-based. Personal themes were present but not dominant.

02

Knowledge, perceptions, attitudes, and barriers to genetic literacy among surgeons: a scoping review. *Zubaib Mir, Linda Fei, Sandra McKeown, Rachelle Dinchong, Nicholas Cofie, Nancy Dalgarno, Rona Cheifetz, Shaila Merchant.* From Queen's University (Mir, Fei, McKeown, Dinchong, Cofie, Dalgarno, Merchant), and University of British Columbia (Cheifetz).

Background: The rapid evolution of genetic technologies and the utilization of genetic information for clinical decision-making has necessitated increased surgeon participation in genetic counselling, testing and appropriate referral of patients for genetic services, without formal training in genetics. We performed a scoping review to describe surgeons' knowledge, perceptions and attitudes toward, as well as barriers to genetic literacy in, the management of patients with confirmed or genetically at risk for cancer. **Methods:** We designed and conducted a scoping review in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews. A comprehensive literature search was performed. Two reviewers independently screened studies for inclusion, and data were abstracted from full-text articles meeting all criteria. The target audience of the studies was practising surgeons involved in the care of patients with confirmed or genetically at risk for gastrointestinal, breast and endocrine/neuroendocrine cancers. **Results:** Seventeen studies were analyzed, with all using survey or interview-based formats. Many surgeons engaged in genetic counselling, testing and referral, but reported low confidence and comfort in doing so. Knowledge assessments showed lower scores/confidence in identifying genetic inheritance patterns and hereditary cancer syndromes, but scores were higher in those with greater clinical volume and/or subspecialty training in oncology. Surgeons felt responsible for facilitating the above-mentioned services and explicitly requested educational support in genetics. Barriers to genetic literacy were identified and catalogued at the patient, surgeon and system level. **Conclusion:** Surgeons managing cancers are frequently engaged in genetics-related tasks despite lack of formal training in this domain, and often report low knowledge, comfort and confidence in providing such services. We have identified several barriers to genetic literacy that can be used to develop interventions to enhance genetic literacy in surgeons.

03

Exploring neutrophil-to-lymphocyte ratio as a predictor of postoperative breast cancer overall survival. *Alisha Jaffer, Carolyn Cullinane, Gerard Feeney, Amirbossein Jalali, Anne Merrigan, Chwanrow Baban, Juliette Buckley, Shona Tormey.* From the University of Limerick (Jaffer, Jalali), University Hospital Waterford (Cullinane), and University Hospital Limerick (Feeney, Merrigan, Baban, Buckley, Tormey).

Background: Neutrophil-to-lymphocyte ratio (NLR) is an established strong predictor of mortality in a variety of solid organ malignancies; however, there is limited evidence regarding breast cancer. The relationship of the host immune system and tumour biology plays an integral role in oncological outcomes. The NLR provides an approximate quantification of host inflammatory response in advancing or more aggressive tumours. Rou-

tine inclusion of the complete blood count in preoperative workup thereby offers a possible cost-effective prognostic biomarker via the NLR. This project explored the association between preoperative NLR and overall survival (OS) in breast cancer. **Methods:** This retrospective cohort study reviewed an institutional database of breast cancer patients undergoing primary curative surgery between Jan. 1, 2010, to June 1, 2017. The primary end point studied was OS. Kaplan–Meier curves were constructed to compare survival between groups of patients with preoperative NLR < 2.5 and NLR ≥ 2.5. Univariate and multivariate Cox regression was used to detect significance in OS between groups of patients, controlling for pathological T stage, node-positive disease, receipt of adjuvant radiotherapy and receipt of endocrine therapy. **Results:** In the included cohort of 579 cases, the mortality rate was 18.3% ($n = 106$). The median preoperative NLR of the cohort was 2.63 (standard deviation 1.42). Patients with NLR ≥ 2.5 were significantly associated with poorer overall survival both on univariate and multivariate analysis (adjusted hazard ratio 1.84, 95% confidence interval 1.20–2.84, $p = 0.006$). Median survival time is not available for this data set at this time and will be reported at 150-month follow-up. **Conclusion:** Preoperative NLR ≥ 2.5 was found to be an independent predictor of breast cancer OS. Upon further validation, the NLR may offer a parsimonious, accessible biomarker to include in prognostic scoring. Analysis of these data is ongoing to evaluate disease-free survival.

04

High β integrin expression is differentially associated with worsened pancreatic ductal adenocarcinoma outcomes. *Matthew Benesch, Rongrong Wu, Kazuaki Takabe.* From the Roswell Park Comprehensive Cancer Center.

Background: Outcomes in pancreatic ductal adenocarcinoma (PDAC) are known to be worse in tumours with high integrin β 1 expression, but targeted monotherapy against this integrin has not been effective. Seven other β integrins are expressed in mammalian biology and are known to have overlapping and compensatory signalling in biological systems. However, their roles in PDAC are poorly understood and have not been systematically compared with integrin β 1 biology. **Methods:** We analyzed the clinical outcomes against integrin β 1–8 (ITGB1–8) expression in PDAC samples from 2 large independent cohorts, The Cancer Genome Atlas (TCGA) and GSE21501. Biological function and tumour micro-environment composition were studied using gene set enrichment analysis and tumour microenvironment cell cybersorting via the xCell and MCP-counter algorithms. **Results:** Expression of all 8 β integrins is significantly increased in PDAC relative to normal pancreatic tissues (all $p < 0.001$). ITGB1, 2, 5 and 6 have similarly enriched gene patterns related to transforming growth factor (TGF)- β , epithelial mesenchymal transition, inflammation, stemness and angiogenesis pathways. Homologous recombination defects and neoantigens are increased in high-expression ITGB4, 5 and 6 tumours, with decreased overall survival in high-expression ITGB1, 5 and 6 tumours compared with low-expression tumours (hazard ratios 1.5–2.0). High-expression ITGB1, 2 and 5 tumours have increased fibroblast infiltration (all $p < 0.01$), while endothelial cells are increased in high-expression ITGB2 and 3 tumours (all $p < 0.05$). Overall, β integrin expression does not correlate to immune cell populations in PDAC. **Conclusion:** While all β

integrins are overexpressed in PDAC, they exert differential effects on PDAC biology. ITGB2, 5 and 6 have a similar profile to ITGB1, suggesting that future research in PDAC integrin therapy needs to consider the complementary signalling profiles mediated by these integrins.

05

Epidemiology of undifferentiated carcinomas. *Matthew Benesch, Shalana O'Brien.* From the Roswell Park Comprehensive Cancer Center.

Background: Undifferentiated carcinomas are rare cancers that lack differentiation, such that they cannot be classified into any conventional histological subtype. These cancers are uniquely codified and are contrasted to carcinomas with an ascertained histology that are classified as poorly differentiated, undifferentiated, or anaplastic. Given their rarity, there are no standardized overviews of undifferentiated carcinomas in the literature, and it is unknown if their classification indicates a unique prognosis profile. **Methods:** We summarize the clinicodemographic and mortality outcomes of undifferentiated carcinomas in 12 primary sites and for unknown primaries, comprising 92.8% of all undifferentiated carcinomas diagnosed from 1975 to 2017 in the National Cancer Institute's Surveillance, Epidemiology, and End Results Program (SEER) database. **Results:** Incidence has decreased to 4 per 1 million cancer diagnoses since 1980. Relative to the most common undifferentiated cancers with a defined histology, undifferentiated carcinomas have overall worse prognosis, except in nasopharyngeal and salivary gland cancers (hazard ratio [HR] 0.7–1.3). After correction for age, sex, race, detection stage and treatment (surgery, chemotherapy and radiotherapy), the mortality HR averages 1.3–1.4 for these cancers relative to histologically ascertainable undifferentiated cancers. **Conclusion:** There is a wide variance in survival patterns for undifferentiated carcinomas, signifying that survival outcomes depend on factors related to site tumour biology.

06

An evidence-based approach to the incorporation of total neoadjuvant therapy into a standardized rectal cancer treatment algorithm. *Karineh Kazazian, Ali Hosni Abdalaty, Christine Brezden, Ron Burkes, Eric Chen, Anand Govindarajan, Raymond Jang, Erin Kennedy, Jelena Lukovic, Aruz Mesci, Fayez Queresby, Carol Swallow, Sami Chadi.* From Princess Margaret Hospital (Kazazian, Abdalaty, Brezden, Burkes, Chen, Govindarajan, Jang, Kennedy, Lukovic, Mesci, Queresby, Swallow, Chadi), University Health Network (Kazazian, Abdalaty, Brezden, Burkes, Chen, Govindarajan, Jang, Kennedy, Lukovic, Mesci, Queresby, Swallow, Chadi), University of Toronto (Kazazian, Swallow), and Mount Sinai Hospital (Brezden, Burkes, Govindarajan, Kennedy, Swallow).

Background: Total neoadjuvant therapy (TNT) is a treatment strategy for nonmetastatic, resectable rectal cancer that involves preoperative delivery of radiotherapy and systemic chemotherapy, intending to give all indicated adjuvant therapy upfront. Given significant heterogeneity in approaches, the purpose of this project was to create evidence-based consensus statements and to generate a standardized TNT algorithm for stage I–III rectal cancer. **Methods:** For this expert consensus, a hybrid methodology was

used involving 1) individual anonymous response to select cases to identify heterogeneity of opinion and create a list of themes for discussion; 2) literature review; 3) in-person expert panel meeting to generate topics for consensus statements; 4) modified Delphi methodology; and 5) focus group discussions. A multidisciplinary group of 5 surgical, 3 radiation and 4 medical oncologists were approached for consensus review. Anonymized Delphi questionnaires were structured as guidance statements, and consensus (> 80%) was assessed based on the level of agreement/disagreement for each item. Two rounds of voting were sent electronically to 12 physicians, with 100% response. Finally, the results were calculated and reviewed during a virtual consensus group discussion (not anonymous). An algorithm was prepared to provide a practical approach to TNT candidacy and sequencing of treatments (100% consensus). **Results:** Four Delphi topics related to TNT terminology/definitions, patient selection, sequencing of treatments and nonoperative management pathways were identified. On the initial round, 13 statements were reviewed and 7 reached consensus. Based on free-text comments, 6 statements were revised. For the second round, statements that had not reached consensus were reviewed: 4 were revised, 2 reached consensus. For the virtual conference, the 13 statements were discussed, with revision of terminology for clarity in 4 and deletion of 3. Ten statements reached consensus. The virtual meeting was also used to develop clinical pathway algorithms. **Conclusion:** A thoughtful, targeted approach can ensure appropriate use of TNT while avoiding overtreatment of lower risk patients.

07

Pushing the boundaries: right retroperitoneoscopic adrenalectomy after laparoscopic right nephrectomy. *Rogeb Habashi, Jesse Pasternak.* From the University of Toronto.

Background: Retroperitoneoscopic adrenalectomy has been described since the early 1990s, but only over the past 10 years has it been standardized and made reproducible. Although the posterior anatomic view, small working space and limited degrees of freedom were deterrents, the retroperitoneoscopic adrenalectomy is associated with shorter operative time, fewer iatrogenic splenic injuries and shorter hospital stays. We present the case of a 53-year-old female with suspected renal cell carcinoma (RCC) with right adrenal metastasis 5 years after her ipsilateral laparoscopic curative nephrectomy. **Methods:** Our patient underwent an uncomplicated laparoscopic right nephrectomy in 2017. On surveillance computed tomography 5 years later, an enlarging 1.8-cm right adrenal mass was identified with 34 noncontrast Hounsfield units, highly suspicious for metastatic RCC. After discussion at multidisciplinary rounds, a decision was made to proceed with retroperitoneoscopic adrenalectomy. Preoperative functional biochemistry was negative. **Results:** The surgery was uncomplicated with minimal retroperitoneal adhesions and a virgin periadrenal space. Operative time was 1 hour and 45 minutes. The patient was discharged within 4 hours from surgery, and analgesia was optimal with acetaminophen and ibuprofen. Pathology confirmed RCC adrenal metastasis with negative margins. **Conclusion:** To our knowledge this is the first successful retroperitoneoscopic adrenalectomy after ipsilateral retroperitoneal surgery. This case supports that notion that whenever the periadrenal space is not breached, a retroperitoneoscopic approach should be entertained as long as there are no other contraindications.

08

The role of caspase-1 in triple negative breast cancer, the immune tumour microenvironment and response to anti-PD1 immunotherapy. *Wanda Marini, Weiyue Zheng, Kiichi Murakami, Pamela Ohashi, Michael Reedijk.* From the University of Toronto (Marini, Ohashi, Reedijk), Princess Margaret Cancer Centre (Zheng, Murakami), and University Health Network (Zheng, Murakami).

Background: Triple negative breast cancer (TNBC) is an aggressive breast cancer subtype with poor prognosis and no known targeted therapies. It is known to have high expression of the inflammatory cytokine interleukin (IL)-1 β , which promotes the recruitment of protumoural tumour-associated macrophages (TAMs) to the tumour microenvironment (TME). In addition, TNBCs are rich in tumour-infiltrating lymphocytes (TILs), which theoretically creates a favourable condition for immunotherapy. However, immunotherapy has shown disappointing results in recent clinical trials. Here we report that TNBCs have elevated caspase-1, a key requirement for IL1 β cleavage and maturation, and this helps shape the immune TME. As well, by inhibiting TAM recruitment through caspase-1 inhibition, response to immunotherapy can be improved. **Methods:** Publicly available gene expression data sets from human breast cancer were analyzed, and the association between caspase-1, breast cancer subtype and estrogen receptor (ER) coexpression was interrogated. This relationship was confirmed in vitro using both human ER-positive and TNBC cell lines. Using TNBC mouse allografts, the effect of caspase-1 knockout (KO) or pharmacological inhibition on tumour growth and macrophage recruitment was assessed. Finally, synergy between caspase-1 inhibition and anti-PD1 immunotherapy in TNBC mouse tumours was studied. **Results:** Caspase-1 was found to have an inverse correlation with ER expression and was associated with the TNBC subtype. In mouse allografts, caspase-1 KO or pharmacological inhibition resulted in significant decrease in tumour growth and TAM infiltration. Finally, caspase-1 inhibition reversed resistance to anti-PD1 immunotherapy, resulting in significant deceleration of tumour growth when used in combination. **Conclusion:** The lack of ER in TNBC promotes caspase-1 expression, allowing IL1 β maturation, macrophage recruitment and tumour progression. Genetic or pharmacologic inhibition of caspase-1 inhibits TAM recruitment and reverses resistance to immunotherapy in TNBC. Our data provide new insights into the biology of TNBC and identifies a novel therapy to combat this disease.

09

Perioperative neutrophil-to-lymphocyte ratio is associated with survival in patients undergoing colorectal cancer surgery. *Richard Hu, Victoria Ivankovic, Lewis Han, Louise Gresham, Ranjeeta Mallick, Rebecca Auer.* From the University of Ottawa (Hu, Ivankovic, Han, Gresham), and the Ottawa Hospital Research Institute (Mallick, Auer).

Background: There is increasing evidence that both cancer-associated inflammation and surgical stress impact oncological outcomes. Neutrophil-to-lymphocyte ratio (NLR) has emerged as a marker of inflammation that correlates with cancer outcomes. The present study aimed determine the prognostic role of perioperative NLR relating to survival, disease-free survival and postoperative

complications in patients undergoing colorectal cancer surgery. **Methods:** A retrospective cohort study was conducted of patients who underwent colorectal cancer surgery between 2010 and 2015 at a single academic centre. High versus low NLR was determined using receiver operating characteristic (ROC) curve analysis. Univariate and multivariate logistic regression analysis was used to establish whether NLR is associated with cancer survival or post-operative complications. **Results:** A total of 534 patients were included (42% female, mean age 67.8yr). Surgery was laparoscopic in 27%, 78% were elective, and 43% had positive nodal disease. An NLR value greater than 5.6 was deemed high using ROC analysis. High preoperative NLR (hazard ratio [HR] 2.06, 95% confidence interval [CI] 1.31–3.23), high NLR at discharge (HR 1.60, 95% CI 1.023–2.49) and N2+ nodal disease were independently associated with worse overall survival (OS). Patients with high preoperative NLR had a 3-year OS of 74.9% (95% CI 64.5–82.6) compared with 92.3% (95% CI 88.8–94.7) in the group with low NLR, and a disease-free-survival of 71.4% (95% CI 60.6–79.7) compared with 83.1% (95% CI 78.5–86.7). Almost half (49%) of patients had 1 or more postoperative complications at 30 days, but perioperative NLR was not found to be associated with the risk of complications. **Conclusion:** Preoperative NLR and NLR at discharge were the most predictive of OS, while perioperative NLR was not associated with postoperative complications at 30 days. Further study is needed to validate the NLR threshold used in this analysis, as well as studies looking at the mechanisms linking perioperative NLR to cancer outcomes.

10

Achievement of quality metrics in older adults undergoing elective colorectal cancer surgery. *Tiago Ribeiro, Adom Bondzi-Simpson, Natalie Coburn, Julie Hallet.* From the University of Toronto (Ribeiro, Bondzi-Simpson), and the Sunnyside Health Sciences Centre (Coburn, Hallet).

Background: Older adults (≥ 65 yr) represent a unique patient population with increased perioperative risks and greater variability in treatment goals. Whether traditional quality metrics are achieved or should be used to monitor care quality for older adults is unknown. We examined achievement of quality metrics in older adults undergoing elective colorectal cancer surgery. **Methods:** We conducted a retrospective cohort study of patients undergoing elective colorectal cancer surgery in the American College of Surgeons National Surgical Quality Improvement Program database (2016–2021). The exposure was being an older adult. Outcomes were quality metrics identified through a literature review of national and international organizations. Logistic regression models evaluated the adjusted association between age and attainment of quality metrics, stratified by colectomy and proctectomy. **Results:** Of 46 159 colectomies and 9106 proctectomies, 59.7% and 43.5% were in older adults, respectively. After adjusting for age, sex, comorbidities, functional status and race, being an older adult was associated with lower odds of nodal harvest ≥ 12 for colectomy (odds ratio [OR] 0.86, 95% confidence interval [CI] 0.78–0.94) and proctectomy (OR 0.81, 95% CI 0.72–0.90), and a higher odds of 30-day mortality for colectomy (OR 4.33, 95% CI 3.15–6.13) and proctectomy (OR 2.29, 95% CI 1.17–4.49). Additionally, being an older adult was associated with lower odds of neoadjuvant chemoradiation for stage II–III rectal cancer (OR 0.66, 95% CI 0.59–0.74) on multivariable

analysis. Attainment of other quality metrics was not associated with being an older adult (surgical site infection, leak and margins). **Conclusion:** Older adults are not meeting all quality metrics for colorectal cancer surgery at the same rate as younger adults. These findings may reflect changes in patient goals, increased patient risk, or differences in care provided to older adults. Work is needed to stratify reporting of quality metrics by age and assess the role of quality metrics specific to older adults to ensure relevant and tailored quality assessment and monitoring.

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Opportunities to improve the environmental sustainability of breast cancer surgical care. *Tulin Cil, Adam Fontebasso.* From the Princess Margaret Cancer Centre (Cil), University Health Network (Cil), and University of Toronto (Cil, Fontebasso).

Background: Breast cancer is the most common cancer in women and is second in female cancer-related mortality. The treatment of breast cancer is multidisciplinary and involves multiple specialists and allied health professionals and thus can be resource-intensive. The environmental impact of breast cancer management has been poorly defined. **Methods:** We performed a scoping review to synthesize the literature on this topic. We focused on studies that characterize the environmental effects of multidisciplinary breast cancer care. We developed a search strategy and accessed the National Library of Medicine to identify the relevant literature. **Results:** Using our search strategy, we identified 18 articles for further review. We noted a general paucity of relevant literature on the topic with only 2 relevant articles. We expanded our search to include articles discussing the environmental impact of the care of other cancers and identified 230 articles. We synthesized relevant literature discussing environmental effects of surgery, radiation and systemic therapies in treating cancer patients and how it may pertain to the treatment of patients with breast cancer. **Conclusion:** We hope to take steps to transform our health care system toward one capable of offering gold standard patient-centred care to future generations of breast cancer patients.

12

Does margin status after biopsy matter in melanoma? A cohort study of micro- and macroscopic margin status and their impact on residual disease and survival. *Alex Lee, Ericka Bernard-Bedard, Boaz Wong, Heidi Li, Elysia Grose, Olivier Brandts-Longtin, Katie Aw, Rebecca Lau, Ahmad Abed, James Stevenson, Rabat Sheikh, Richard Chen, Stephanie Johnson-Obaseki, Carolyn Nessim.* From the University of British Columbia (Lee), The Ottawa Hospital (Bernard-Bedard), and the University of Ottawa (Wong, Li, Grose, Brandts-Longtin, Aw, Lau, Abed, Stevenson, Sheikh, Chen, Johnson-Obaseki, Nessim).

Background: The presence of positive biopsy margins can provoke anxiety over potential disease progression from delays to surgical excision. Most studies do not specify if the positive margins were microscopically positive, defined as having only a scar post-biopsy versus having a macroscopically positive margin where there is obvious residual disease. We suspect that the presence of residual invasive melanoma in the wide local excision (WLE) specimen after a microscopically positive margin is low and would likely not affect overall outcome or survival. **Methods:** All patients with cuta-

neous malignant melanoma who underwent surgical management at a tertiary cancer centre between Jan. 1, 2010, and Apr. 1, 2022, were included. Biopsy and surgical characteristics and disease outcomes were compared between patients with negative biopsy margins, microscopically positive margins (scar only postbiopsy) and macroscopically positive margins (clinically residual disease post-biopsy). Kaplan–Meier survival curves were plotted, and overall survival was compared using the log-rank test. **Results:** A total of 854 patients were included, of whom 198 (23.2%) had a macroscopically positive margin and 271 (31.7%) had a microscopically positive margin. Most (82.9%) patients with negative margins were alive with no evidence of disease, which was not significantly different from those with microscopically positive margins (83.8%, $p = 0.7595$). Accordingly, the log-rank test showed no difference in overall survival between those with negative and microscopically positive margins (median 25 v. 26.3 months, $p = 0.257$). Moreover, in the patients with microscopically positive margins, following WLE, only 44 (16.2%) patients had residual disease and the majority of these (59%) were in situ disease only. **Conclusion:** Despite microscopically positive margins, patients can be reassured that only 16% will have residual disease in their WLE and comparable survival to patients with negative margins. This should reassure patients and clinicians at time of consultation regarding favourable outcomes despite having microscopically positive margins.

13

Demonstration of D2 Lymph node stations during laparoscopic total gastrectomy. *Rachel Liu Hennessey, Adam T. Meneghetti.* From the University of British Columbia.

Background: The Japanese Gastric Cancer Association published the sixth edition of the Japanese Gastric Cancer Treatment Guidelines in 2022, again defining various surgeries for gastric cancer and D-level criteria for lymph node dissection. Here, we report the case of a patient with locally advanced adenocarcinoma of the cardia and evidence of low-volume peritoneal metastasis. **Methods:** We present the case of a 76-year-old female of East Asian descent with 3-month history of indigestion and epigastric discomfort refractory to proton pump inhibitor therapy. Investigations showed a 2-cm ulcerated gastric cardinal mass, in keeping with gastric adenocarcinoma, intestinal subtype; HER2 2++ (negative FISH test); negative PDL1 (SP263) test; and MMR-proficient tumour. Endoscopic ultrasound showed a T3 lesion. Staging computed tomography (CT) showed no evidence of distant disease. However, diagnostic laparoscopy showed 3 2-mm nodules in the abdominal wall, pathology for which demonstrated atypical cells highly suspicious for carcinoma. Peritoneal fluid cytology showed a single cluster of atypical cells suspicious for carcinoma. A multidisciplinary tumour board recommended neoadjuvant chemotherapy with FOLFOX and Nivolumab. **Results:** After therapy, repeat CT showed no evidence of disease progression. Repeat diagnostic laparoscopy showed no evidence of peritoneal disease. The patient was brought to the operating room for laparoscopic total gastrectomy, D2 lymphadenectomy and Roux-en-Y reconstruction. The patient recovered well in hospital, experienced no complications, and was discharged home on postoperative day 5. Final pathology showed residual moderately differentiated invasive adenocarcinoma, intestinal type. Final stage was ypT3 ypN2 (3/40 lymph nodes positive). All margins were negative. **Conclusion:** Laparoscopic total gastrectomy and D2 lymphadenectomy is safe and effective. We

demonstrate the associations between lymph node stations and major vascular anatomy in a step-by-step manner.

14

Incidence of metastatic tumours to the ovary (Krukenberg) versus primary ovarian neoplasms associated with colorectal cancer surgery. *Michael Bildersheim, Antoine Bouchard-Fortier, Gregg Nelson, Lloyd Mack.* From the University of Calgary.

Background: Development of an ovarian mass at the time of or following surgery for colorectal cancer is concerning. It is often unclear if these masses represent metastatic disease, primary ovarian cancer or a benign neoplasm, leading to different referral patterns and potential treatment. Our primary objective was to determine the proportion with metastatic colorectal cancer versus primary ovarian pathology in women diagnosed with colorectal cancer. **Methods:** The Alberta Cancer Registry was queried for women 18 years of age or older diagnosed and treated with colon cancer in 2014. We screened 806 records for radiologic, pathologic or intraoperative findings that showed any ovarian mass either at the time of index surgery or in follow up to April 2022. Underlying pathology of the ovarian mass was determined via resection, biopsy, or imaging characteristics with follow-up. **Results:** Forty-three (5.3%) of the 806 women with a diagnosis of colorectal cancer had an ovarian mass: 14 patients at index surgery for colorectal cancer and 29 patients developed one during follow-up. Median age at diagnosis of colorectal cancer among this group was 62 (range 35–85) years, with the majority being stage III (27%) or IV (32%). For the cohort of 14 found at initial surgery, 8 (57%) had metastatic colon cancer, 3 (21%) had benign neoplasms and 3 (21%) had synchronous ovarian and colon cancer. Of the 29 who developed masses on follow-up, 21 (72%) represented metastatic colorectal cancer to the ovary and the remainder were benign. No patient developed ovarian cancer during follow-up. **Conclusion:** Approximately 5.3% of women diagnosed with colorectal cancer develop an ovarian mass. Our findings suggest the majority (two-thirds) of these ovarian masses represent metastatic disease. Initial evaluation by the gastrointestinal tumour group may be the most judicious initial assessment in this scenario.

15

Spatial biomarkers in cancer. *Farhad Ghasemi, Mabtab Malekian Naeni, Armen Parsyan.* From Western University.

Background: The interplay between the heterogeneous elements within tumour microenvironment impacts the development and progression of cancer. While bulk and single-cell "omics" technologies have advanced our understanding of cancer, they lack in the full characterization of tissue spatial diversity. Developments in spatial omics technologies have provided us with the opportunity to map and quantify cancer cells' molecular alterations in relation to the tumour microenvironment and its respective changes. These technologies provide us with the opportunity to add another dimension toward the search for clinically relevant cancer biomarkers. **Methods:** To define the current progress in clinical applications of spatial omics information in cancer, we conducted a review of the literature for spatial omics technologies, such as genomics, transcriptomics, proteomics, lipidomics, and metabolomics.

We then analyzed the literature to define if spatial omics technologies lead to identification of molecular changes or biomarkers that can be used in cancer diagnosis, prognostication and treatment response prediction. **Results:** We found that spatial omics technologies are being increasingly applied to the study of spatial molecular changes in various cancers to identify their relevance in clinical applications. Characterization of the spatial distribution of molecular changes and its microenvironment in various cancers, such as breast, ovarian, prostate, melanoma, and other solid tumours, has led to the identification of novel molecular markers that can be used for clinically relevant applications, such as differentiating malignancy from normal tissue, classifying response to neoadjuvant chemotherapy and predicting patient survival. **Conclusion:** Novel, cutting-edge, spatial omics technologies provide us with innovative tools for discovery of clinically useful biomarkers in oncology and drug development.

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How informed is the consent process for complex cancer resections? *Yvreet Kaur, Andrea Covelli, Fayez Quereshy, Elena Elimova, Elan Panov, Jelena Lukovic, James Brierley, Bev Burnett, Carol Swallow.* From the University of Toronto (Kaur, Covelli, Quereshy, Elimova, Panov, Swallow), Princess Margaret Cancer Centre (Covelli, Quereshy, Elimova, Panov, Lukovic, Brierley, Burnett, Swallow), University Health Network (Covelli, Quereshy, Elimova, Panov, Lukovic, Brierley, Burnett, Swallow), and Mount Sinai Hospital (Covelli, Quereshy, Burnett, Swallow).

Background: Informed consent is the process by which physicians provide patients with sufficient knowledge to enable them to make treatment decisions. This is particularly important for complex cancer resections that carry significant morbidity and impact long-term quality of life. The goal of this project was to identify the elements of consent for complex cancer resections in order to understand how truly informed this process is. **Methods:** An exploratory qualitative study was conducted to elucidate the process of informed consent for surgical treatment of complex gastrointestinal cancers. Research ethics board approval was obtained. Semistructured interviews were conducted with surgeons at our tertiary cancer centre. Data analysis occurred via constant comparison across data sources, coding and identifying themes. **Results:** Data saturation was achieved after 12 interviews: hepatopancreatobiliary ($n = 5$), peritoneal malignancy ($n = 2$), sarcoma ($n = 2$), thoracic ($n = 2$) and melanoma ($n = 1$). The key elements of consent were a discussion of risks and benefits, alternatives and postoperative cancer outcomes. Common themes included 1) surgeons' consent discussions changed over the course of their career; 2) for complex oncologic resections, consent is a longitudinal process requiring multiple discussions, with a trend toward more concise discussions in certain subspecialties; and 3) surgeons believe that true informed consent does not exist, as most patients are not able to fully comprehend potential complications and the magnitude of long-term postoperative changes. Notably, only 1 surgeon mentioned exploring patient values, and 1 believed that consent is a biased discussion. **Conclusion:** While all surgeons satisfy the medicolegal

definition of informed consent for complex cancer surgery, there is considerable heterogeneity in this process, both with respect to the individual provider and the disease entity. Most perceive that true informed consent is not always achievable for complex resections. Greater understanding of patient comprehension and intentional attention to patient values may make this process more informed.

17

Adjuvant radiation therapy among immigrant and Canadian-born/long-term resident women with breast cancer. *Ashley Eom, David Kirkwood, Nicole Hodgson, Aristithes Doumouras, Jessica Bogach, Timothy Whelan, Mark Levine, Elena Parvez.* From McMaster University (Eom, Hodgson, Doumoura, Bogach, Whelan, Levine, Parvez), and ICES (Kirkwood).

Background: Appropriate adjuvant radiation therapy (RT) after breast cancer surgery is an important quality of care metric. Cancer treatment experience for immigrant women may differ due to challenges in navigating the health care system. This study compares the proportion of immigrant and Canadian-born/long-term resident women receiving adjuvant RT and time to RT. **Methods:** A population-level retrospective cohort study using provincial databases was conducted including women with stage I–III breast cancer diagnosed between 2010 and 2016 in Ontario. Women were classified as immigrants or Canadian-born/long-term residents based on their country of birth and arrival in Canada. Dependent variables (age, comorbidity, socioeconomic factors, stage and treatments) were collected. Data on proportion of women undergoing RT and time from surgery to RT were collected. Multivariable analysis was performed, adjusting for dependent variables. **Results:** Out of 54 090 patients, 7160 (13.2%) were immigrants. Immigrants were younger at diagnosis (54.3 v. 63.0 yr) and more often had stage III disease (16.8% v. 13.9%). Odds of receiving RT after breast-conserving surgery (BCS) was 0.86 (95% confidence interval [CI] 0.78–0.95), and 0.98 (95% CI 0.86–1.12) after mastectomy. Mean time from any surgery to RT was longer for immigrants (126.9 days v. 117.1 days, $p < 0.001$). Using a multivariable piecewise Cox regression model, excluding patients receiving adjuvant chemotherapy before radiation, the hazard ratio for receipt of RT for immigrants compared with Canadian-born/long-term residents was 0.96 (95% CI 0.91–1.01). Immigrants from Latin America and the Caribbean had the longest wait times. There were no differences based on length of stay in Canada or immigration class. **Conclusion:** Our study demonstrates a smaller proportion of immigrant women receiving RT after BCS compared with Canadian-born/long-term resident women in Ontario, and a crude longer wait time for adjuvant RT. Further research is needed to explore system, provider and patient factors that may be driving this difference.

18

Human peritoneal explant model reveals genomic alterations that facilitate peritoneal implantation of gastric cancer cells. *Deanna Ng, Karineb Kazazian, Kiera Lee, Yi Qing Lu, Dae Kyum Kim, Marco Magalhaes.* From the University of Toronto (Ng, Kazazian, Lu, Magalhaes), University of British

Columbia (Lee), and Roswell Park Comprehensive Cancer Center (Kim).

Background: Carcinomas of the stomach, gallbladder and appendix are prone to peritoneal metastasis, a phenomenon that is associated with intractable symptoms and poor survival. The mechanisms through which gastric cancer cells preferentially implant within the peritoneum are poorly understood. To investigate this, we developed a novel human peritoneal explant model. **Methods:** With research ethics board approval, fresh human peritoneal tissue samples were obtained intraoperatively and suspended above a monolayer of fluorescent green fluorescent protein-labelled AGS human gastric cancer cells. Using RNA sequencing, the genomic profile of the implanted cells was compared with that of cells that failed to implant. **Results:** The differentially expressed genes (DEGs), which characterized AGS gastric cancer cells that successfully implanted within the peritoneum, are known to be involved in cell adhesion, motility and membrane depolarization. From this list, we developed a select “peritoneal implantation” gene set ($n = 6$ DEGs). To functionally validate these, we used CRISPR technology to deplete individual genes in AGS cells. In the ex vivo peritoneal explant model, depletion of *CGNLI*, *ADAM12* and *MUC16* significantly impaired implantation and invasion by gastric cancer cells. **Conclusion:** This work reveals a distinct peritoneal metastasis gene set that facilitates implantation of gastric cancer cells within the human peritoneum. Interruption of the relevant signalling pathways has the potential to suppress gastric cancer peritoneal metastasis and thereby improve quality of life.

19

Preoperative breast satisfaction association with major complications following oncologic breast surgery. *Emma Grigor, Angel Arnaout, Jing Zhang.* From the University of Ottawa.

Background: Psychological factors may be associated with postoperative complications following breast cancer surgery. Despite significant research investigating surgical factors associated with postoperative outcomes, there is a paucity of patient-reported outcome measures (PROMs) data concerning the patient perception of care and outcomes. High-quality, validated PROMs, including BREAST-Q, are increasingly becoming recognized as the standard of care. This study aimed to determine the association between preoperative BREAST-Q and postoperative complications after breast cancer surgery. **Methods:** A mixed-method prospective-retrospective study of 122 patients who received oncologic breast surgery from general and plastic surgeons between January 2016 and June 2022 was approved at The Ottawa Hospital. All patients prospectively completed BREAST-Q questionnaires. All patient demographic and surgical characteristics and postoperative data were retrospectively collected from electronic medical records. The association of the preoperative BREAST-Q domain of patient-reported satisfaction and well-being and postoperative complications, including operating room (OR) take-back, was analyzed using multivariable logistic regression. Results were considered significant at $p < 0.05$. **Results:** On univariate analysis, patients who

reported lower preoperative breast satisfaction with appearance in the mirror were significantly more likely to develop a major complication postoperatively ($p = 0.012$). There was no significant association between preoperative satisfaction scores and minor complications. On multivariable logistic regression analysis, after controlling for age, body mass index and use of radiotherapy, patients who reported lower preoperative breast satisfaction had an increased risk for major wound complications requiring unplanned OR take-back ($p = 0.025$). **Conclusion:** Lower patient breast satisfaction preoperatively was associated with an increased risk of major wound complications and unplanned OR take-back. Preoperative psychological and physical well-being factors were not predictors of major complications postoperatively. These findings support existing data that patient-reported body image satisfaction preoperatively may predict surgical outcomes postoperatively. Our study highlights preoperative breast satisfaction as a key preoperative target to optimize oncologic breast surgery outcomes.

20

Impact of geography on receipt of medical oncology consultation and neoadjuvant chemotherapy for triple negative and HER2 positive breast cancer. *Elliott K. Yee, Julie Hallet, Nicole J. Look Hong, Lena Nguyen, Natalie Coburn, Frances C. Wright, Sonal Gandhi, Katarzyna J. Jerzak, Andrea Eisen, Amanda Roberts.* From the University of Toronto (Yee), Sunnybrook Health Sciences Centre (Hallet, Look Hong, Coburn, Wright, Gandhi, Jerzak, Eisen, Roberts), Sunnybrook Research Institute (Hallet, Look Hong, Coburn, Wright, Gandhi, Jerzak, Eisen, Roberts), and ICES (Look Hong, Nguyen, Coburn).

Background: Consensus guidelines recommend consideration of neoadjuvant chemotherapy (NAC) for most patients with early-stage triple negative (TN) and HER2 positive (HER2+) breast cancer, yet most are not seen by a medical oncologist before surgery and do not receive NAC. Distance to cancer centres has been shown to mediate medical oncology referral and use of systemic therapy for other malignancies. We therefore aimed to characterize the impact of region of residence and cancer centre proximity on receipt of pretreatment medical oncology consultation and NAC for patients with TN and HER2+ breast cancer. **Methods:** Using linked administrative health care data sets in Ontario, we performed a retrospective population-based analysis of women diagnosed with stage 1–3 TN or HER2+ breast cancer for the period 2012–2019. Outcomes were pretreatment medical oncology consultation and initiation of NAC. We created choropleth maps to assess the spatial distribution of outcomes across Census divisions using geographic information system analysis. To assess the association between distance to the nearest cancer centre and outcomes, we performed a multivariable regression analysis adjusted for sociodemographic and clinical factors, including tumour extent and nodal status. **Results:** Among 12 881 patients, there was no statistically significant association between distance to the nearest cancer centre (≤ 5 v. 5–10, 10–25, and ≥ 25 km) and medical oncology consultation or NAC. Mapping demonstrated high interregional outcome variability, ranging across Census divisions from 12.2% to 64.3% for medical oncology consultation, and 9.3% to 64.3%

for NAC. Most (77.7%) of patients referred to medical oncology received NAC. **Conclusion:** Among patients with TN and HER2+ early breast cancer, medical oncology consultation and NAC were not significantly impacted by distance to cancer centres but varied highly by region. Regional and/or provider practice patterns may underlie this variation. These findings can inform further studies and interventions aiming to improve equitable access to NAC for this patient population.

21

Comparison of radiation, surgery or both in women with breast cancer and 3 or more positive lymph nodes. *Daniel Ben Lustig, May Lynn Quan, Tien Phan, Antoine Bouchard-Fortier, Jeff Cao, Conrad Bayley.* From the University of Calgary.

Background: The optimal management of patients with early-stage breast cancer who have 3 or more positive sentinel lymph nodes is unknown. Currently, there is a lack of evidence comparing nodal radiation therapy (RT), completion axillary lymph node dissection (cALND) or both in terms of recurrence-free survival (RFS) and overall survival (OS). **Methods:** Patients with early-stage clinically node-negative breast cancer (T1/T2) who underwent surgery (mastectomy or partial mastectomy) and a sentinel lymph node biopsy (SLNB) between 2012 and 2017 who were found to have 3 or more positive nodes were included. Patients were stratified based on their adjuvant treatment strategy: cALND, RT, or both. Kaplan–Meier survival curves using log ranked analysis were used to determine the 5-year RFS and 5-year OS. **Results:** A total of 87 patients were included in our study. Median follow up was 7.8 years. The 5-year RFS for cALND, RT and both was 57%, 87% and 80%, respectively, which was statistically significant in the cALND compared with the RT group ($p = 0.22$). **Conclusion:** Patients with early-stage breast cancer with 3 or more positive lymph nodes may be treated with adjuvant nodal RT alone, as the benefit of cALND does not improve RFS or OS.

22

Impact of synoptic operative reporting as a quality indicator for thyroid surgery: a Canadian national study. *Akie Watanabe, Susan Yao, Eitan Prisman, Gary Groot, Elliot Mitmaker, Ross Walker, Jonn Wu, Jesse Pasternak, Cbi Kien Lai, Antoine Eskander, Jonathan Wasserman, Frederic Mercier, Kathryn Roth, Sabrina Gill, Carlos Villamil, David Goldstein, Vicki Munro, Alok Pathak* (University of Manitoba), *Debon Lee, Anne Nguyen, Sam Wiseman.* From the University of British Columbia (Watanabe, Yao, Prisman, Wu, Lai, Gill, Villamil, Lee, Nguyen, Wiseman), University of Saskatchewan (Groot), McGill University (Mitmaker), Queen's University (Walker), University of Toronto (Pasternak, Eskander, Wasserman, Goldstein), Université de Montréal (Mercier), Western University (Roth), Dalhousie University (Munro), and University of Manitoba (Pathak).

Background: Narrative operative reports (NORs) often lack important information that can guide multidisciplinary management of benign and malignant thyroid disease. This study aimed to improve information consistency by validating a

nationally developed synoptic operative report (SOR) for thyroid surgery. **Methods:** A 21-item SOR for thyroidectomy was piloted by 6 thyroid surgeons beginning in September 2022. Overall completeness of SORs were compared with pre-pilot NORs using the independent Student *t* test and linear regression adjusting for baseline factors including diagnosis (benign v. malignant), procedure type (partial v. total thyroidectomy) and surgeon volume (< 25 v. ≥ 25 thyroidectomies/yr). We used χ^2 analyses to assess the associations between item-specific reporting frequencies and report type. **Results:** Among 144 NORs and 86 SORs collected, 40% were reported for malignant disease and 35% for total thyroidectomies. Overall completeness was significantly higher in SORs ($99\% \pm 3\%$) compared with NORs ($63\% \pm 18\%$, $p < 0.001$) with comparable results when stratified by benign (SOR: $99\% \pm 3\%$; NOR: $72\% \pm 13\%$, $p < 0.001$) or malignant disease (SOR: $99\% \pm 2\%$; NOR: $51\% \pm 17\%$, $p < 0.001$). When adjusted for baseline fac-

tors, SORs were 33.14% (95% confidence interval [CI] 29.63 to 36.65, $p < 0.001$) more complete than NORs, while reports created for malignant disease were 14.98% (95% CI -18.44 to -11.52, $p < 0.001$) less complete than those created for benign disease. While both report types consistently documented important anatomic structures such as the status of the recurrent laryngeal nerve (SOR: 100%; NOR: 98%, $p = 0.20$), SORs reported all cancer-related elements 100% of the time, while NORs underreported presence of gross extrathyroidal extension (38%, $p < 0.001$), invasion of structures (31%, $p < 0.001$) and presence (16%, $p < 0.001$) and location (8%, $p < 0.001$) of gross residual disease. **Conclusion:** Implementation of a nationally developed SOR for thyroid surgery enhanced overall completeness and delivery of cancer-specific information, which can improve quality of postoperative multidisciplinary care. Future investigation of SOR user satisfaction may help encourage its widespread adoption.

CANADIAN HEPATO-PANCREATO-BILIARY ASSOCIATION

01

The Toronto management of initially unresectable liver metastases from colorectal cancer in a living donor liver transplant program. *Lucksbi Rajendran, Marco Claasen, Tommy Ivanics, Nazia Selzner, Ian McGilvray, Mark Catral, Anand Ghanekar, Carol-Anne Moulton, Trevor Reichman, Chaya Shwaartz, Ur Metser, Ron Burkes, Erin Winter, Steven Gallinger, Gonzalo Sapisochin.* From the University of Toronto (Rajendran, Selzner, McGilvray, Catral, Ghanekar, Moulton, Reichman, Shwaartz, Metser, Gallinger, Sapisochin), University Health Network (Claasen, Ivanics, Selzner, McGilvray, Catral, Ghanekar, Reichman, Shwaartz, Metser, Winter, Sapisochin), Erasmus MC Transplant Institute (Claasen), Henry Ford Hospital (Ivanics), Uppsala University (Ivanics), Mount Sinai Hospital (Metser, Burkes), and Women's College Hospital (Metser).

Background: Living donor liver transplantation (LDLT) is an attractive option for patients with unresectable, bilobar colorectal liver metastases (CRLM). However, it is not available in most centres beyond study protocols. This study describes the interim experience with LDLT for CRLM at a large North American transplant and hepatobiliary centre. **Methods:** Adults with unresectable CRLM, receiving systemic chemotherapy were recruited into a prospective clinical trial. Data on demographics, referral patterns and clinical characteristics were extracted from October 2016 to February 2023. Patients were divided into 3 groups: transplanted, resected and control (excluded, with continuation of systemic chemotherapy). Overall survival (OS) and recurrence-free survival (RFS) were compared. **Results:** Eighty-one referred patients were assessed for LDLT. Of these, 7 received transplants, 22 underwent resection and 48 control. All had similar preassessment baseline characteristics. Median time from initial assessment to transplantation was 15.3 months. The control population had significantly worse postassessment OS than the transplanted population ($p = 0.002$) and resected population ($p < 0.001$). The median follow-up duration was

21.4 months (resection) and 14.8 months (LDLT). There was no difference in OS between the transplanted and resected populations (1-yr: 100% v. 93.8%; 3-year: 100% v. 43.3%, $p = 0.17$). However, RFS was superior in the LDLT group (1-yr: 85.7% v. 16.4%; 3-year: 68.6% v. 10.9%, $p = 0.015$). **Conclusion:** Most patients with unresectable CRLM referred for LDLT are deemed ineligible for trial inclusion. However, the excellent oncologic outcomes in patients who meet criteria for LDLT support its role in highly selected populations. Future results after the trial's completion will inform long-term outcomes.

02

Dissection of a replaced right hepatic artery arising from the superior mesenteric artery during a laparoscopic Whipple. *Juan Glinka, Evelyn Waugh, Ken Leslie, Anton Skaro, Epharaim Tang.* From London Health Sciences Centre and Western University.

Background: Increasing evidence supports the superior mesenteric artery (SMA) divestment in pancreatic cancer, especially in the neoadjuvant era. It increases the chances of achieving negative margins, maximizing survival benefits. Vascular variants, such as right hepatic artery (RHA) arising from the SMA, are quite common and require special care during the final steps of the Whipple to prevent arterial evascularization of the liver. Ways of dealing with such aberrant anatomy are well described in the conventional surgery literature. However, technical reports about its management within minimally invasive approaches are limited. **Methods:** Here, we present our uncinate dissection approach when this particular situation is encountered during laparoscopic pancreatoduodenectomy (LP). We also present a strategy to dissect the RHA when a metal stent has been placed preoperatively, creating inflammation and adhesions to the hilar structures. **Results:** LP, when an accessory or replaced RHA originates from the SMA, is safe, feasible, and does not affect the outcomes of the procedure. **Conclusion:** A number of details have to be considered to prevent a major arterial injury from compromising either the liver

or the small bowel blood supply during LP, especially in the context of RHA arising from the SMA.

03

Implementing the HIBA index: a low-cost method for assessing future liver remnant function. *Juan Glinka*. From London Health Sciences Centre and Western University.

Background: The HIBA index is a novel method based on hepatobiliary scintigraphy (HBS) and single-photon emission computed tomography that can accurately predict posthepatectomy liver failure (PHLF) when planning a major liver resection. Since the initial data and validation were published, many HPB surgery centres around the world have found this method interesting and promising. However, the collaboration between surgeons and nuclear medicine physicians has been a challenge and, in many cases, a barrier to its implementation. **Methods:** We created a didactic video explaining the basis and the process of the HIBA index implementation, including captures of the nuclear medicine console and real-time acquisitions (<https://www.youtube.com/watch?v=vk4nMBbdneM>). This will not only serve as a guide for the nuclear medicine specialist but also provides a multidisciplinary overview to help explore this useful tool that can be incorporated into any liver surgery unit. We aim to generalize this method and create a multicentric registry that would aim to validate the ultimate outcomes upon its implementation. **Results:** We have tutored a limited number of liver surgery centres with great success. Formal multicentric validation along the implementation aspects is still required. **Conclusion:** This presentation provides a didactic and broad overview of the HIBA index technique that facilitates its understanding and, therefore, implementation in a multidisciplinary fashion. This certainly would result in the availability of a noninvasive, low-cost test that can be performed broadly, facilitating decision-making when assessing PHLF risk in patients needing a major liver resection.

04

Oncologic outcomes after surgical resection versus thermoablation in early-stage hepatocellular carcinoma: a systematic review of randomized controlled trials with meta-analysis. *Janyssa Charbonneau, Alexandre Brind'Amour, Alexis F. Turgeon, Sarab O'Connor, Thomas Couture*. From Université Laval (Charbonneau, Brind'Amour, Turgeon, O'Connor, Couture), and Centre Hospitalier Universitaire de Québec (Charbonneau, Brind'Amour, Turgeon, Couture).

Background: Surgical resection is considered the standard of care for hepatocellular carcinomas, but thermoablation treatments represent less invasive curative options. To date, optimal treatment choice remains unclear and guidelines are conflicted. This systematic review sought to evaluate whether thermoablation techniques are noninferior to surgical resection for early-stage hepatocellular carcinomas (stage T1–T2). **Methods:** Randomized controlled trials comparing thermoablation techniques with surgical resection among patients with hepatocellular carcinomas were systematically searched through Embase, MEDLINE, CENTRAL and Web of Science, up to November 2022. No restrictions for language, publication type or year

were made. Primary outcome was overall survival (OS) and secondary outcomes were recurrence-free survival (RFS), overall hepatic recurrence, extrahepatic recurrence, overall morbidity, minor and major complications. Relative risks (RR) with random-effects models (inverse variance) were used. A noninferiority margin of 5% RR was considered following consensus of a group of clinical experts. Subgroup analyses were planned for latest follow-up time, risk of bias, number and diameter of lesions, thermoablation technique and cirrhosis status. The Grading of Recommendations, Assessment, Development, and Evaluations approach was used to estimate the quality of evidence. **Results:** Overall, 5829 citations were identified, and 11 trials (1736 patients) were included. Noninferiority of thermoablation could not be shown on OS (RR 0.92, 95% confidence interval [CI] 0.85–1.00, $I^2 = 33\%$) and RFS (RR 0.80, 95% CI 0.69–0.93, $I^2 = 49\%$). Thermoablation was associated with decreased overall morbidity (RR 0.43, 95% CI 0.30–0.62) and incidence of major complications (RR 0.22, 95% CI 0.07–0.71). Overall hepatic recurrence was higher with thermoablation (RR 1.28, 95% CI 1.10–1.48), but there was no significant difference in extrahepatic recurrence (RR 0.84, 95% CI 0.47–1.50). Analyses offered low quality of evidence. **Conclusion:** Noninferiority of thermoablation could not be confirmed when compared with surgical resection in terms of OS and RFS in patients with early-stage hepatoma. High-quality studies are still needed, but this could suggest surgical resection to be the preferred oncological option.

05

Robotic pancreatic necrosectomy and internal drainage for walled-off pancreatic necrosis. *Yifan Wang, Osamu Yoshino, Michael Driedger, Michael Beckman, Dionisios Vrochides, John Martinie*. From McGill University (Wang), and Atrium Health Carolinas Medical Center (Yoshino, Driedger, Beckman, Vrochides, Martinie).

Background: Pancreatic necrosectomy with concomitant internal drainage is a single-stage treatment option for walled-off pancreatic necrosis (WOPN). However, an optimal minimally invasive technique has not been established. We sought to evaluate the safety and single-intervention success rate of robotic pancreatic necrosectomy and internal drainage. **Methods:** Patients with WOPN undergoing robotic pancreatic necrosectomy and internal drainage at a single, high-volume pancreatic centre between 2011 and 2022 were identified. The primary outcome was the rate of clinical symptom resolution following the index surgical intervention. **Results:** Fifty-seven patients underwent robotic pancreatic necrosectomy and internal drainage, consisting of robotic cystgastrotomy ($n = 37$), robotic cystjejunostomy ($n = 13$) and robotic fistulojejunostomy ($n = 7$). Surgery was performed a median of 102 (range 28–1153) days following the onset of necrotizing pancreatitis. The median WOPN size was 13.4 (range 5.6–23.6) cm. The median operative time was 187 (range 91–344) minutes and there were 2 (3.5%) conversions. The median length of hospital stay was 4 (range 2–38) days. Postoperative morbidity was 11%, and there was 1 (1.8%) death within 90 days. At a median follow-up of 5.5 months, 53 (93%) patients had clinical symptom resolution after their index procedure and did not require any reintervention. **Conclusion:** In select

patients, robotic pancreatic necrosectomy and internal drainage is safe and achieves a high single-intervention success rate.

06

Predicting diabetes mellitus after partial pancreatectomy: PRIMACY, a pilot study. *Abdulrahman Alabduljabbar, Maral Aali, Christopher Lightfoot, Boris Gala-Lopez.* From Imam Abdulrahman Bin Faisal University (Alabduljabbar), and Dalhousie University (Aali, Lightfoot, Gala-Lopez).

Background: Endocrine insufficiency is frequent after partial pancreatectomy (PP). It severely impacts quality of life, but there are limited data describing the incidence of postpancreatectomy diabetes mellitus (PPDM), or adequate predictors. **Methods:** We conducted a prospective feasibility trial to explore the design of a model to predict the risk of PPDM in nondiabetic patients undergoing PP at a tertiary hospital between January 2021 and November 2022. The model included the estimated baseline pancreatic β cell function using the BETA-2 Score, a validated tool including fasting blood glucose, C-peptide and HbA_{1c}, paired with the estimated future remnant pancreatic volume (FRPV), calculated from the preoperative imaging. The 90-day BETA-2 score was also measured, along with the outcome variable — diabetes, as defined by the American Diabetes Association (ADA). **Results:** Among 43 recruited patients who underwent the procedure, 30 patients met the inclusion criteria, but only 22 completed the study. Three (13.6%) experienced diabetes according to ADA (HbA_{1c} \geq 6.5%), but none required oral antihyperglycemic agents or insulin. Four patients (18.2%) had prediabetes (HbA_{1c} 5.7%–6.4%). Four patients (18.2%) reported exocrine insufficiency 90 days after surgery, but this was not associated with any endocrine changes. There were significant differences observed between the pre- and postoperative BETA-2 scores and HbA_{1c} during left pancreatectomies, and this was associated with the outcome variable ($p = 0.02$). A preliminary model was designed using the preoperative BETA-2 score, the use of neoadjuvant chemotherapy and the FRPV, which is highly predictive of diabetes. **Conclusion:** Although this is an exploratory study with small sample size, we were able to identify potential predictors of PPDM after a partial pancreatectomy, which can be used as a clinical tool to assist surgeons preoperatively. It's also a platform to launch a larger pan-Canadian study with sufficient power to validate our findings.

07

Bleed and save: patient blood management in hepatectomy. *Maud Labelle, Frédérick D'Aragnon, Yves Collin.* From the Université de Sherbrooke.

Background: Hepatectomies are associated with a significant risk of bleeding. Clinicians' use of strategies to prevent bleeding are determined by a combination of factors, including emerging clinical research, knowledge translation and resource availability. The objective of this study was to describe the availability of treatment strategies to prevent bleeding during hepatectomies in a single centre. **Methods:** We conducted a retrospective cohort study in a single Canadian academic centre. All adult patients undergoing hepatectomy between Jan. 1, 2011, and Mar. 31, 2022, were included. We collected data from hospital records.

We performed detailed data collection of patients' demographic, clinical and pathological characteristics. Descriptive analyses generated means with standard deviation (SD), medians with interquartile range, or proportions, as appropriate. Research ethics boards approved this study using a waiver of research consent (2023–5069). **Results:** Of all eligible patients, 555 met our inclusion criteria. The mean age was 64.3 (SD 11.5) years, and 43.1% ($n = 239$) were female. The most common diagnosis leading to hepatectomy was colorectal hepatic metastasis (52.3%, $n = 290$), benign cysts (10.6%, $n = 59$) and hepatocellular carcinoma (9.4%, $n = 52$). The mean hemoglobin before surgery was 130 (SD 19) g/L. Seventy-eight (14.1%) patients received at least 1 unit of red blood cell transfusion during or after surgery. Intraoperative strategies to prevent blood transfusion included blood salvage technology (14.6%, $n = 81$), phlebotomy (42.7%, $n = 237$) and intermittent Pringle manoeuvre (3.1%, $n = 17$). Hypovolemic phlebotomy is a preoperative blood withdrawal from the patient that is transfused after liver resection and hemostasis. **Conclusion:** Only a few hepatectomies required blood transfusion. It is unclear if current intraoperative strategies prevent blood transfusion. Research to identify patients at low risk of bleeding during hepatectomy can lead to more efficient resource utilization.

08

Defining standards for hepatopancreatobiliary cancer surgery in Ontario, Canada: a population-based cohort study of clinical outcomes. *Dhruvin Hirpara, Jonathan Irish, Mohammed Rashid, Tbarsiya Martin, Alice Zbu, Leah McKnight, Amber Hunter, Shiva Jayaraman, Alice Wei, Natalie Coburn, Frances Wright.* From the University of Toronto (Hirpara, Zhu), University Health Network (Irish), Ontario Health (Rashid, Martin, McKnight, Hunter), Unity Health (Jayaraman), St. Joseph's Health Centre (Jayaraman), Memorial Sloan Kettering Cancer Center (Wei), and Sunnybrook Health Sciences Centre (Coburn, Wright).

Background: In 2006, Cancer Care Ontario created Surgical Oncology Standards for hepatopancreatobiliary (HPB) surgery. This study aimed to identify the impact of these quality metrics on outcomes and organization of care for hepatectomy and pancreaticoduodenectomy (Whipple) in Ontario, Canada. **Methods:** We performed a population-level analysis of all hepatectomy and Whipple procedures performed between 2003 and 2019. Multi-level regression models were used to compare 30- and 90-day mortality and length of stay (LOS), before (2003–2006), during (2007–2011) and after (2012–2019) standardization. Interrupted time series (ITS) models were used to account for secular trends. **Results:** A total of 7904 hepatectomies and 5238 Whipple resections were performed. Age, sex, and comorbidities were comparable over time. Over 98% of hepatectomies and Whipples were performed at a designated centre (DC) after standardization. Median annual case volumes at DCs increased from 55 to 67 hepatectomies ($p < 0.001$) and from 22 to 50 Whipple procedures ($p < 0.001$) over time. Crude 30-day mortality after hepatectomy was 2.6% (95% confidence interval [CI] 1.8%–3.7%) and 2.3% (95% CI 1.9%–2.8%) before and after standardization, respectively ($p = 0.9$). Crude 30-day mortality rate after Whipple procedures was 3.6% (95% CI 2.5%–5.1%) before and 2.4% (95% CI 1.9%–3%) after standardiza-

tion ($p = 0.1$). On multivariable analysis, the only difference observed was in 90-day mortality following Whipple after standardization (4.3%) compared with before (6.3%; adjusted odds ratio 0.66, 95% CI 0.5–0.9, $p = 0.03$). Median LOS was significantly lower for hepatectomy (6 v. 8 days) and Whipple procedures (9 v. 14 days; $p < 0.0001$), after standardization. All immediate and late effects on mortality and LOS were likely attributable to pre-existing secular trends. **Conclusion:** Provincial standardization was associated with a higher volume of complex HPB procedures at designated centres, with low rates of postoperative mortality. Our data highlight the merits of a coordinated and multifaceted system for consistently achieving the highest-quality outcomes after specialized oncologic surgery throughout a region of 15 million people.

09

Laparoscopic choledochoduodenostomy for recurrent choledocholithiasis. *Katlin Mallette, Ahmad Elnahas, Nawar Alkhamesi, Christopher Schlachta, Jeffrey Hawel, Ephraim Tang.* From Canadian Surgical Technologies & Advanced Robotics (Mallette, Elnahas, Alkhamesi, Schlachta, Hawel), London Health Sciences Centre (Mallette, Elnahas, Alkhamesi, Schlachta, Hawel, Tang), and Western University (Mallette, Elnahas, Alkhamesi, Schlachta, Hawel, Tang).

Background: Laparoscopic Roux-en-Y gastric bypass (LRYGB) is one of the most frequent operations currently done in the management of morbid obesity. Unfortunately, LRYGB limits access to the biliary tree, thus making management of patients with choledocholithiasis challenging. **Methods:** Here we present a case of a patient post-LRYGB with recurrent choledocholithiasis despite transgastric endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic cholecystectomy. After extensive discussion between a surgical endoscopist and an minimally invasive hepatobiliary surgeon, it was decided that she would undergo laparoscopic choledochoduodenostomy. **Results:** This video demonstrates the successful completion of her laparoscopic choledochoduodenostomy (https://youtu.be/r_lIGVBA35Y). The patient did well postoperatively and was discharged home on postoperative day 2. She was well with no recurrent symptoms at 4-week follow-up. **Conclusion:** Laparoscopic choledochoduodenostomy is a safe and effective treatment for recurrent choledocholithiasis. It is particularly helpful in the postoperative bariatric patient population where endoscopic access to the common bile duct is altered due to anatomy and ERCP access is limited.

10

A comparison of daytime versus evening versus overnight liver transplant from a single Canadian centre. *Subin Punnen, Jade Zhong, Yuwei Yang, Lucas Streith, Jordan Yu, Stephen Chung, Peter Kim, Stephanie Chartier-Plante, Maja Segedi, Michael Bleszynski.* From the University of British Columbia.

Background: Liver transplant is commonly performed overnight to avoid disruption to elective cases. This study sought to evaluate if daytime liver transplants affect patient outcomes in the Canadian system. **Methods:** Liver transplants performed

between 2012 and 2020 at a Canadian centre were reviewed retrospectively. Patients were split into 3 groups. Daytime was classified as a start time between 7 am and 3 pm, evening between 3 pm and 11 pm and overnight between 11 pm and 7 am. Demographics, preoperative characteristics, intraoperative metrics, postoperative complications and mortality were collected. Comparisons used a Kruskal–Wallis test, 2-way analysis of variance or Fisher exact test, depending on the variable. Survival analysis with Kaplan–Meier curves were performed for mortality and graft failure. **Results:** In total, 551 patients underwent liver transplant, with 37.0% as day transplants, 26.9% as evening and 36.1% as overnight. Groups had similar sex, age, Model For End-Stage Liver Disease score and prior liver transplant. There was no difference in mortality at 60 days (4.8% v. 2.9% v. 2.1%, $p = 0.41$), 1 year (10.4% v. 5.5% v. 7.5% $p = 0.38$) or 3 years (16.4% v. 12.9% v. 15.8%, $p = 0.81$). Similarly, there was no difference in graft failure at 60 days, 1 year or 3 years. There was no difference in operative time, blood loss or intraoperative fluid use. The daytime group had a longer cold ischemic time (CIT; 541.1 v. 344.1 v. 412.8 minutes, $p < 0.001$) and a lower reoperation rate (35% v. 46.2% v. 46.4%, $p = 0.04$). There were no differences in other complications, admission to the intensive care unit or hospital length of stay. **Conclusion:** The start time of liver transplant does not impact graft failure, mortality, operative time and most postoperative complications, despite longer CIT during day cases. Evening and overnight transplants are associated with more reoperations. Overall, there are some benefits to daytime liver transplants for patients. Future work is needed to examine resource utilization feasibility and health care provider burnout to provide a holistic conclusion on transplant start times.

11

Pilot study validating the line of safety as a landmark for safe laparoscopic cholecystectomy using indocyanine green and near-infrared imagine. *Molly White, Melanie E. Tsang, Shiva Jayaraman.* From the University of Edinburgh (White), the University of Toronto (Tsang), and St. Joseph's Health Centre (Jayaraman).

Background: Laparoscopic cholecystectomy (LC) has been the gold standard for gallbladder removal for decades, but remains associated with higher rates of bile duct injury than open cholecystectomy. To decrease rates of biliary injury, experts have developed various approaches, such as the “Critical View of Safety.” Despite these tools, bile duct injuries continue to occur. Landmarking the entire operative field may be a missing piece to enhance safe LC. The line of safety is defined as an imaginary line from Rouviere's sulcus to the junction of the peritoneum and fat overlying the cystic and hilar plates. All biliary and portal structures must lie inferior to this line, and thus keeping dissection above this line should keep surgeons in a zone of safety, even in challenging situations. Intraoperative biliary imaging can be accomplished using near-infrared fluorescence cholangiography (NIRF-C). This technique involves preoperative intravenous injection of indocyanine green (ICG). Following injection, ICG is protein bound, metabolized by the liver, then excreted in bile. The biliary tree can then be imaged, as its fluorescence can be integrated with a conventional laparoscopic view of the

operative field to show surgeons the location of the bile duct. With this technique, we hope to show validity of the previously described line of safety. **Methods:** This will be a pilot prospective observational study of patients undergoing elective cholecystectomy. In order to validate the line of safety as an anatomically correct landmark, deidentified screen captures of the portal and hepatocystic areas after ICG administration and with and without NIRF-C, will be taken in 10 consecutive cases. Two expert general surgeons (S.J. and M.T.) will review the photographs to verify the line of safety using the NIRF-C image as a correct anatomic reference. No patient data will be collected, except whether or not a bile duct injury was identified. **Results:** (Pending).

12

Effect of transversus abdominis plane catheters on postoperative opioid consumption in patients undergoing open liver resections — a single-centre retrospective review. *Kimberly Lam-Tin-Cheung, Shiva Jayaraman, Melanie Tsang, Brittany Greene.* From the University of Toronto (Lam-Tin-Cheung, Jayaraman, Tsang, Greene), St. Joseph's Health Centre (Jayaraman, Tsang, Greene), and Unity Health Toronto (Jayaraman, Tsang, Greene).

Background: Epidurals have long been considered the gold standard regional anesthetic for upper abdominal incisions; however, they can be associated with complications such as hypotension, spinal hematomas and infection. Local anesthetic infiltrated in the transversus abdominis plane (TAP) via intraoperatively placed catheter has been shown to be a safe locoregional alternative for liver surgery. This study aimed to compare opioid usage in patients undergoing open liver surgery between TAP catheters and epidurals. **Methods:** This single-centre retrospective study included patients who underwent liver resection with right subcostal incisions at a high-volume hepatopancreaticobiliary centre between January 2015 and December 2020. Patients either received epidural ($n = 62$) or TAP catheter ($n = 79$) in addition to standard multimodal analgesia. Outcomes measured included daily opioid consumption for the first 3 postoperative days (POD) and the day before discharge measured in morphine equivalents (MEQ). Cumulative MEQ and length of stay in hospital (LOS) were also measured. **Results:** Cumulative opioid consumption and average MEQ per day were found to be significantly higher in the TAP group than the epidural group (MEQ: 288.1 v. 191.9, $p = 0.017$; MEQ/d: 48.3 v. 31.6, $p = 0.008$). On POD1 and POD2, TAP catheters had significantly higher narcotic consumption (30.3 v. 20.2, $p = 0.04$ and 65.5 v. 26.7, $p = 0.0004$, respectively). At POD3 and the day before discharge, there were no significant differences (43.4 v. 38.0, $p = 0.33$ and 22.6 v. 27.6, $p = 0.11$, respectively). There was no difference in LOS between groups (6.2 v. 6.5 days, $p = 0.31$). **Conclusion:** Cumulative opioid consumption was higher with TAP catheters than epidurals. While narcotic consumption was greater up front, this did not translate to sustained increased opioid requirements. By POD3 and discharge, the daily consumption equalized between the groups, with no significant difference in LOS. These findings support TAP catheters as a reasonable alternative to epidurals for locoregional anesthetic.

13

Comparing the RETREAT score to the Milan criteria for predicting 5-year survival in post-liver transplant hepatocellular carcinoma patients: a retrospective analysis. *Pantbea Pouramin, Susan Allen, David Evan Nelson, Mark Walsh.* From Dalhousie University.

Background: In our regional-specific program, since 2015, hepatocellular carcinoma (HCC) has been the primary indication for liver transplant, accounting for 32% of cases. Given the scarcity of organ donations, it is important to identify patients who will survive long-term. Two scoring systems used to predict post-liver transplant survival include the Milan criteria and the RETREAT score. Here, we conducted a retrospective analysis to compare the prognostic performance of the Milan and the RETREAT scores on 5-year mortality in post-transplant HCC patients. **Methods:** We conducted a retrospective chart review of HCC patients who received a transplant in our catchment area between 2008 and 2022. In total, 104 patients met the inclusion criteria, and 5-year survival data were complete for 75 patients. **Results:** Mean age of patients was 66.9 ± 7.6 years, and mean body mass index was 29.4 ± 4.9 kg/m². The mean survival of patients at 1- and 5-year follow-up was 84.6% and 54.7%, respectively. HCC recurred in 9.6% of patients. The 3 most common comorbidities were hypertension (36.5%), diabetes (34.6%) and major cardiovascular disease (18.3%). Using area under the receiver operating curve analysis, the RETREAT score was comparable to the Milan score (0.64 v. 0.59). With the optimal cut-off of < 5 , the RETREAT score proved more sensitive than the Milan criteria (0.92 v. 0.82). Neither test was particularly specific (RETREAT: 0.21; Milan: 0.36). In a subsequent logistic regression analysis, which included the individual RETREAT and Milan components among other demographic and clinical factors, only the presence of microinvasion was predictive of 5-year survival (odds ratio 0.17, 95% confidence interval 0.048–0.62, $p = 0.007$). **Conclusion:** Our study found that the RETREAT score was more sensitive than the Milan criteria; however, only the presence of microinvasion had any significant prognostic value. Indicators beyond the RETREAT score may be needed to help predict mortality.

14

Characterizing the effect of a heat shock protein-90 inhibitor on porcine liver for transplantation using ex-vivo machine perfusion. *Julien Côté, Rolando Rebollo, Mélanie Borie, Ahmed Menaouar, Carolyne Landry, Marylène Plasse, Richard Létourneau, Michel Dagenais, Zbixia Rong, André Roy, Eve Beaudry-Simoneau, Franck Vandenbroucke-Menu, Réal Lapointe, Pasquale Ferraro, Shant Der Sarkissian, Nicolas Noiseux, Simon Turcotte.* From Centre hospitalier de l'Université de Montréal (Côté, Plasse, Létourneau, Dagenais, Rong, Roy, Beaudry-Simoneau, Vandenbroucke-Menu, Lapointe, Ferraro, Noiseux, Turcotte), Centre de recherche du Centre hospitalier de l'Université de Montréal (Côté, Borie, Menaouar, Landry, Lapointe, Ferraro, Der Sarkissian, Noiseux, Turcotte), and Pontificia Universidad Católica de Chile (Rebollo).

Background: Donation after circulatory death (DCD) results in a greater susceptibility of the liver to ischemia reperfusion injury

(IRI). Ex-vivo machine perfusion may reduce complications associated with IRI, but optimal protocols remain to be established. The use of a heat shock protein-90 inhibitor (HSP90i) in ex-vivo perfused animal lung and heart grafts has shown a protective effect from IRI. We assessed whether a HSP90i in ex-vivo perfusion could protect porcine liver from IRI. **Methods:** The machine perfusion protocol was 2h at 10°C, 1h of controlled rewarming, and 4h at 38°C. The perfusate included a buffered extracellular solution, synthetic hemoglobin (HbO2 Therapeutics) and parenteral nutrition. We compared the hydrodynamics and the liver histological integrity and functions of non-DCD controls versus DCD livers with or without a HSP90i during warm perfusion. **Results:** In 3 controls, 5 DCD and 2 controls + HSP90i, the mean (\pm standard error of the mean [SEM]) arterial flow was 243 ± 5.5 , 287 ± 6.8 and 494 ± 14.9 mL/min/kg, respectively, significantly higher in the HSP90i groups ($p < 0.0001$). The mean (\pm SEM) portal flow was 445 ± 2.4 , 466 ± 4.6 and 1103 ± 17.6 , respectively, significantly higher in the HSP90i group ($p < 0.001$). The mean (\pm SEM) portal pH was 7.35 ± 0.02 , 7.37 ± 0.02 , and 7.44 ± 0.02 , respectively, significantly more alkaline in the HSP90i group. The mean (\pm SEM) lactate concentration in the perfusate was 3.37 ± 0.30 , 4.16 ± 0.36 and 2.76 ± 0.54 mmol/L, respectively, similar in all groups. The mean total bile volume produced was 39.0, 36.6 at 12.9 mL, respectively. **Conclusion:** We have optimized an ex-vivo porcine liver perfusion protocol to test the effect of drugs on organ reconditioning. Our preliminary data suggested that a HSP90i can markedly increase the perfusate inflow. Experiments are ongoing to characterize the underlying mechanism and its histological and functional impact specifically in the DCD livers.

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Modulation by PCSK9 of the immune recognition of colorectal cancer liver metastasis. *Yara Haddad, Antoine Bernard, Clara Lafortune, Nathalie Brassard, Annie Roy, Claude Perreault, Gaétan Mayer, Mieczyslaw Marcinkiewicz, Majambu Mbikay, Michel Chrétien, Simon Turcotte.* From Centre de recherche du Centre hospitalier de l'Université de Montréal (Haddad, Bernard, Brassard, Turcotte), Centre hospitalier de l'Université de Montréal (Haddad, Bernard, Brassard, Turcotte), and Institut de recherches cliniques de Montréal (Lafortune, Roy, Perreault, Mayer, Marcinkiewicz, Mbikay, Chrétien).

Background: Patients with colorectal cancer liver metastasis (CRLM) are refractory to current immunotherapies. The pro-protein convertase subtilisin/kexin type 9 (PCSK9) is mainly produced by the liver and causes the internalization of the low-density lipoprotein receptor (LDL-R) on hepatocytes; it could also internalize the major histocompatibility complex class I molecules (MHC-I) from the surface of cancer cells, preventing tumour recognition by T lymphocytes. We assessed whether PCSK9 contributes to the immune evasion of liver metastasis. **Methods:** Prognostic value of PCSK9: We assessed correlations between the oncological outcomes of a cohort of 250 patients following CRLM resection and the plasmatic levels (enzyme-linked immunosorbent assay [ELISA]) and intratumoral expression (immunohistochemistry and RNAseq) of PCSK9. In vitro impact of PCSK9 on MHC-I: We assessed PCSK9 secretion by cancer lines (ELISA), colocalization of PCSK9 and MHC-I using proximity ligation assays, and we assessed modulation of MHC-I with the

addition of anti- or recombinant PCSK9 protein (fluorescence-activated cell sorting). **Results:** By gene expression analysis of 52 resected CRLM, PCSK9 was expressed at lower levels in metastases classified as immune-reactive compared with non-immune reactive metastases. Unlike melanoma, cancer lines derived from colorectal cancer secreted PCSK9. On cancer cell lines, PCSK9 co-localized with MHC-I in addition to LDL-R. In correlative analysis, patients with high compared with low preoperative plasmatic PCSK9 had a shorter median survival after mCRC resection (46.5 v. 55.1 months, $p = 0.0209$). PCSK9 expression in the liver and CRLM has been optimized by immunohistochemistry and is being correlated with oncological outcomes. **Conclusion:** PCSK9 is produced by both hepatocytes and cancer cells in the liver and high plasmatic level is associated with shorter patient survival after resection of CRLM. Since PCSK9 colocalizes with MHC-I, experiments are ongoing to characterize whether the use of an anti-PCSK9 could prevent MHC-I internalization and enhance the immune recognition of CRLM and immunotherapeutic options for patients with this common malignancy.

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Implementation of a preoperative ketogenic diet for reduction of hepatic steatosis before hepatectomy. *Evelyn Waugh, Lynne Sinclair, Juan Glinka, Elizabeth Shin, Crystal Engelage, Ephraim Tang, Anton Skaro.* From Western University.

Background: Preoperative ketogenic diet (KD) has been proposed as a strategy to mitigate the risks of hepatic steatosis in patients undergoing hepatectomy. Our objective was to determine the short-term perioperative outcomes associated with a preoperative KD in patients with nonalcoholic fatty liver disease (NAFLD) undergoing liver resection. **Methods:** Retrospective review was conducted of patients with NAFLD identified on preoperative imaging or biopsy who were selected to undergo a 4-week well-formulated KD before liver resection for any indication. The primary outcome was receipt of blood transfusion. Secondary outcomes were number of units of packed red blood cells (pRBC) received, intraoperative blood loss, length of stay (LOS), 30-day major complications, 30-day mortality, 30-day readmission and 30-day reoperation. **Results:** Fifty patients underwent a ketogenic diet and 27 ultimately underwent major or minor hepatectomy. Median body mass index (BMI) was 30.4 kg/m². Perioperative transfusion rate was 1.5%. Median pRBC transfused in those receiving transfusion was 2 units. Mean blood loss was 566.7 mL. Median LOS was 6 days. The 30-day major morbidity was 33.3%, 30-day readmission was 7.4%, 30-day reoperation was 3.7% and 30-day mortality was 7.4%. BMI, laparoscopic versus open approach, neoadjuvant chemotherapy or major versus minor hepatectomy were not significant independent risk factors for intraoperative blood loss. **Conclusion:** The prevalence of NAFLD in Canada and a projected increase in sequelae of NAFLD including steatohepatitis, cirrhosis, hepatocellular carcinoma (HCC) and liver disease-related mortality over the next 10 years demands implementation of strategies to reduce hepatectomy-associated morbidity and mortality. Preoperative KD for NAFLD patients results in similar perioperative outcomes to what is reported in the literature. A propensity score-matched analysis is underway comparing these outcomes to patients without NAFLD undergoing liver resection.

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Trends in the incidence and management of hepatocellular carcinoma in Ontario. *Hala Muaddi, Jennifer Flemming, Bettina Hansen, Laura Dawson, Grainne O’Kane, Jordan Feld, Gonzalo Sapisochin.* From the University of Toronto (Muaddi, Hansen, Dawson, O’Kane, Feld, Sapisochin), and Queen’s University (Flemming).

Background: Hepatocellular carcinoma (HCC) is the third most common cancer worldwide and represents the fourth most common cause of cancer-related deaths. Preliminary data demonstrate that the incidence of HCC in Ontario increased by 65% from 2000 to 2021. However, it remains unknown whether patients in the province are served equally and how their treatments and outcomes differ by region. Our objectives were to examine trends in the incidence of HCC and to report variations in the treatment of HCC according to regions in Ontario. **Methods:** This was a retrospective population-based cohort study using linked administrative health data holdings at ICES. The study population included patients older than 18 years with liver cirrhosis who were living in Ontario had been diagnosed with hepatocellular carcinoma between 2004 and 2021. Herein we include a description of the preliminary data. Final analyses will include the annual incidence rate of HCC adjusted for age and sex, standardized to the 2011 Ontario population, and the first modality used to treat HCC stratified by region. **Results:** Preliminary analysis identified 18760 individuals newly diagnosed with HCC. The average age at the time of HCC diagnoses was 63.7 years (standard deviation [SD] 15.3), more commonly in males (64.3%), with either viral hepatitis (26.8%) or nonalcoholic fatty liver disease (53.8%). The average age of receiving the first treatment of HCC was 66.2 years (SD 13.9). Individuals were commonly treated with liver resection (11.2%) or with ablation (11.6%), while fewer received liver transplantation (4.6%). Most, however, did not receive any treatment for HCC (64.8%). **Conclusion:** This study will significantly impact patient management and will help inform initiatives to ensure equitable care across the province for HCC management. Additional analysis will be conducted to determine how HCC treatment varies in Ontario based on the individuals’ principal residence.

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Canadian coaching program leads to successful transition from open to laparoscopic hepatopancreatobiliary surgery. *Alice Zhu, Shiva Jayaraman, Sean Cleary.* From the University of Toronto (Zhu, Jayaraman), and the Mayo Clinic Comprehensive Cancer Center (Cleary).

Background: The adoption of minimally invasive surgery (MIS) in hepatopancreatobiliary (HPB) surgery is slow compared with other surgical fields. We aimed to explore surgeons’ perspective of coaching in surgery, barriers to the uptake of laparoscopy in HPB surgery and the role of an interactive coaching program in the uptake of laparoscopic HPB surgery across Canada. **Methods:** Between 2012 and 2019, practising HPB surgeons at 11 HPB centres across Canada participated in a hands-on, practical coaching program designed for introducing and enhancing MIS HPB surgery. The coaching consisted of didactic lectures/discussions, institutional visit to the coach’s centre, skills labora-

tory training and an institutional visit to participating centres for real-time coaching. Exit interviews were conducted with 1 lead surgeon from each centre. **Results:** Coaching was identified as a powerful tool in surgery, particularly in light of ongoing, rapid developments. Barriers identified for the uptake of laparoscopic HPB included inadequate experience and training. Institutional visits, hands-on practice, collegiality and enthusiasm from coaches and participants were key to a successful coaching program. All surgeons reported an increase in their comfort level at performing laparoscopic HPB procedures. Surgeons reported that coaching played a significant role in the uptake of laparoscopic HPB procedures at their institution, helping them in their transition toward MIS. Coaching increased the proportion of pancreas and liver resections done laparoscopically at their institution by 57% and 17%, respectively. **Conclusion:** Barriers to expanding laparoscopic HPB surgery include experience and lack of training in advanced MIS. An interactive, hands-on surgical coaching program creates a unique opportunity for professional development and may help with the uptake of laparoscopy in HPB. Expanding coaching initiatives in this context are key in the broader effort to allow for successful integration of new techniques in surgery.

21

The impact of a positive pancreatic margin analyzed according to LEEPP on the recurrence and survival of patients with pancreatic head adenocarcinoma. *Anthonie Hamel, Claudie-Anne Pigeon, Camille Marcoux, Thanh-Quan Philips Ngo, Isabelle Desbaies.* From the CHU de Québec and Université Laval.

Background: The resection margin (RM) plays an important role in pancreatic cancer. The microscopic margin involvement (R1) rate may vary according to the standardization of the pathological analysis protocol. The Leeds Pathology Protocol (LEEPP) allows circumferential analysis of RM according to a fully standardized pathology examination technique. Depending on the type of pathological protocol used, the prognostic significance of R1 margin compared with negative microscopic margin (R0) remains unclear. The aim of this study was to identify the impact of LEEPP on 3-year survival and recurrence of patients who underwent Whipple surgery for pancreatic head adenocarcinoma. **Methods:** This single-centre retrospective cohort study included adults who underwent Whipple surgery for pancreatic head adenocarcinoma between 2006 and 2019. **Results:** Among the 147 patients included in the study, the analysis of the specimens was done by the LEEPP for 101 patients and by a non-standardized protocol for 46 patients. A statistically significant difference was demonstrated for distant recurrence-free survival of R0 patients between the 2 groups ($p = 0.0380$). However, there was no statistically significant difference between the 2 groups when comparing R0 and R1 for overall survival and locoregional disease-free survival. **Conclusion:** LEEPP can recognize patients who are truly R0 and clarify the prognostic significance of R1. LEEPP improves distant recurrence-free survival of R0 patients when compared with R0 patients analyzed with a nonstandardized protocol. A fully standardized pathology protocol allowing circumferential analysis of RM should therefore be used for pathological margin analysis of pancreatic head adenocarcinomas.

22

Armed oncolytic virus VSV-LIGHT/TNFSF14 promotes survival and results in complete pathological and radiological response in an immunocompetent model of advanced pancreatic cancer. *Sarab Mansouri, Nawal Ambis, Maxime Léveillé, Christine Lawson, Carol Achard, Carolina Ilkow, Yves Collin, Lee-Hwa Tai.* From Université de Sherbrooke (Mansouri, Amhis, Léveillé, Lawson, Achard, Collin, Tai) and the Ottawa Hospital Research Institute (Ilkow).

Background: Oncolytic virotherapy (OV) is a promising therapy for immunologically cold malignancies such as pancreatic cancer. Without affecting healthy cells, the oncolytic vesicular stomatitis virus (VSV) infects, multiplies and lyses cancer cells. Infection with VSV induces a robust anti-tumour immune response, which is mediated by the immunogenic cell death (ICD) of cancer cells. This immune response can be amplified further by arming VSV with an immune-stimulating transgene, such as TNFSF14/LIGHT. **Methods:** We armed oncolytic VSV with TNFSF14/LIGHT. Recombinant VSV-TNFSF14/LIGHT was compared with unarmed VSV. Murine Panc02 and KPC cell lines were used. Cytotoxicity, viral replication, TNFSF14/LIGHT detection and ICD measurements were completed in vitro. We established a syngeneic, immunocompetent C57BL/6 mouse model. Mice were given saline, Folfirinox, VSV-TNFSF14/LIGHT, or a combination of treatments after tumours were established. The mice were then followed for survival. A computed tomography protocol was developed for monitoring. Immunophenotyping in peripheral blood was performed by flow cytometry. Tumors collected were analyzed by histologic staining, immunohistochemistry and flow cytometry. At day 200, mice that were tumour-free were rechallenged and followed for survival and recurrence. **Results:** VSV-TNFSF14/LIGHT selectively infects and lyses PDAC cell lines while generating immune-stimulating TNFSF14/LIGHT and inducing the release of ICD markers. In vivo, VSV-TNFSF14/LIGHT was well tolerated up to 6 doses with no adverse effects. When compared with saline, unarmed-VSV and Folfirinox, systemic VSV-TNFSF14/LIGHT treatments resulted in disruption of the immunosuppressive tumour micro-environment, significant tumour suppression and increased overall survival in mice with advanced disease. At 200 days, 10% of VSV-TNFSF14/LIGHT-treated mice showed complete response and developed durable anti-tumour immunity, making them immune to rechallenge. **Conclusion:** In our animal model, arming VSV with the immune-stimulating TNFSF14/LIGHT induces a potent antitumour immune response, resulting in durable tumour regression and immunity against rechallenge. VSV-

TNFSF14/LIGHT is a promising viro-immunotherapy for the treatment of pancreatic cancer.

23

Comparing the efficacy of cefazolin/metronidazole, piperacillin-tazobactam, or ceftioxin as surgical antibiotic prophylaxis in patients undergoing pancreaticoduodenectomy: a retrospective cohort study. *Lily Park, Christopher Griffiths, Daniel D'Souza, Felipe Rodriguez, Tyler McKechnie, Pablo E. Serrano.* From McMaster University.

Background: Postoperative complications following pancreaticoduodenectomy remain high at 40%–58%. The most common complications are surgical site infections (SSI). Optimal antibiotic selection for surgical prophylaxis is unclear. The current standard of care in many institutions includes ceftioxin (CX) or a combination of cefazolin and flagyl (CF). Recent studies suggest superiority of piperacillin-tazobactam (PT). The objective was to explore the impact of preoperative antibiotic selection (CF v. PT v. CX) on SSI. **Methods:** This was a retrospective cohort study at 1 Canadian institution. We included consecutive adult patients who underwent pancreaticoduodenectomy between November 2017 and December 2021 and received either CF, PT or CX preoperatively. Outcomes of interest included composite SSI, composite infection, and postoperative pancreatic fistula (POPF). Logistic regression models were used with adjustment for potential confounders including sex, body mass index, preoperative biliary stenting, bile duct size and gland texture. **Results:** We included 144 patients in the study. PT, CF and CX were administered as surgical antibiotic prophylaxis in 47, 51 and 46 patients, respectively. There were 39 (27.1%) composite SSI, 52 (36.1%) composite infections and 33 (22.9%) clinically significant POPF events in total. Adjusted analyses for composite SSI demonstrated odds ratio (OR) values and 95% confidence intervals (CI) of CX 0.61 (0.23–1.38), CF 0.88 (0.35–2.21) and PT 0.37 (0.15–0.88). Adjusted analyses for composite infections demonstrated OR values and 95% CI of CX 0.73 (0.29–1.83), CF 0.73 (0.30–1.77) and PT 0.14 (0.01–1.90). Adjusted analyses for POPF demonstrated OR values and 95% CI of CX 1.06 (0.87–1.31), CF 0.96 (0.79–1.18) and PT 0.70 (0.37–1.32). **Conclusion:** Antibiotic selection for surgical prophylaxis did not impact the development of composite SSI, composite infections or POPF in patients undergoing pancreaticoduodenectomy at our centre. These results are limited by the small sample size. A large-scale randomized controlled trial is needed to draw robust conclusions.

CANADIAN HERNIA SOCIETY

01

Not just jumping on the bandwagon: a cost-conscious establishment of a robotic abdominal wall reconstruction program in a publicly funded health care system. *Rachel Liu Hennessey, Yuwei Yang, Adam T. Meneghetti, O. Neely, M. Pantony, Chieh Jack Chiu.* From the University of British Columbia.

Background: The incidence and complexity of ventral hernias, particularly incisional hernias, is rising substantially. The increase in demand for minimally invasive approaches also challenges traditional open repairs as the standard accepted technique. Indeed, robotic-assisted laparoscopic repairs have gained popularity on the world stage, and many authors have published on its uptake. Despite reports of better short-term

outcomes, the main criticism for the adoption of the robotic surgery platform for abdominal wall reconstruction (AWR) has been the associated cost, especially in countries with publicly funded health care such as Canada. We describe our experience in implementation of robotic AWR while ensuring cost-effectiveness. **Methods:** This was a retrospective cohort analysis of all patients with ventral hernias ranging between 5 cm and 15 cm who underwent either open or robotic AWR between January 2020 and August 2022. We reviewed patient characteristics, operative time, postoperative length of stay (LOS) and average cost of surgery. **Results:** Forty-five patients underwent open repair and 28 underwent robotic AWR in the study period. There was no difference in major patient characteristics between the 2 groups. Operative time was shorter for open repairs (233.2 ± 96.6 min v. 299.3 ± 71.8 min, $p < 0.001$). LOS was significantly longer for open repairs (5.1 ± 2.5 days v. 2.5 ± 1.6 days, $p < 0.001$) and there were significantly more patients who underwent robotic repair who left hospital in less than 3 days (13.3% v. 64.3%, $p < 0.001$). The average overall hospital-based cost for each open repair was \$31 102.18 when the cost for equipment, operative time, inpatient hospital stay and epidural use was accounted for, compared with \$21 528.00 for robotic repair (\$9504.78 saving per case). **Conclusion:** With proper selection of patients based on size of hernia, we demonstrate cost-effective adaptation of the robotic technology to AWR. Our future study will continue to explore the benefits and limits of this approach in complex hernia repair.

02

Shouldice method brief educational video. *Oscar Henao, Fernando Spencer Netto, Marguerite Mainprize. From the Shouldice Hospital.*

Background: Ongoing education and training is vital for success in the field of medicine. In general surgery, one of the most commonly performed surgeries is hernia repair. There are many different hernia repair techniques, such as open with mesh or tissue, laparoscopic and robotic. Although many techniques are taught on an ongoing basis, there seems to be a gap in educating surgeons and trainees on tissue repairs. The Shouldice repair is the recommended tissue repair for inguinal hernias in recent guidelines. With the growing patient interest in a non-mesh-based hernia repair and absence of resources on learning the Shouldice repair, the aim of this project was to provide a visual tool on the Shouldice method. **Methods:** After the hospital's standard procedure of surgical consent was completed, patients who were undergoing primary inguinal hernia repair over the past 6 months from a single specialty hospital were selected to have their operations recorded. The template for building the recordings used a previously published article on the Shouldice method. Videos were recorded with GoPro hero 11 Black. The video was set at highest quality, 1x speed/low light 5.3–30FPS. A linear lens was used, and editing was done using the GoPro Application version 11.12.1 and Microsoft Video Editor version 2022.30120.12007.0. **Results:** A technical video of the Shouldice method was created (<https://youtu.be/1dPZB92w7AY>). The video depicts surgical steps unique to the Shouldice method, including the nerve identification, handling of the cremasteric

muscles, hernia treatment and the 4-layer repair. **Conclusion:** The results of this project provide a clear and concise video of the Shouldice method and can be used to update or teach general surgeons who want to incorporate non-mesh hernia repair into their practice.

03

Laparoscopic recurrent hiatal hernia repair with mesh gastropexy. *Rachel Liu Hennessey, Chieh Jack Chiu. From the University of British Columbia.*

Background: Hiatal hernia recurrence after previous repair continues to pose a challenge in management. The current recurrence rate is estimated to be 5%–30%, with reports of up to 42%. The use of mesh in hiatal hernia repair shows improved rates of recurrence but may be related to more dysphagia in the early postoperative period and increased complication rates at the time of reoperation. **Methods:** A recent systematic review and meta-analysis showed, however, that there may be benefit to mesh reinforcement during redo repair. We present the case of a 55-year-old female patient with recurrence at 1 year after laparoscopic primary hiatal hernia repair with Toupet fundoplication. **Results:** Recurrence of hiatal defect was confirmed on imaging study. Barium swallow study showed no evidence of obstruction at the level of the repair. The patient underwent laparoscopic recurrent hiatal hernia repair with reinforcement of the hiatus with hybrid monofilament resorbable mesh with hydrogel barrier. Interrupted sutures were placed to anchor the fundoplication to the right crus to ensure it did not volvulize. The stomach was further anchored to the anterior abdominal wall using a running 2–0 V-loc stitch. **Conclusion:** The patient did not experience any complications in the postoperative period and was discharged on postoperative day 2. There was no imaging evidence of recurrence at 1 month postoperatively.

04

Robotic transabdominal preperitoneal Grynfeltt lumbar hernia repair with mesh. *Rachel Liu Hennessey, Chieh Jack Chiu. From the University of British Columbia.*

Background: Lumbar hernias occur through the posterolateral abdominal wall bordered by the twelfth rib superiorly, iliac crest inferiorly, erector spinae medially and external oblique laterally. Overall rare in incidence, there are 2 types of lumbar hernias through either the superior or inferior lumbar triangles described by Grynfeltt and Petit, respectively. **Methods:** We present the case of a superior, or Grynfeltt, lumbar hernia. A 52-year-old female presented with a slowly enlarging bulge in the right lumbar area, causing soreness with activity. She had not experienced obstructive symptoms. Computed tomography showed a 3.4 cm right lumbar hernia containing retroperitoneal fat. **Results:** The patient underwent robotic transabdominal preperitoneal repair with primary closure of the fascial defect along with light-weight polypropylene mesh reinforcement. The peritoneal flap was recreated to exclude the mesh from the peritoneal cavity. **Conclusion:** The patient did not experience any complications in the postoperative period and was discharged on postoperative day 2.

CANADIAN ASSOCIATION OF BARIATRIC PHYSICIANS AND SURGEONS

01

Substance abuse screening prior to bariatric surgery: an MBSAQIP cohort study evaluating frequency and factors associated with screening. *Sukbdeep Jatana, Kevin Verboeff, Valentin Mocanu, Uzair Jogiati, Daniel Birch, Shabzeer Karmali, Noah Switzer.* From the University of Alberta (Jatana, Verboeff, Mocanu, Jogiati, Birch, Karmali, Switzer), and Royal Alexandra Hospital (Birch, Karmali).

Background: Patients undergoing bariatric surgery experience substantial risk of pre- and postoperative substance use. Identifying patients at risk for substance use using validated screening tools remains crucial to risk mitigation and operative planning. We aimed to evaluate proportion of bariatric surgery patients undergoing specific substance abuse screening, factors associated with screening and the relationship between screening and postoperative complications. **Methods:** The 2021 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database was analyzed. Bivariate analysis was performed to compare factors between groups who were screened for substance abuse versus non-screened and to compare frequency of outcomes. Multivariate logistic regression analysis was performed to assess the independent effect of substance screening on serious complications and mortality and to assess factors associated with substance abuse screening. **Results:** A total of 210 804 patients were included, with 133 313 (63.2%) undergoing screening and 77 491 (36.8%) who did not. Those who underwent screening were more likely to be White, non-smokers and have more comorbidities. The frequency of complications was not significant (e.g., reintervention, reoperation, leak) or similar (readmission rates 3.3% v. 3.5%) between screened and non-screened groups. On multivariate analysis, lower substance abuse screening was not associated with 30-day mortality or 30-day serious complication rates. Factors that significantly affected likelihood of being screened for substance abuse included being Black (adjusted odds ratio [aOR] 0.87, $p < 0.001$) or other race (aOR 0.82, $p < 0.001$) compared with White, being a smoker (aOR 0.93, $p < 0.001$), having a conversion (aOR 0.78, $p < 0.001$) or revision procedure (aOR 0.64, $p < 0.001$), having more comorbidities and undergoing Roux-en-y gastric bypass (aOR 1.13, $p < 0.001$). **Conclusion:** There remains significant inequity in substance abuse screening in bariatric surgery patients regarding demographic, clinical and operative factors. These factors include race, smoking status, presence of preoperative comorbidities and procedure type. Further awareness and initiatives highlighting the importance of identifying at-risk patients is critical for ongoing outcome improvement.

02

MBSAQIP risk calculator use in elective bariatric surgery is uncommon, yet associated with reduced odds of serious complications: a retrospective cohort analysis of 210 710 patients. *Alexandra Hetherington, Kevin Verboeff, Valentin Mocanu, Daniel Birch, Shabzeer Karmali, Noah Switzer.* From the University of Alberta.

Background: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) Bariatric Surgical Risk/Benefit Calculator was developed to provide patient-specific information to assist surgical decision making and aims to estimate the risk of complication following bariatric surgery. To date, no study has characterized which patients are being evaluated with this tool and whether those patients have improved outcomes. **Methods:** The 2021 MBSAQIP database was evaluated for the use of the risk calculator on preoperative counselling for patients undergoing bariatric surgery. Patient characteristics, operative techniques and outcomes were compared using bivariate analysis. Multivariable modelling evaluated factors, including use of the calculator, independently associated with serious complications and mortality. **Results:** Our study included 210 710 patients; 35 158 (16.7%) were evaluated using the calculator. Patients for whom the calculator was used were older (43.8 ± 11.6 years v. 43.6 ± 11.7 years, $p < 0.001$) and their average body mass index was higher (45.0 ± 8.0 kg/m² v. 44.7 ± 7.7 kg/m², $p < 0.001$). Additionally, patients in the calculator cohort were less likely to have an American Society of Anesthesiologists classification of 1–2 (16.2% v. 19.9%, $p < 0.001$) and were more likely to have insulin-dependent diabetes, hypertension, gastroesophageal reflux disease, renal insufficiency and sleep apnea. More patients underwent Roux-en-Y gastric bypass in the calculator cohort (29.6% v. 28.6%, $p < 0.003$). The rate of readmission was significantly lower in the calculator cohort (3.0% v. 3.4%, $p < 0.001$), as was the rate of serious complication (3.1% v. 3.4%, $p < 0.030$). Multivariable modelling evaluating serious complications showed that in all patients undergoing bariatric surgery, use of the calculator was independently associated with reduced risk of serious complications (odds ratio 0.87, 95% confidence interval 0.82–0.93, $p < 0.001$) but was not associated with mortality. **Conclusion:** In high-risk bariatric patients there is a reduction in serious complications when the risk calculator is used for preoperative counselling. The calculator should be used more often preoperatively to guide bariatric surgical decision making.

03

Short-term outcomes of concomitant versus delayed revisional bariatric surgery after adjustable gastric band removal. *Ali Safar, Najla Al-Ghathbi, Phil Vourtzoumis, Sebastian Demyttenaere, Olivier Court, Amin Andalib.* From McGill University.

Background: The need for revisional bariatric surgery after adjustable gastric banding (AGB) is increasingly reported, with a rate of 30%–60%. The timing of band removal and type of revisional procedure remain controversial. Our aim was to compare the safety and short-term outcomes of concomitant versus delayed revisional surgery after AGB removal. **Methods:** This was a retrospective review of all patients who underwent AGB removal with planned revisional bariatric surgery at a single academic institution between 2013 and 2020. Baseline demographics, body mass index (BMI), early postoperative morbidity and short-term outcomes were recorded.

Descriptive statistics are displayed as count (percentage) or median (range). **Results:** Sixty-one patients underwent AGB removal with a planned revisional surgery. While 44 patients (72%) underwent 1-stage revisional surgery, 17 patients (28%) had their revisional surgery performed in 2 stages. Median time interval between band removal and planned revisional surgery in the 2-stage group was 3 (range 1–24) months. Forty-four patients (72%) were female, and median BMI before band removal was 46 (range 30–72) kg/m². The most common revisional surgery performed was sleeve gastrectomy (SG; 89%). Median follow-up time was 12 (range 5–18) months and 11 (range 7–17) months in the 1-stage and 2-stage groups, respectively ($p = 0.17$). Median percent total weight loss was 22% (range 6%–40%) in the 1-stage group and 22% (range 1%–26%) in the 2-stage group ($p = 0.12$). The rate of major 30-day postoperative morbidity was 5% in the 1-stage and 12% in the 2-stage group ($p = 0.65$). There was 1 patient from the entire study cohort who developed a leak after a 2-stage SG, which was managed nonoperatively. **Conclusion:** Revisional bariatric surgery, particularly SG, after AGB removal can be safe in a 1-stage setting. Both 1-stage and 2-stage approaches in revisional surgery after AGB removal are similarly effective in further weight loss at short-term follow-up. Larger studies with longer follow-up time are needed to confirm our findings.

04

Safety and outcomes of bariatric surgery in patients with inflammatory bowel disease: a systematic review and meta-analysis. *Hillary Wilson, Kevin Verboeff, Jerry Dang, Janice Kung, Noah Switzer, Daniel Birch, Karen Madsen, Shabzeer Karmali, Valentin Mocanu.* From the University of Alberta (Wilson, Verboeff, Kung, Switzer, Birch, Madsen, Karmali, Mocanu), and the Cleveland Clinic (Dang).

Background: Prevalence of obesity in patients with inflammatory bowel disease (IBD) is increasing; however, few studies have evaluated bariatric surgery outcomes in this unique patient population. We aimed to perform a systematic review and meta-analysis evaluating the safety and efficacy of bariatric surgery in patients with IBD. **Methods:** This systematic review and meta-analysis was performed in keeping with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses and Meta-analysis of Observational Studies in Epidemiology guidelines. We evaluated adults (> 18 years) with IBD undergoing any bariatric surgery compared with those without IBD. Our primary outcome was complications, while secondary outcomes were anthropometric outcomes and IBD disease control. **Results:** We reviewed 2703 studies, with 11 (6 retrospective cohort studies, 4 retrospective observational studies, and 1 prospective descriptive study) meeting inclusion criteria. Within included studies, there were 1595 (0.5%) patients with IBD and 314 267 (95.5%) patients without IBD. There was a similar female predominance in both groups and ages were similar (55.7% and 46.0 years IBD v. 78.3% and 45.5 years non-IBD). Meta-analysis revealed that patients with IBD had significantly increased likelihood of postoperative complications (risk ratio 2.14, 95% confidence interval 1.87–2.44, $p < 0.00001$, $I^2 = 0\%$) compared with patients without IBD. Mortality and length of hospital stay were similar between groups. Despite risks, patients with IBD achieved on average a 55.1% excess weight

loss. Additionally, de-escalation of IBD medication was achieved in 11.4% of participants, while 9.7% required escalation of medication and 38.9% had no change in medication. **Conclusion:** While bariatric surgery presents a potentially effective weight loss option for patients with IBD, these patients are associated with higher rates of postoperative complications but no difference in mortality. Literature evaluating this topic is limited, warranting future research to better delineate the use of bariatric surgery in this patient population.

08

Prescription drug usage as measure of comorbidity resolution after bariatric surgery — a population-based cohort study. *Ted Wu, Wenjing He, Ashley Vergis, Krista Hardy.* From the University of Manitoba.

Background: Obesity is a chronic and progressive disease associated with significant morbidity, mortality and health care costs. Bariatric surgery is the most effective intervention for sustainable weight loss and resolution of obesity-related comorbidities. Studies looking at comorbidity resolution largely rely on individual self-reported outcomes and review of electronic records. We present a population-based study looking at prescription medication utilization before and after bariatric surgery as a measure of comorbidity resolution. **Methods:** All patients enrolled in the Centre for Metabolic and Bariatric Surgery who underwent either gastric bypass or sleeve gastrectomy between 2012 and 2019 in Manitoba were included. Demographic information, follow-up and prescription utilization data were collected through the Manitoba Centre for Health Policy for 5 years pre- and postsurgery. **Results:** A total of 1184 patients were included. Antidepressants and selective serotonin reuptake inhibitors were the most commonly prescribed medications and, along with thyroid medication, utilization remained stable after bariatric surgery. Proton pump inhibitors and opioid class drugs increased at 1 year after surgery then returned to baseline. Glucose and lipid-lowering medications including statins, biguanides, sulfonylureas and insulin were significantly decreased. Antihypertensives including angiotensin-converting enzyme inhibitors, calcium-channel blockers, angiotensin-receptor blockers, thiazides and β -blockers were similarly decreased. **Conclusion:** This is the first Canadian study using a province-wide prescription database to measure long-term comorbidity resolution after bariatric surgery. The use of administrative data eliminates potential biases and inaccuracies in follow-up and self-reported outcomes. Consistent with the literature, prescriptions for the treatment of metabolic syndrome were all significantly decreased and sustained at long-term follow up. Further studies are needed to delineate the effects of altered pharmaceutical utilization on patient quality of life and health care expenditures.

09

Experiences and outcomes of Indigenous patients undergoing bariatric surgery: a mixed-methods scoping review. *Marta Zmudzinski, Felica Daenick, Janice Linton, Marta Zmudzinski, Melinda Fowler-Woods, Wenjing He, Amanda Fowler-Woods, Geraldine Shingoose, Ashley Vergis, Krista Hardy.* From the University of Manitoba.

Background: Obesity and type 2 diabetes are growing global health concerns. Evidence suggests that Indigenous peoples are at higher lifetime risk of obesity and its associated conditions. The aim of this review was to explore the experiences and outcomes of Indigenous peoples living with obesity undergoing bariatric surgery in Canada, the United States, Australia and New Zealand. **Methods:** A literature search was conducted in MEDLINE, Scopus, CINAHL and Embase using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews guidelines. Two independent reviewers identified all studies exploring the experiences and outcomes of Indigenous patients undergoing bariatric surgery. Included quantitative and qualitative studies were evaluated using the Grading of Recommendations, Assessment, Development, and Evaluations and Critical Appraisal Skills Programme approaches, respectively. **Results:** A total of 92 nonduplicate articles were identified and 14 were included (4 qualitative, 10 quantitative). Quantitative data analysis revealed that Indigenous patients had fewer bariatric procedures, poorer clinic attendance, similar weight loss outcomes and slightly higher postoperative complication rates. Qualitative data analysis revealed that Indigenous patients living with obesity have a desire to improve their health and quality of life. Family is an important support and motivator, and nonsurgeon supports such as psychologists and bariatric mentors are lacking for Indigenous patients. **Conclusion:** Indigenous people in Canada, the United States, Australia and New Zealand appear to have poorer access to bariatric care, with similar outcomes and strong motivators for pursuing surgery. There is a paucity of literature examining the experiences or outcomes of Indigenous patients undergoing bariatric surgery. Further research must focus on development and implementation of cultural/community-based supports incorporating traditional Indigenous ways of knowing and being.

10

Bariatric surgery reduces major adverse kidney events in patients with chronic kidney disease: a multiple-linked database analysis in Ontario. *Yung Lee, Aristithes Doumouras, Amber Molnar, Francis Nguyen, Dennis Hong.* From McMaster University (Lee, Doumouras, Molnar, Hong), and ICES (Nguyen).

Background: Bariatric surgery has been shown to significantly reduce risk factors of metabolic syndrome. However, whether surgery can reduce mortality and improve renal function, especially in patients with established chronic kidney disease (CKD), remains poorly understood. **Methods:** This retrospective, population-based cohort study included patients with CKD (estimated glomerular filtration rate [eGFR] < 90 mL/min/1.73 m²) and body mass index (BMI) > 35 kg/m² who underwent bariatric surgery with follow up between 2010 and 2022. Multiple-linked administrative databases were used to define confounders, including baseline age, sex, BMI, eGFR, comorbidities, health care utilization (cancer screening, hospitalizations, specialist visits), socioeconomic status, and smoking or substance use. Nonsurgical control patients were identified from a linked primary care medical record database. The primary outcome was major adverse kidney events, which included a composite of all-cause mortality; new initiation of dialysis;

decline of eGFR by 50%; and admission to hospital with acute kidney injury, myocardial infarction, or heart failure. Secondary outcomes were individual components of the composite outcome and cause-specific mortality. Outcomes were evaluated through a multivariable adjustment. **Results:** We included 2471 CKD patients (mean age 60.13 years [standard deviation 8.34], 58.4% women), with 564 surgical patients and 1907 nonsurgical controls and a median follow-up time of 7.6 years. In the surgery group, 78 patients (13.8%) died, compared with 511 patients (26.8%) in the control group (adjusted hazard ratio [HR] 0.50, 95% confidence interval [CI] 0.39–0.62). Bariatric surgery was associated with 24% lower risk of major adverse kidney events than controls (adjusted HR 0.76, 95% CI 0.48–0.88). Specifically, bariatric surgery was associated with lower risk in all the individual components of the composite outcome. Bariatric surgery was also associated with lower cardiovascular and cancer mortality. **Conclusion:** Bariatric surgery was associated with substantially lower major adverse kidney events as well as all-cause, cardiac, and cancer mortality in patients with CKD and severe obesity.

11

Inter-rater reliability of indocyanine green fluorescence angiography for blood flow visualization in laparoscopic Roux-en-Y gastric bypass. *Romano Schneider, Andras B. Fecso, Priya Sharma, Azusa Maeda, Timothy Jackson, Allan Okrainec.* From the University Health Network.

Background: Indocyanine green (ICG) blood flow assessment may represent a sensitive, minimally invasive method to quantify perfusion of the gastrojejunostomy during laparoscopic Roux-en-Y gastric bypass (LRYGB). However, rating ICG perfusion may be challenging owing to its subjective nature and different scoring observers. **Methods:** This was a preliminary analysis of an interventional pilot study aimed to establish and evaluate the use of ICG fluorescence angiography as an indicator of anastomotic blood flow during LRYGB. ICG measurements were performed at 4 different locations of the gastric wall and at the small bowel, prior to and after the creation of the gastrojejunostomy using a simple visual scoring system (1 to 5). The scores were assessed by 2 independent surgeons intraoperatively as well as by 2 blinded surgeons using video recordings of the procedures. To assess whether raters scored perfusion similarly, the inter-rater reliability was determined using the intraclass correlation coefficient (ICC). ICC values were categorized as poor (0.9) agreement. **Results:** Inter-rater reliability of ICG assessment was examined in 20 patients undergoing ICG angiography during LRYGB. ICC calculated on different anatomic localizations ranged from 0.323 to 0.769, with a mean ICC of 0.605. While some ICCs fell below 0.5, most ICCs were between 0.5 and 0.7, and 2 ICCs were higher than 0.7. These results suggest that the reliability of the measures showed on average a moderate to good correlation. **Conclusion:** ICG angiography allows blood flow assessment during LRYGB using a simple observer scoring system. Based on the calculated ICC values, however, there is not always a good agreement among the raters in terms of their scores. This highlights the need for further improvement and standardization of rating procedures to ensure more consistent and reliable results.

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Characterization of small bowel obstructions following elective bariatric surgery. *Cheyne McLean, Valentin Mocanu, Daniel Birch, Shabzeer Karmali, Noab Switzer.* From the University of Alberta.

Background: Small bowel obstruction (SBO) after bariatric surgery is a common and poorly characterized complication. Our objectives were to characterize bariatric surgery patients who developed an SBO, compare 30-day complication rates among bariatric surgery patients who developed an SBO with those who did not, and determine the influence of patient and procedure factors on the development of SBO. **Methods:** Data were extracted from the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database using the 2020 operative year. Multivariable logistic regression modelling was used to determine the influence of patient and operative factors on the development of SBO. **Results:** Of 142 111 patients, 408 (0.3%) were identified as having developed SBO. Overall, SBO patients were older (45.7 ± 11.5 yr v. 43.5 ± 11.9 yr, $p = 0.0002$), of reduced BMI (43.6 ± 6.8 kg/m² v. 45.1 ± 7.7 kg/m², $p = 0.0001$), and more likely to be of female sex (92.2% v. 81.1%, $p < 0.0001$). At 30 days postoperation, complications including need for reoperation (59.8% v. 1.0%, $p < 0.0001$), reintervention (12.8% v. 0.9%, $p < 0.0001$), readmission (71.3% v. 3.0%, $p < 0.0001$) and intensive care unit admission (9.8% v. 0.6%, $p < 0.0001$) were all increased in SBO patients. RYGB as the index surgery was the largest independent predictor of development of SBO (odds ratio [OR] 11.91, 95% confidence interval [CI] 8.92–15.90, $p < 0.0001$). With regards to patient factors, chronic obstructive pulmonary disease (OR 2.60, 95% CI 1.54–4.38, $p < 0.0001$), lower BMI (OR 0.83, 95% CI 0.77–0.90, $p < 0.0001$) and female sex (OR 0.38, 95% CI 0.27–0.56, $p < 0.0001$) were all independently predictive. **Conclusion:** SBO among elective bariatric surgery patients comprises approximately 0.3% of all MBSAQIP cases. Development of SBO is associated with serious outcome measures and certain patient populations may be at an increased risk. Further elucidation of technical factors for RYGB specifically associated with development of SBO may reduce this serious complication among elective bariatric surgical patients.

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Revision of bariatric surgery for gastroesophageal reflux disease: characterizing patient and procedural factors and 30-day outcomes for a retrospective cohort of 4412 patients. *Sarah MacVicar, Jerry Dang, Valentin Mocanu, Kevin Verboeff, Uzair Jogiati, Shabzeer Karmali, Daniel Birch, Noab Switzer.* From the University of Alberta (MacVicar, Mocanu, Verboeff, Jogiati, Karmali, Birch, Switzer), and the Cleveland Clinic (Dang).

Background: Gastroesophageal reflux disease (GERD) is a well-established potential consequence of bariatric surgery and can require revisional surgery. Our understanding of the population requiring revision is limited. In this study, we aim to characterize patients requiring revisional surgery for GERD to understand their perioperative risks and identify strategies to improve their outcomes. **Methods:** Using the Metabolic and Bariatric Surgery

Accreditation and Quality Improvement Program (MBSAQIP) registry, a retrospective cohort of patients who required revisional surgery for GERD in 2020 was identified. Multivariable logistic regression modelling was used to assess correlations between baseline characteristics and morbidity. **Results:** In total, 4412 patients required revisional surgery for GERD, encompassing 40.5% of all conversion procedures. In most cases, patients underwent sleeve gastrectomy (SG) as their original surgery ($n = 3535$, 80.1%). The revisional surgery for most patients was a Roux-en-Y gastric bypass (RYGB; $n = 3722$ [84.4%]). Major complications occurred in 527 patients (11.9%) and 10 patients (0.23%) died within 30 days of revisional surgery. Major complications included anastomotic leak in 31 patients (0.70%) and gastrointestinal bleeding in 38 patients (0.86%). Multivariable analyses revealed that operative length, preoperative antacid use and RYGB were predictors of major complications. **Conclusion:** GERD is a common indication for revisional surgery in patients who have undergone bariatric surgery. Patients who underwent SG as their initial procedure were the primary group who required revisional surgery for GERD; most underwent revision via RYGB. Further inquiry is needed to tailor operative approaches and preoperative optimization for revisional surgery patients.

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Duodenal-jejunal bypass liners are superior to optimal medical management in ameliorating metabolic dysfunction: a systematic review and meta-analysis. *Steffane McLennan, Kevin Verboeff, Kieran Purich, Jerry Dang, Janice Kung, Valentin Mocanu.* From the University of Alberta.

Background: Duodenal-jejunal bypass liners (DJBLs) are innovative reversible endoscopically implanted devices that have demonstrated great potential as either a primary or adjunct therapy for patients with obesity and metabolic disease. This systematic review and meta-analysis evaluates metabolic and anthropometric outcomes of DJBLs compared with optimal medical management for the treatment of obesity and its associated metabolic complications. **Methods:** A systematic search of MEDLINE, Embase, Scopus and Web of Science databases was conducted. Studies were reviewed and data extracted following Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. The primary outcome was glycated hemoglobin (HbA_{1c}) change at device explant, with secondary outcomes including body mass index (BMI), weight, fasting plasma glucose (FPG) and adverse events. **Results:** Twenty-eight studies evaluating a total of 1229 patients undergoing DJBL treatment met inclusion criteria. When compared with medical management, DJBLs provided superior reductions in HbA_{1c} (mean difference [MD] -0.96% , 95% confidence interval [CI] -1.43 to -0.49 , $p < 0.0001$), FPG (MD -1.76 mmol/L, 95% CI -2.80 to -0.72 , $p = 0.0009$), BMI (MD -2.80 kg/m², 95% CI -4.18 to -1.41 , $p < 0.0001$) and weight (MD -5.45 kg, 95% CI -9.80 to -1.09 , $p = 0.01$). Postexplant data reveal a gradual return to baseline status. Incidence of early device explant was 20.2%. Complications were resolved conservatively or with device explant without long-term morbidity or mortality. **Conclusion:** DJBLs provide significant metabolic and anthropometric improvements for patients with obesity. Uncertainty about the extent to which improvements are maintained after device removal may limit the use of DJBLs as a standalone treatment for obesity and associated metabolic complications.

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Characteristics and outcomes for patients undergoing revisional bariatric surgery due to persistent obesity: a retrospective cohort study of 10 589 patients. *Steffane McLennan, Kevin Verboeff, Valentin Mocanu, Uzair Jogiati, Daniel W. Birch, Shabzeer Karmali, Noah J. Switzer.* From the University of Alberta.

Background: Revisional bariatric surgery is an option for patients who experience weight regain or inadequate weight loss after primary elective bariatric procedures. However, there are conflicting data on safety outcomes of revisional procedures. We aim to characterize patient demographics, procedure type and safety outcomes for those undergoing revisional compared with initial bariatric interventions to guide management of these patients. **Methods:** The 2020 Metabolic and Bariatric Accreditation and Quality Improvement Program (MBSAQIP) registry was analyzed, comparing primary elective to revisional bariatric procedures for inadequate weight loss. Bivariate analysis was performed to determine between-group differences. Multivariable logistic regression determined factors associated with serious complications or mortality. **Results:** We evaluated 158 424 patients, including 10 589 (6.7%)

revisional procedures. Patients undergoing revisional procedures were more likely to be female (85.5% revisional v. 81.0% initial, $p < 0.001$), had lower body mass index (43.6 ± 7.8 kg/m² revisional v. 45.2 ± 7.8 kg/m² initial, $p < 0.001$) and fewer metabolic comorbidities than patients undergoing primary bariatric surgery. The most common revisional procedures were Roux-en-Y gastric bypass (48.4%) and sleeve gastrectomy (32.5%). Revisional procedures had longer operative duration compared with primary procedures. Patients undergoing revisional procedures were more likely to experience readmission to hospital (4.8% revisional v. 2.9% initial, $p < 0.001$) and require reoperation (2.4% revisional v. 1.0% initial, $p < 0.001$) within 30 days of the procedure. Revisional procedures were independently associated with increased serious complications (odds ratio [OR] 1.49, 95% confidence interval [CI] 1.36–1.64, $p < 0.001$) but were not a significant predictor of 30-day mortality (OR 0.74, 95% CI 0.36–1.50, $p = 0.409$). **Conclusion:** In comparison to primary bariatric surgery, patients undergoing revisional procedures have fewer metabolic comorbidities. Revisional procedures have worse perioperative outcomes and are independently associated with serious complications. These data help to contextualize outcomes for patients undergoing revisional bariatric procedures and to inform decision making in these patients.

ACUTE CARE SURGERY/TRAUMA

01

Collateral damage: the impact of the COVID-19 pandemic on the severity of abdominal emergency surgery at a regional hospital. *Lisa Jeffery, Hamish Hwang, Alexis Ryley.* From the University of British Columbia (Jeffery, Hwang), Vernon Jubilee Hospital (Hwang, Ryley), and Interior Health Authority (Ryley).

Background: The COVID-19 pandemic was declared Mar. 11, 2020. This had an unprecedented impact on primary and specialty care that went beyond patients directly infected. Visits to emergency departments dropped precipitously after the pandemic due to hospital avoidance, and when patients presented it was with more advanced diseases. Our objective for this quality-improvement project was to compare severity of abdominal emergency surgery pre- and postpandemic. **Methods:** We conducted a retrospective chart review of general surgery emergency bowel surgeries performed at Vernon Jubilee Hospital in the year pre-pandemic (2019–20) and 2 years postpandemic. Patient demographics and outcomes were recorded, including 2 previously validated scores measuring surgical disease severity: the Hospital length of stay, Readmissions and Mortality (HARM) score and the World Society of Emergency Surgery (WSES) score. **Results:** There were 85 cases pre-pandemic and 147 cases postpandemic. Demographics and whether patients had a family doctor were similar pre- and postpandemic. Patients postpandemic were more likely to have presentation more than 72 hours after onset of symptoms (61.2% v. 30.6%, $p < 0.00001$), colon resection (48.3% v. 32.9%, $p = 0.023$), ischemic bowel (9.5% v. 1.2%, $p = 0.013$), overall complications (49.0% v. 15.3%, $p < 0.00001$), Clavien–Dindo class 3–5 complications (15.0% v. 5.9%, $p = 0.038$), longer operating time (133 min v. 107 min, $p = 0.0004$), higher HARM score (2.4 v. 1.6, $p = 0.015$) and higher WSES score (5.8 v. 3.2, $p < 0.00001$). Complications, HARM and WSES scores were not affected by lack of a

family doctor or by more than 5 COVID patients concurrently admitted to hospital. **Conclusion:** Patients requiring emergency abdominal surgery fared worse in multiple dimensions in the post-pandemic period. We found a strong association between this period and delayed presentation and between delayed presentations and increased disease severity.

02

Pseudoaneurysms after high-grade penetrating solid organ injury and the utility of delayed CT angiography. *Morgan Schellenberg, Natthida Owattanapanich, Brent Emigh, Chance Nichols, Joshua Dilday, Chaiss Ugarte, Atsushi Onogawa, Kazubide Matsushima, Matthew J. Martin, Kenji Inaba.* From the LAC+USC Medical Center.

Background: Selective nonoperative management of penetrating abdominal trauma has gained traction over the past few decades. This management strategy leaves the injured viscera in situ and thereby allows complications such as pseudoaneurysms (PSAs), which carry risk of rupture/exsanguination. An empiric approach to PSA screening after solid organ injury is not yet established, particularly following penetrating trauma. Our study objective was definition of delayed computed tomography–angiography (dCTA) yield in triggering intervention for PSA after high-grade penetrating solid organ injury. **Methods:** Penetrating trauma patients at our American College of Surgeons–verified level 1 trauma centre with American Association for the Surgery of Trauma (AAST) grade ≥ 3 abdominal solid organ injury (liver, spleen, and/or kidney) were retrospectively screened (January 2017 to October 2021). Exclusions were age younger than 18 years, transfers in, death within 48 hours and immediate nephrectomy/splenectomy. dCTA was pursued at the discretion of the attending trauma surgeon. The primary outcome was intervention triggered by dCTA. Statistical testing with analysis of variance or the χ^2 test compared

outcomes by solid organ injured. **Results:** In total, 136 penetrating trauma patients with 148 high grade solid organ injuries met study criteria. These included 96 (65%) liver injuries, 44 (30%) kidney injuries and 8 (5%) splenic injuries. Median AAST grade of solid organ injury for each was 3 (range 3–4). dCTA to screen for PSA was performed in 65 patients (44%) at a median of hospital day 5 (range 3–8). dCTA identified PSAs and triggered angioembolization in 27% ($n = 6$) of kidney, 17% ($n = 7$) of liver and none of the splenic injuries, for an overall yield of 20%. **Conclusion:** Half of eligible penetrating high-grade solid organ injuries were screened for PSA with dCTA. dCTA identified a significant number of PSAs and triggered intervention in 20%, with the highest yield for kidney injuries. To avoid missing PSAs and incurring the risk of rupture, we suggest universal screening of high-grade penetrating solid organ injuries until the true incidence and natural history of PSAs is established.

03

Pseudoaneurysm screening after pediatric high-grade solid organ injury. *Morgan Schellenberg, Brent Emigh, Chance Nichols, Joshua Dilday, Chais Ugarte, Atsushi Onogawa, Doug Shapiro, Daniel Im, Kenji Inaba.* From the LAC+USC Medical Center.

Background: High-grade solid organ injuries carry a risk of complications, including pseudoaneurysms (PSA). The optimal approach to PSA screening among pediatric patients is unknown and may include delayed computed tomography–angiography (dCTA) and/or contrast-enhanced ultrasound (CEUS). This study endeavoured to define dCTA/CEUS yield in PSA diagnosis after pediatric high-grade solid organ injury. **Methods:** Patients younger than 18 years presenting to our American College of Surgeons–verified level 1 trauma centre with 1 or more American Association for the Surgery of Trauma (AAST) grade ≥ 3 abdominal solid organ injury (kidney, liver, spleen) were included (January 2017 to October 2021). Transfers in, death within 48 hours, and immediate nephrectomy/splenectomy were exclusions. PSA screening was pursued selectively based on attending discretion. Demographics, clinical/injury data and outcomes were collected. Primary outcome was performance of dCTA or CEUS. **Results:** Forty-two patients satisfied criteria, with median age of 12.5 years and Injury Severity Score of 22. Liver injuries were most frequent (48%), followed by spleen (33%) and kidney (19%). Initial management strategy was most commonly nonoperative (liver 60%, spleen 64%, kidney 75%). Overall, 26% underwent PSA screening at a median of hospital day 4, with dCTA (21%) or CEUS (5%). CEUS was used only among liver injuries (10%), with no PSA identified. One PSA was diagnosed on dCTA after splenic injury and was managed with observation. **Conclusion:** PSA screening occurs infrequently after pediatric high-grade solid organ injury, potentially due to concerns about radiation exposure from dCTA, which would be mitigated with CEUS. Further delineation of PSA incidence and yield of screening investigations are needed to avoid missing this important diagnosis and to determine the diagnostic accuracy of dCTA and CEUS.

04

Witnessed prehospital traumatic arrest: predictors of survival to hospital discharge. *Morgan Schellenberg, Natthida*

Owattanapanich, Chais Ugarte, Lydia Lam, Matthew J. Martin, Kenji Inaba. From the LAC+USC Medical Center.

Background: Trauma patients are rapidly transported to hospital for definitive care. Nonetheless, some are alive upon Emergency Medical Services (EMS) arrival but arrest on-scene or during transport to hospital. The objective of this study was to analyze EMS-witnessed traumatic arrests to identify survivors to hospital discharge. **Methods:** Patients sustaining EMS-witnessed traumatic arrest and entered into the National Trauma Data Bank were included (2007–2018). Mortality defined groups: survival to hospital discharge versus in-hospital death versus death in the emergency department (ED)/declared dead on arrival (DOA). We used analysis of variance or the χ^2 test to compare cohorts. Multivariable analyses established factors independently associated with survival out of the ED and to hospital discharge. **Results:** In total, 14177 patients met criteria: 10% survived, 22% died in hospital and 68% died in the ED or were DOA. Survivors tended to be female (33% v. 23% v. 23%, $p < 0.001$), injured by blunt trauma (71% v. 56% v. 60%, $p < 0.001$), had higher scene Glasgow Coma Scale (GCS) scores (15 [range 7–15] v. 3 [range 3–11] v. 3 [range 3–7], $p < 0.001$), and lower Injury Severity Scale (ISS) scores (13 [range 7–26] v. 27 [range 18–41] v. 25 [range 10–30], $p < 0.001$), particularly of the head (Abbreviated Injury Scale score 0 [range 0–2] v. 0 [range 0–4] v. 1 [range 0–4], $p < 0.001$). Survival out of the ED and to hospital discharge, respectively, were independently associated with younger age (odds ratio [OR] 0.990, $p < 0.001$ and OR 0.983, $p < 0.001$, respectively), female sex (OR 0.801, $p < 0.001$ and OR 0.706, $p < 0.001$, respectively), and higher scene systolic blood pressure (OR 1.004, $p < 0.001$ and OR 1.007, $p < 0.001$, respectively) and GCS scores (OR 1.122, $p < 0.001$ and OR 1.245, $p < 0.001$, respectively). Penetrating injury was associated with reduced survival to discharge (OR 0.579, $p < 0.001$). **Conclusion:** After EMS-witnessed traumatic cardiac arrest, survivors were more likely to be young, female and injured by blunt trauma, but less likely to be hypotensive or comatose on scene. These findings may have implications for ED resuscitation or declaration of care futility and should be further investigated with prospective multicentre study.

05

A tension controlled, noninvasive device for reapproximation of the abdominal wall fascia in open abdomens. *Joao Rezende-Neto.* From St. Michael's Hospital, University of Toronto and Keenan Research Centre.

Background: Delayed primary fascial closure can be challenging in abdominal operations for severe trauma and emergency surgery. Current techniques to reapproximate the fascia are invasive and provoke fascial damage. Therefore, their use is avoided during the early management of the open abdomen, causing gaps in the fascia to increase. This pilot study investigated the use AbCLO, a tension-controlled, noninvasive device for early application in staged laparotomies to promote fascial reapproximation. **Methods:** The device was used in conjunction with conventional temporary abdominal coverage dressing within 24 hours of the initial damage control laparotomy for trauma and emergency surgery. An integrated pressure gauge allowed control of tension during fascial reapproximation. The

fascial gap was measured daily; a paired 2-sided t test was used. **Results:** The device was applied at the bedside in 22 patients (13 trauma laparotomies and 9 emergency general surgeries). The abdomens were left open for 4.4 ± 2.9 days. Primary fascial closure was achieved in 18 patients (90%) despite a positive fluid balance of 10.3 ± 2.6 L on the day of fascial closure. Care was discontinued in 2 patients before attempt to close the fascia. The width of the fascial gap at the midpoint of the laparotomy was significantly smaller on the day of closure compared with baseline (4.8 ± 2.2 cm v. 15.3 ± 5.3 cm, $p = 0.003$). Similar findings were shown at the top and bottom of the incision. Airway and bladder pressures did not increase with the AbCLO compared with baseline (30 ± 4.6 cm/H₂O v. 30.3 ± 4.1 cm/H₂O, $p = 0.19$ and 10.4 ± 2.6 mm Hg v. 11.4 ± 3.4 mm Hg $p = 0.10$, respectively). Fascial reapproximation generated a pressure of 38.1 ± 6.3 mm Hg on the abdominal wall and did not cause intra-abdominal hypertension or abdominal compartment syndrome. The fascia and the skin were intact in all patients with AbCLO. **Conclusion:** Gradual reapproximation of the abdominal wall fascia and reduction of the fascial gap was achieved noninvasively with controlled tension at the bedside. The AbCLO device successfully promoted primary fascial closure in open abdomens.

08

Delayed vs. early laparoscopic appendectomy (DELAY) for adult patients with acute appendicitis: a randomized controlled trial. *Sunil Patel, Lisa Zhang, Zubaib Mir, Madeline Lemke, William Leeper, Laura Allen, Eric Walser, Kelly Vogt.* From Queen's University (Patel), University of Ottawa (Zhang), Dalhousie University (Mir), and Western University (Lemke, Leeper, Allen, Walser, Vogt).

Background: Despite a lack of supporting evidence, those with acute appendicitis who present at night frequently have surgery delayed until the following morning. Thus, the objective of this randomized controlled trial was to assess whether delaying appendectomy until the following morning is non-inferior to immediate surgery in those with acute appendicitis presenting at night. **Methods:** The DELAY trial was a non-inferiority randomized controlled trial conducted between 2018 and 2022 at 2 tertiary care hospitals in Canada. Adults with imaging-confirmed acute appendicitis who presented at night (10 pm to 4 am) were included. Delaying surgery until after 6 am was compared with immediate surgery. The primary outcome was 30-day postoperative complications. A prior noninferiority margin of 15% was deemed clinically relevant. **Results:** In total, 127 of a planned 140 patients were enrolled in the DELAY trial (59 in the delayed group, 68 in the immediate group). The 2 groups were similar at baseline. The mean time between decision to operate and surgery was longer in the delayed group (11.0 hours v. 4.4 hours, $p < 0.0001$). The primary outcome occurred in 6/59 (10.2%) of those in the delayed group and 15/67 (22.4%) of those in the immediate group ($p = 0.07$). The difference between groups met the a priori noninferiority criterion of +15% (risk difference -12.2%, 95% confidence interval -24.4% to 0.4%, test of noninferiority $p < 0.0001$). **Conclusion:** The DELAY study is the first trial to assess delaying appendectomy in those with acute appendicitis. We demonstrate noninferiority of delaying

surgery until the following morning, which supports this widely adopted practice.

09

Days at home after malignant bowel obstructions: a patient-centred analysis of treatment decisions. *Tiago Ribeiro, Sarah Bateni, Adom Bondzi-Simpson, Natalie Coburn, Julie Hallet, Victoria Barabash, Austin Barr, Wing Chan.* From the University of Toronto (Ribeiro, Bondzi-Simpson), University of Alabama at Birmingham (Bateni), Sunnybrook Health Sciences Centre (Coburn, Hallet), Sunnybrook Research Institute (Barabash, Barr), and ICES (Chan).

Background: Malignant bowel obstruction (MBO) is a common presentation in patients with incurable gastrointestinal (GI) cancer. Treatment decisions are challenging and include surgery, procedural interventions, or conservative management. Few patient-centred outcomes are available to support these decisions. We assessed days at home (DAH) after MBO, as a validated patient-centred outcome. **Methods:** We conducted a population-based retrospective cohort study using administrative data at ICES. Adults ≥ 18 years with a diagnosis of incurable GI cancer between 2010 and 2019 hospitalized with a first episode bowel obstruction were included. The outcome was DAH over 90 days (DAH-90) from the date of admission. Multivariable quantile regression was used to assess the association between treatment choice on DAH-90 after adjusting for cancer and patient factors. A sensitivity analysis was performed to evaluate DAH over additional time periods. **Results:** A total of 4642 patients made up the study cohort with a median DAH-90 of 54 (interquartile range [IQR] 5–78), of whom 20% died in hospital. Patients had a median DAH-90 of 67 (IQR 23–80) with surgical treatment, 45 (IQR 7–78) with procedural treatment and 31 (IQR 0–76) with no intervention ($p < 0.01$). After adjusting for age, sex, comorbidity, cancer type, rurality and socioeconomic status, surgical treatment was associated with a median of 20 (95% confidence interval [CI] 15–24) additional DAH-90 and procedural treatment with a median of 14 (95% CI 5.6–21.9) additional DAH-90 compared with no treatment ($p < 0.01$). Independent association with additional DAH was also identified for DAH at 60 days, but not DAH at 30 days after MBO admission. **Conclusion:** After adjusting for patient and tumour factors, surgical treatment of MBO was associated with the greatest DAH-90. The DAH gain of surgical treatment was realized over longer periods of time. These findings support the role of surgery in MBO and are important for counselling.

10

Polytrauma and polyshock: prevailing puzzle. *Subail Yaqoob Hakim, Ayman El-Menyar, Sandro Rizoli, Hassan Al-Thani.* from Hamad Medical Corporation (Hakim, El-Menyar, Rizoli, Al-Thani), Qatar University (Hakim), and Weill Cornell Medical College Doha (El-Menyar).

Background: Polytrauma and shock are a nightmare for the resuscitation team. The dire situation of the patient, the chaos in the resuscitation and the stress of decision making is a trauma surgeon's crown of thorns. Very quickly, a definitive pathway must be created for the successful management and survival of a

dying patient. **Methods:** We report a case of a young adult victim of a motor vehicle collision who presented to the trauma room in hypotension. His pallor, positive Extended Focused Assessment with Sonography in Trauma (E-FAST) for belly free fluid was not corroborating with the relative bradycardia, a distended inferior vena cava and an almost normal arterial blood gas. His altered sensorium made the rest of the exam futile. The patient was stabilized but again decompensated rapidly. Repeat E-FAST results were the same. The patient was intubated successfully with a decision to transfer him to the operating room with suspicion of a devastating abdominal visceral injury demanding operative source control. **Results:** Splenectomy was done for a shattered spleen. He stabilized intraoperatively, but his blood pressure needed vasopressor support. The pulse rate remained relatively low. Postoperatively he was shifted for pan computed tomography scan and the rest of his trauma assessment. **Conclusion:** Besides a rapid primary survey EFAST plays an important role in helping differentiate causes of shock in trauma, which guides our treatment decisions.

11

National emergency laparotomy audit: a 9-year evaluation of postoperative mortality in emergency laparotomy. *Hanaa N. Mughal, Mumtaz Bbugio, Muhammed A. Gok, Usman A. Khan.* From the East Cheshire NHS Trust.

Background: Compared with elective surgery, emergency laparotomy is an independent risk factor for increased mortality. The National Emergency Laparotomy Audit (NELA), established in 2014, aims to improve the standard of care for patients undergoing emergency laparotomies in the United Kingdom. NELA emphasizes the need of identifying patients who are at a high risk for postoperative morbidity and mortality. This study evaluates 90-day postoperative mortality following emergency laparotomy. **Methods:** Cohort analysis of patient mortality for patients dying within 90 days of surgery was performed on all emergency laparotomies between 2014 and 2023. Those who survived more than 90 days were used as controls. **Results:** A total of 772 emergency laparotomies were performed since the establishment of NELA. Death within 90 days following emergency laparotomy occurred in older (74.0 yr, $p < 0.0001$), multimorbid patients with high American Society of Anesthesiologists status (ASA 3, $p < 0.0001$) with worse preoperative lactate (3.0 mmol/L, $p < 0.0001$) and C-reactive protein (82.6 mg/L, $p < 0.01$) levels. This group had prolonged operating times and longer postoperative stay compared with those who survived more than 90 days ($p > 0.05$). The overall Portsmouth Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity (P-POSSUM) scores were worse in those who died within 90 days (Kruskal–Wallis $p < 0.0001$). Kaplan–Meier survival rates in the 9-year NELA cohort were 82.0% (year 1), 75.4% (year 2) and plateauing to 71.1% in years 5–9 following emergency laparotomy. **Conclusion:** Death within 90 days of emergency laparotomy occurred in 13.5% of patients. Early postoperative death was more likely in older, frail, multimorbid individuals. Postoperative death was more likely within 90 days of surgery, after which time survival plateaued to become comparable to death from natural causes. P-POSSUM is a useful predictor of individuals at increased risk of early postoperative death and can allow appropriate allocation

of surgical interventions, collaborating with surgeons and intensivists to improve quality of care for those undergoing emergency surgery.

13

A comparison of stress response in high-fidelity and low-fidelity trauma simulation. *Abmed Warrach, Lawrence Gillman, Markus Ziesmann.* From the University of Manitoba.

Background: Crisis simulation is a commonly used tool in medical training for developing nontechnical skills to reduce human error in high-stress situations. The assumption that higher-fidelity simulations (with fidelity referring to how well a simulation replicates reality) lead to better learning experiences is debated. The objective of our study was to assess whether low-fidelity simulation (LFS) can generate similar levels of stress as high-fidelity simulation (HFS) in participants. **Methods:** Junior-level learners (postgraduate year [PGY] 1/2) were invited to wear a Bodyguard 2 heart rate monitor (Firstbeat Technologies, Palo Alto, CA) during 2 trauma simulations, 1 high-fidelity and 1 low-fidelity. Heart rate (HR) and heart rate variability (HRV) were continuously measured during each simulation. HRV was captured at 3 time points (5 min each): rest, during HFS and during LFS. Participants were randomly assigned to either the HFS or LFS as their first simulation. **Results:** Twenty-three participants have been recruited at this time, with data from 19 participants available for analysis. Analysis of heart rate variability using a pnn50% (marker of parasympathetic activity, higher values suggest a more relaxed state) showed that stress during HFS was higher than the control condition (mean 10.56 v. 18.4, $p = 0.006$). Stress during LFS was higher than control condition (mean 8.72 v. 18.4, $p = 0.0$). Stress levels between simulations was similar (mean 10.56 v. 8.72, $p = 0.244$). **Conclusion:** LFS generates similar stress to HFS in trauma simulation participants. LFS also has the advantages of being less costly, more readily available and requires fewer human resources to operate, making it a more appealing learning tool.

14

ASA versus heparin in the treatment of blunt cerebrovascular injury — a systematic review and meta-analysis. *Jovana Momic, Nouf Yassin, Mella Kim, Amy Makish, Eric Walser, Shane Smith, Ian Ball, Brad Moffat, Neil Parry, Kelly Vogt.* From Western University.

Background: Blunt cerebrovascular injury (BCVI), if untreated, is associated with stroke in approximately 20% of cases. Early treatment is imperative to reduce risk of stroke; however, optimal pharmacologic treatment strategy in the setting of multisystem trauma remains unknown. This study compared antiplatelets and anticoagulants in the management of BCVI to determine efficacy (risk of stroke) and safety (bleeding complications). **Methods:** A systematic review of MEDLINE, Embase and CENTRAL databases was conducted with the assistance of a medical librarian. The search was supplemented with manual review of included articles and the grey literature. Included studies evaluated adult patients and reported treatment-stratified risk of stroke following BCVI. All studies were screened independently by 2 reviewers, and data extracted in

duplicate. Meta-analysis was conducted using pooled estimates of odds ratios (OR) with a random-effects model. **Results:** A total of 3312 studies were screened, yielding 35 studies for inclusion. Included studies evaluated 6434 patients (range 27–777 per study), with stroke rates ranging from 1.9% to 26%. Overall, 595 strokes were evaluated, with 193 (32.4%) occurring on therapy. When including only the 10 studies comparing acetylsalicylic acid (ASA) to heparin, the stroke rate was not different (OR 0.64, 95% confidence interval [CI] 0.24–1.72, $p = 0.39$). Six studies evaluated bleeding complications and demonstrated lower risk of bleeding with ASA than heparin (OR 0.15, 95% CI 0.03–0.68, $p = 0.03$). **Conclusion:** This study evaluated ASA versus heparin for treatment of BCVI and BCVI-related stroke; while stroke risk was not different between groups, ASA had lower rates of bleeding complications. The ideal dose of ASA remains unknown and should be a focus of future study.

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Comparison of complication reporting in trauma systems: a review of Canadian trauma registries. *Alex Lee, Jenna Kroeker, David Evans.* From the University of British Columbia (Lee, Evans), and Vancouver Coastal Health (Kroeker).

Background: Effective quality assurance in trauma systems relies on objective and standardized reporting of perioperative complications. This remains challenging, however, due to variable data collection methodologies and inconsistent identification of complications, which may produce divergent evaluations of quality of care. This study aimed to compare the complications recorded in existing trauma registries to evaluate the need for a national standardized system of complication reporting. **Methods:** A literature search was performed to identify active trauma registries used in Canada based on Moore's definition of "databases that document acute care delivered to patients hospitalized with injuries." Registries with publicly available data dictionaries containing their reported complications and respective definitions were included. The presence of each reported complication and their definitions were then compared across the trauma registries and described. **Results:** A total of 5 registries were included, and across them, 39 individual complications were identified. Different registries reported 17 (44%) to 34 (87%) of these complications, with no registry reporting an identical set of complications. There were 12 complications represented by only a single registry. Of the 27 complications that were shared between at least 2 registries, 13 (48%) had different definitions. While 10 complications were represented in all registries, only 4 shared the same definition. **Conclusion:** The type of complications reported by trauma registries in Canada are variable. Even when complications are shared, their definitions vary almost half the time, which may ultimately impact patient capture. Accurate comparisons of trauma system performance are likely challenging given these findings, and efforts to standardize complication reporting across Canada may be a valuable undertaking for improving quality assurance.

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Benefits of the addition of a nurse practitioner to a high-volume acute care surgery service: a quantitative survey of

nurses, residents and surgery attendings. *Nabal Fansia, Chana Notik, Evan G. Wong.* From McGill University.

Background: Nurse practitioners (NPs) have been welcome additions to various surgical subspecialty teams, including trauma and cardiac surgery. Touted benefits include decreased administrative workloads for resident teams and improved communication with patients, families and other health care professionals. The integration of an NP into an acute care surgery (ACS) team, particularly in Canada, is a novel concept. With the current resident workforce shortage, we hypothesize that these benefits will be reflected in the perceptions of the health care professionals working within the busy ACS service. **Methods:** We surveyed all ACS attendings, surgical residents and nursing staff who directly worked with the NP in her first year on the service between Jan. 1, 2022, and Dec. 31, 2022, at a single tertiary care centre. Themes explored included communication, patient care quality, ward/consultation efficiency, education, surgical resident workload and overall satisfaction. Responses were quantified using standard 5-point Likert scales. **Results:** The response rate for attending surgeons, residents and nursing staff was 87.5% (7/8), 64.0% (16/25) and 30.3% (30/99), respectively. All surgeons (7/7) agreed that the NP provided safe patient care, improved patient flow and enhanced communication within the treating team and patients/families. Most surgeons (6/7 [85.7%]) noted improved efficiency in addressing pending consultations. Residents reported increased operating room (OR) exposure (13/16 [81.3%]), decreased workload (14/16 [87.5%]) and decreased administrative tasks (14/16 [87.5%]) since the NP's addition. All residents (16/16) disagreed that the NP negatively affected their learning experience. Nursing staff were highly satisfied with the NP's care (27/30 [90.0%]) and agreed that their patient concerns were heard and addressed by the NP (26/30 [86.7%]). **Conclusion:** The numerous benefits of an NP appear to translate to a busy ACS service. These include improved patient care, communication and efficiency. In addition, the NP appears to enhance the educational experience of surgical residents.

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Examining current evidence for trauma recurrence prevention systems. *Guire Coyle, David Seben, Jaiden Smith, Brandy Tanenbaum, Corey Freedman, Avery Nathens, Robert Fowler.* From McMaster University (Coyle), Sunnybrook Health Sciences Centre (Coyle, Tanenbaum, Freedman, Nathens, Fowler), and University of Guelph (Seben, Smith).

Background: Trauma is a leading cause of morbidity and mortality in Canada, yet research and interventions addressing recurrence have not received the same focus as other leading causes. Successes of postevent recurrence prevention programs for myocardial infarction (MI) and stroke, focusing on important risk factors, highlight the potential impact of an injury prevention strategy for trauma patients. These existing programs build on well-understood epidemiology backed by level I evidence. Therefore, to explore possible implementation of such a postevent prevention system for trauma, a scoping review to assess the current extent of evidence and intervention was

conducted. **Methods:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews methodology was followed. Electronic search of Pubmed and Cochrane using the terms “trauma AND (tertiary prevention OR recurrence prevention OR follow up)” was completed. Titles, abstracts and full texts were screened independently by 2 reviewers, conflicts were resolved by a third. Articles adhering to inclusion and exclusion criteria were included in the review. Data were extracted in accordance with the Joanna Briggs Institute framework. **Results:** In total, 17 106 articles were identified. After title screening, 724 studies underwent abstract screening, 76 underwent full text review, and 47 were included in the final review. Among selected articles, types of initial trauma were general, falls, musculoskeletal, alcohol-related trauma, violence, pediatric, brain injury, burns and animal bites. Targets of prevention were falls, psychological illness, musculoskeletal, alcohol-related trauma, general, violence and pediatric injury. **Conclusion:** There are evidence-based posttrauma injury prevention interventions; however, they are heterogeneous in initial trauma and prevention targets, inconsistent in risk factors addressed and generally supported by level II/III evidence. In order to build a trauma recurrence prevention system comparable to other leading causes of morbidity and mortality, further research to better define and target modifiable trauma risk factors and integrate current piecemeal interventions is necessary.

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Disparities in access to trauma care in Canada: a geospatial analysis of Census data. *Prachikumari Patel, Tim Elrick, Meghan Ewing, Steven Di Marco, Tarek Razek, Jeremy Grushka, Evan G. Wong.* From McGill University.

Background: Significant disparities in access to trauma care exist across Canada, particularly affecting rural and remote regions owing to travel distances, limited local resources and complex transfer mechanisms. With the ongoing urbanization of the Canadian population, we sought to determine the proportion of the current population living within 1 hour of definitive trauma care and to characterize the sociodemographic characteristics of the population living beyond this range. **Methods:** Geographic information system (GIS) methods were used to define 1-hour catchment areas surrounding adult level 1 and 2 trauma centres across Canada, as designated by the Trauma Association of Canada. Statistics Canada Census 2021 data were used to calculate the population over 15 years of age living within and outside the 1-hour distance of designated trauma centres. Socioeconomic indicators were compared between these populations to elicit disparities in access to care. **Results:** The majority of the adult Canadian population (23 475 747 [75.8%]) lives within 1 hour of 32 designated level 1 and level 2 trauma centres. However, as compared with those with adequate access to definitive trauma care, the population living outside this range (7 503 439 [24.2%]) is more likely to be unemployed (12.0% v. 8.0%, $p < 0.05$), without postsecondary education (21.2% v. 13.6%, $p < 0.05$), with household incomes of less than 60 000\$/year (10.9% v. 1.7%, $p < 0.05$) and of Indigenous origin (13.1% v. 3.2%, $p < 0.05$). **Conclusion:** Significant disparities in access to definitive trauma care persist across Canada. This disproportionately affects certain patient populations, notably those with lower

socioeconomic statuses and of Indigenous origins. Future efforts should focus on enhancing the delivery of trauma care to these neglected populations.

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Fast-track pathway to accelerated cholecystectomy versus standard of care for acute cholecystitis: the FAST pilot trial. *Lily J. Park, Flavia K. Borges, Rabima Nenshi, Pablo E. Serrano, Paul Engels, Kelly Vogt, Emily Di Sante, Jessica Vincent, Kate Tsiplova, P.J. Devereaux.* From McMaster University (Park, Borges, Nenshi, Serrano, Engels, Devereaux), Population Health Research Institute (Park, Borges, Nenshi, Di Sante, Vincent, Tsiplova, Devereaux), and Western University (Vogt).

Background: Timing to surgery for acute cholecystitis (AC) remains variable, ranging anywhere from early (< 7 d) to delayed surgery (> 7 days). Accelerated surgery for AC may result in better outcomes by reducing patient exposure to inflammatory, hypercoagulable and stress states. We undertook a pilot trial to determine the feasibility of providing accelerated care (i.e., surgery within 6 hours of diagnosis) compared with standard care among patients with calculus AC. **Methods:** Adult patients with AC requiring surgery were randomized to receive accelerated surgery or standard care. The primary feasibility outcome included recruitment of 60 patients, randomizing the equivalent of 1 or more patients per site per month, and achieving $\geq 95\%$ follow-up at 90 days. The secondary exploratory outcome was a composite of major perioperative complications within 90 days of randomization. Analyses included descriptive statistics and Cox proportional hazards models to calculate hazard ratios (HR) and 95% confidence intervals (CI). **Results:** Sixty patients were randomly assigned across 4 Canadian hospitals to accelerated surgery ($n = 31$) and standard care ($n = 29$). Across all sites, the equivalent of 4.6 patients per month were randomized. All patients completed 90-day follow-up. The median time and interquartile range (IQR) from diagnosis to surgery in the accelerated arm was 5.8 (IQR 4.4–11.1) hours versus 20.3 (IQR 6.8–26.8) hours in the standard care arm. A major perioperative complication occurred in 9/31 (29.0%) patients in the accelerated and 4/29 (13.8%) patients in the standard care arm (HR 2.42, 95% CI 0.74–7.91). The main contribution was from 5/31 (16.1%) versus 1/29 (3.4%) postoperative endoscopic retrograde cholangiopancreatography performed in the accelerated versus standard care arm, respectively (HR 5.11, 95% CI 0.60–43.9). **Conclusion:** These results demonstrate the feasibility of a trial comparing accelerated and standard care among patients requiring surgery for AC and supports a definitive trial.

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Using the modified Frailty Index to predict postoperative outcomes in patients undergoing surgery for adhesive small bowel obstruction: analysis of the National Inpatient Sample, 2015–2019. *Gaurav Talwar, Joanna Dionne, Tyler McKechnie, Yung Lee, Tania Kazi, Abdullah El-Sayes, Jessica Bogach, Dennis Hong, Cagla Eskicioglu.* From McMaster University (Talwar, Dionne, McKechnie, Lee, Kazi, El-Sayes, Bogach, Hong, Eskicioglu), Juravinski Hospital (Dionne, Bogach), and St. Joseph’s Healthcare (Hong, Eskicioglu).

Background: There is a paucity of data identifying patient-specific predictors of postoperative outcomes in adhesive small bowel obstruction (ASBO). This study uses the National Inpatient Sample (NIS) data to assess the efficacy of the modified Frailty Index (mFI) as a tool to predict postoperative morbidity and mortality among patients undergoing surgery for ASBO. **Methods:** A retrospective population-based analysis of the NIS from Sept. 1, 2015, to Dec. 31, 2019, was performed. Adult patients who underwent emergent operative intervention for ASBO were identified. The mFI, consisting of 11 variables, was used to stratify patients as either frail (mFI \geq 0.27) or robust (mFI $<$ 0.27). The primary outcomes were overall in-hospital postoperative morbidity and mortality. The secondary outcomes were system-specific postoperative morbidity, length of stay, total in-hospital health care cost and discharge destination. Subgroup analyses of patients undergoing open surgery and those older than 65 years were performed. Univariable and multivariable regressions were used to compare robust and frail patient groups. **Results:** In total, 23 251 patients with mFI $<$ 0.27 and 6122 patients with mFI \geq 0.27 met the inclusion criteria. Adjusted analyses demonstrated that patients with mFI \geq 0.27 had increased in-hospital mortality (adjusted odds ratio [aOR] 2.16, 95% confidence interval [CI] 1.80–2.60), postoperative morbidity (aOR 1.63, 95% CI 1.52–1.74), postoperative length of stay (aMD 0.97 days, 95% CI 0.73–1.21), total in-hospital health care costs (aMD USD\$18 921, 95% CI 14 608–23 234), and were less likely to be discharged home (aOR 0.59, 95% CI 0.55–0.63). Similar significantly worse outcomes were found in the subgroup analyses for patients undergoing open surgery and those older than 65 years of age. **Conclusion:** The mFI may be a convenient tool to predict postoperative outcomes following surgery for ASBO. Stratifying patients may assist clinicians and patients to make informed decisions, set realistic expectations, and proactively plan postoperative disposition.

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Adequacy of thromboprophylaxis in trauma patients receiving conventional versus higher dosing regimens of low-molecular-weight heparin: a prospective cohort study. *Matthew Connell, Amanda Klooster, Jenna Beck, Kevin Verboeff, Matt Strickland, Ram Anantha.* From the University of Alberta.

Background: Injured patients remain at high risk of developing venous thromboembolism (VTE) despite thromboprophylaxis. New guidelines suggest revised dosing of low-molecular-weight heparin (LMWH) to combat this complication. We sought to compare the adequacy of thromboprophylaxis (VTEp) among trauma patients before and after implementation of the revised dosing guidelines. **Methods:** This prospective cohort study at a tertiary trauma centre included all adult patients receiving VTEp with LMWH. The conventional dosing group received enoxaparin 30 mg twice daily and the higher dosing group received enoxaparin 40 mg twice daily. Both groups included modifications for patients $>$ 100 kg. Serum anti-Xa levels were drawn after the third dose of LMWH, and patient charts were abstracted to collect clinical demographics and identify VTE and bleeding complications. **Results:** In total, 243 patients were included: 150 in the conventional and 93 in the

updated groups. We found that 57% and 68% of patients in the conventional and updated groups, respectively, achieved prophylactic anti-Xa levels ($p = 0.11$). Significantly fewer patients receiving higher dosing were subprophylactic (17% v. 38%, $p < 0.01$). Three percent of patients in the conventional group and no patients in the updated group developed a VTE ($p = 0.11$). Subprophylactic patients experienced more VTE than prophylactic patients (4.1% v. 0.6%, $p = 0.048$). There were no differences in bleeding between the conventional and updated dosing groups ($p = 0.19$). There was no statistically significant difference in bleeding complications between the prophylactic and supraprophylactic groups (6% v. 13%, $p = 0.17$). **Conclusion:** Updated VTEp dosing decreases the proportion of patients achieving subprophylactic anti-Xa levels. Subprophylactic anti-Xa levels are in turn associated with an increased incidence of VTE. Despite a higher dosing regimen, over 15% of patients remain subprophylactic. Future studies on risk factors for subprophylactic levels and powered to detect differences in VTE and bleeding complications are needed.

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The hidden epidemiology of trauma in Nunavik: a comparison of trauma registries as a call to action. *Lilly Groszman, Natasha G. Caminsky, Larry Watt, Nathalie Boulanger, Tarek Razek, Jeremy Grushka, Steven Di Marco, Evan G. Wong.* From the McGill University Health Centre (Groszman, Caminsky, Razek, Grushka, Di Marco, Wong), McGill University (Caminsky, Razek, Grushka, Wong), Ungava Tulattavik Health Centre (Watt, Boulanger), and Inuulitsivik Health Centre (Boulanger).

Background: Improving trauma care in Northern Quebec relies on measuring outcomes, yet current government databases do not routinely capture information about injured patients in Nunavik. This study aimed to define the epidemiology of trauma in Nunavik more accurately through onsite data collection, and to contrast the findings with the registry at the level-1 trauma centre. **Methods:** This was a retrospective review of all on-site medical records of trauma patients presenting to the Ungava Tulattavik Health Center (Kuujuaq) and the Inuulitsivik Health Centre (Puvirnituq) between 2015 and 2021. Patient demographics, injury and transfer characteristics, interventions and outcomes were collected. To demonstrate the hidden epidemiology of trauma in the region, these patients were compared with the cohort of patients originating from Nunavik who were captured in the level-1 trauma registry at the referral centre. **Results:** Of the 776 trauma patients reviewed from the Nunavik records, only 366 (47.2%) were captured in the level-1 registry. As compared with the level-1 database, patients captured through onsite data collection were significantly younger (mean age 26 [interquartile range (IQR) 18–42] yr v. 33 [IQR 23–48] yr, $p < 0.0001$), more often female (51.0% v. 38.8%, $p < 0.0005$) and more likely to have a normal Glasgow Coma Scale score (mean 15 [IQR 15–15] v. 13 [IQR 13–15], $p < 0.0001$). Mechanisms documented between sites were significantly different with Nunavik registering a greater proportion of blunt assaults (33.1% v. 21.0%, $p < 0.001$) and a smaller proportion of falls (17.9% v. 21.0%, $p < 0.001$), gunshot wounds (0.8% v. 3.3%, $p < 0.001$) and stabbings (3.6% v.

12.8%, $p < 0.0001$). **Conclusion:** The study offers a more accurate overview of the trauma epidemiology in Nunavik than previous studies relying on tertiary care registries. The significant difference in cohort characteristics highlights the need for enhanced documentation practices for patients from Northern Quebec and should serve as an impetus for the implementation of a local prospective registry.

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Mapping surgical services in rural British Columbia: an environmental scan. *Rachel Livergant, Brooke McDonald, Catherine Binda, Shreya Luthra, Nicole Ebert, Ryan Falk, Emilie Joos.* From the University of British Columbia.

Background: British Columbia (BC) has seen significant attrition of rural, small-volume surgical programs. These closures have multifactorial impacts, including loss of maternity services and lack of capacity to support surgical emergencies. There has been a drive to support regional networks staffed by generalist specialty surgeons and family physicians with enhanced surgical skills (FP-ESS) and obstetric surgical skills (FP-OSS). This scan aimed to map out current surgical services provided in rural and remote BC. **Methods:** Locations of practising FP-ESS and FP-OSS and local general surgeons and obstetrician–gynecologists

(OBGYNs) were elicited from available literature, professional networks and hospital administrations. Medical Services Plan (MSP) billing data for the 2021 fiscal year was obtained from Doctors of BC for all procedures performed by FPs, general surgeons and OBGYNs in included communities. **Results:** We identified 50 general surgeons, 34 OBGYNs, 11 FP-ESS and 18 FP-OSS practising in rural BC communities. Twenty-eight (62.2%) communities lacked local general surgeons, 29 (64.4%) communities lacked local OBGYNs and 39 (86.7%) communities lacked local anesthesiologists. Overall, 22 communities (48.9.1%) did not have local surgical capacity. FP-ESS and FP-OSS practised in 15 of 45 (33.3%) communities and were the sole local surgical providers in Creston, Fernie, Revelstoke, Smithers and Vanderhoof. Fifteen (33.3%) communities provided billing data for general surgeons. In 2021, general surgeons practising in rural communities billed a total of 388 unique procedures, with a broad scope of general, otolaryngology, plastic, OBGYN, urology, orthopedic and vascular surgical procedures. **Conclusion:** Generalist surgeons and FPs provide core surgical services in rural BC, often as the sole surgical providers in a community. Supporting and sustaining these providers and surgical programs is integral to the well-being of rural patients and the wider health care systems they access.