Canadian Journal of Surgery
Journal canadien de chirurgie

Vol. 67 (6 Suppl 2) November 28, 2024
doi: 10.1503/cjs.012624

# 2024 Canadian Surgery Forum

## Sept. 25–28, 2024

## Abstracts presented at the Canadian Surgery Forum Winnipeg, Manitoba

**The Canadian Surgery Forum Steering Committee acknowledges and thanks the following organizations for their support of the 2024 Forum:**

**Visionary Partners:**

ETHICON

MERCK

**Contributor Partners:** BD Canada, Hoffmann-La Roche, MD Financial Management, Novartis, Olympus, and Stryker

**Supporter Partners:** Bristol Myers Squibb, Pendopharm, Regeneron

# Abstracts

## CANADIAN ASSOCIATION OF GENERAL SURGEONS

**01**

**The green thumb of endoscopy: switching from sterile water to tap water.** ***Christine Li, Michael Guo, Ahmer Karimuddin*. From the University of British Columbia.**

**Background:** The use of sterile water in endoscopy is a common practice that is not based on available evidence. Literature suggests that the use of tap water in endoscopy is safe and appropriate, even for advanced procedures. We examined the financial and environmental cost savings at our institution after switching from using sterile water to tap water for endoscopy. **Methods:** We conducted a comparative analysis between a period of sterile water irrigation use (October 2022) in endoscopy to an equivalent period of tap water irrigation use (October 2023). Advanced and invasive procedures such as endoscopic retrograde cholangiopancreatography continued to utilize sterile water during both study periods. Our analysis focused on the financial and environmental impact of switching to tap water in our endoscopy unit. **Results:** The introduction of tap water led to a significant reduction in sterile water usage, from 336 to 192 bottles per month, saving $310.70 per month. Despite the decrease in sterile water usage, the number of procedures remained relatively stable, with 922 procedures during the sterile water phase compared to 905 procedures during the tap water phase. The cost of irrigation water per procedure decreased from $0.80 to $0.47, representing a 59% cost reduction. Additionally, transitioning to tap water eliminated the need for 144 bottles per month, resulting in a monthly waste reduction of 17.45 kg from a single endoscopy unit. The estimated carbon footprint from production alone was 54.18 kg $CO_2$e, excluding sterilization, transportation, or waste management processes. **Conclusion:** Use of tap water in endoscopy has been proven to be safe and effective. An additional benefit is the financial and environmental cost savings of decreasing sterile water use. Implementation of tap water protocols in endoscopy units can be a simple step toward increasing sustainability in endoscopy.

**02**

**Comparing wait times for common elective general surgery procedures between immigrants and non-immigrants in British Columbia.** ***Michael Guo, Christine Li, Ahmer Karimuddin, Jason Sutherland*. From the University of British Columbia (Guo, Sutherland), and St. Paul's Hospital (Li, Karimuddin).**

**Background:** Long wait times for elective surgery represent a persistent challenge in health care systems, particularly in Canada, which has struggled with timely care delivery. These delays not only impact patient well-being, but also disproportionately affect vulnerable populations. Despite the growing immigrant population in Canada, research on surgical wait times for this demographic remains scarce. This study aims to investigate wait times for common elective surgeries among immigrants compared to non-immigrants in British Columbia, Canada. **Methods:** This study was based on population-based longitudinal data that linked citizenship and immigration data with hospital and physician visit information. All elective general surgery procedures performed between 2013 and 2021 were included. Wait time was defined as the duration between the last general surgery consult or office visit and the surgery date. Wait times were calculated for patients who had 2 or fewer preoperative general surgery visits within 1 year prior to their surgery to account for the initial consultation and a subsequent visit to review additional investigations. Wait times were compared between immigrants and non-immigrants. **Results:** A total of 179 101 elective general surgery procedures were included, with cholecystectomies (21.9%) and hernia repairs (16.7%) being among the most common. Immigrants made up 15.0% of the study cohort. Immigrants experienced longer wait times for general surgery procedures than non-immigrants (78.7 v. 74.7 days, $p < 0.01$), even after adjusting for age, sex, comorbidities, and hospital. Immigrants waited 6.4 days (8.7% of expected wait time for non-immigrants) longer on average for elective cholecystectomies than non-immigrants ($p < 0.01$). **Conclusion:** This study reveals significant disparities in elective surgery wait times between immigrants and non-immigrants in British Columbia, Canada. Despite adjustments for demographic and hospital factors, immigrants consistently face delays in accessing surgical care, which may lead to disproportionately prolonged suffering and diminished quality of life.

**03**

**Dr. GPT will see you now: the ability of large language models to provide colorectal cancer screening recommendations.** ***Bright Huo, Tyler McKechnie, Monica Ortenzi, Yung Lee, Stavros Antoniou, Julio Mayol, Hassaan Ahmed, Vanessa Boudreau, Karim Ramji, Cagla Eskicioglu*. From McMaster University (Huo, McKechnie, Lee, Boudreau, Ramji, Eskicioglu), Università Politecnica delle Marche (Ortenzi), Papageorgiou General Hospital (Antoniou); the Hospital Clinico San Carlos (Mayol), and Phelix AI (Ahmed).**

**Background:** Patients use online resources for health advice, and large language models (LLMs) may positively augment clinical practice. However, their ability to provide health advice is poorly characterized. This study assessed the accuracy of colorectal cancer screening advice from LLM-based chatbots for both clinicians and patients. **Methods:** ChatGPT, Bing Chat, Google Bard, and Claude 2 were queried using standardized prompts on July 27–28, 2023 for screening advice using 9 patient cases, varying by age and family history of colorectal cancer. Chatbots reported which screening test was indicated, the frequency of interval screening, and management for patients with positive test results. Clinical advice for both physician and patient inquiries were compared to guidance from major North American societies. **Results:** Relative to the U.S. Multi-Society Task Force (USMSTF) on Colorectal Cancer guidelines, advice for clinicians aligned in 7/9 (77.8%), 5/9 (55.6%), 6/9 (66.7%), and 3/9 (33.3%) cases when querying ChatGPT, Bing Chat, Google Bard, and Claude 2, respectively. Advice for patients aligned with 5/9 (55.6%), 4/9 (44.4%), 6/9 (66.7%), and 4/9 (44.4%) cases for ChatGPT, Bing Chat, Google Bard, and Claude 2, respectively. ChatGPT demonstrated the ability to exercise clinical reasoning. Conflicting clinician and patient advice was given for 2/9

 

(22.2%), 1/9 (11.1%), 2/9 (22.2%), and 3/9 (33.3%) cases with ChatGPT, Bing Chat, Google Bard, and Claude 2, respectively. **Conclusion:** LLM-based chatbots have promise in providing colorectal cancer screening recommendations but still perform with inconsistent accuracy. Clinicians and patients must be aware of the pitfalls of using these platforms for health advice.

**04**

**Surgeon- and hospital-level variation in wait times for scheduled non-urgent surgery in Ontario, Canada: a cross-sectional population-based study.** ***Pieter de Jager*, *David Urbach*. From Dalhousie University (De Jager), and the Women's College Hospital (Urbach).**

**Background:** Canadian health systems fare poorly in providing timely access to elective surgical care, which is crucial for quality, trust, and satisfaction. **Methods:** We conducted a cross-sectional analysis of surgical wait times for adults receiving non-urgent cataract surgery, knee arthroplasty, hip arthroplasty, gallbladder surgery, and non-cancer uterine surgery in Ontario, Canada, between 2013 and 2019. We obtained data from the Wait Times Information System (WTIS) database. Inter- and intra-hospital and surgeon variations in wait time were described graphically with caterpillar plots. We used non-nested 3-level hierarchical random effects models to estimate variation partition coefficients, quantifying the proportion of wait time variance attributable to surgeons and hospitals. **Results:** A total of 942 605 procedures at 107 health care facilities, conducted by 1834 surgeons, were included in the analysis. We observed significant intra- and inter-provider variations in wait times across all 5 surgical procedures. Inter-facility median wait time varied from 6-fold for gallbladder surgery to 15-fold for knee arthroplasty. Inter-surgeon variation was more pronounced, ranging from a 17-fold median wait time difference for cataract surgery to a 216-fold difference for non-cancer uterine surgery. The proportion of variation in wait times attributable to facilities ranged from 6.2% for gallbladder surgery to 23.0% for cataract surgery. In comparison, surgeon-related variation ranged from 16.0% for non-cancer uterine surgery to 28.0% for cataract surgery. **Conclusion:** There is extreme variability in surgical wait times for 5 common, high-volume, non-urgent surgical procedures. Strategies to address surgical wait times must address the variation between service providers through better coordination of supply and demand. Approaches such as single-entry models could improve surgical system performance.

**05**

**Multicentre pan-Canadian experience of per oral endoscopic myotomy (POEM) for the treatment of achalasia: a retrospective study.** ***Meredith Poole*, *Aghiles Abbad*, *Hussain Al-Shamali*, *Zainab Al-Faraj*, *Chuck Wen*, *Radu Pescarus*, *Robert Bechara*, *Dennis Hong*. From McMaster University (Poole, Hong), the Université de Montréal (Abbad, Pescarus), Queen's University (Al-Shamali, Al-Faraj, Bechara), and Surrey Memorial Hospital (Wen).**

**Background:** Per oral endoscopic myotomy (POEM) has emerged as a modality for the surgical treatment of achalasia using a minimally invasive approach with similar clinical efficacy to laparoscopic Heller myotomy. Japanese, European, American and international clinical practice guidelines now cite POEM as a first-line treatment for achalasia. In Canada, single-centre experiences with POEM have shown promising results. This study aims to capture the pan-Canadian national experience with POEM for the treatment of achalasia across multiple institutions. **Methods:** This was a retrospective study of patients who underwent POEM for achalasia across 4 Canadian institutions between 2012 and 2022. Preoperative, procedural and postoperative data were collected. Our primary outcome was the proportion of patients with a normal Eckhardt score (< 3) at 4 weeks. Secondary outcomes included procedure-related adverse events, length of stay in hospital, post-procedure lower esophageal sphincter pressures, post-procedure gastroesophageal reflux disease (GERD) and response rate at further timepoints. Outcomes are reported as either proportions (%) or medians (interquartile range). **Results:** POEM was attempted in 369 patients with a success rate of 99%. The median duration of surgery was 64 (47–89) minutes, and length of stay was < 1 day in 88% of patients. Perioperative complications occurred in 11% of patients, all of which were Clavien–Dindo grade < III. The postoperative response rate (Eckhardt score < 3) was 100%, 98% and 95% at 1, 6 and 12 months, respectively. Additional interventions for achalasia following POEM were required in 6% of patients. High DeMeester scores, endoscopic esophagitis and symptomatic GERD were reported in 36%, 43% and 44%, respectively, and 93% of GERD was treated with proton pump inhibitors. **Conclusion:** POEM is safe, feasible and efficacious in Canadian institutions, in keeping with current international literature.

**06**

**Safety and efficacy of tranexamic acid use in general surgery patients: a sub-study of the POISE-3 randomized controlled trial.** ***Lily J. Park*, *Maura Marcucci*, *Sandra Ofori*, *Jessica Bogach*, *Pablo E. Serrano*, *Marko Simunovic*, *Ilun Yang*, *Margherita Cadeddu*, *Michael J. Marcaccio*, *Flavia K. Borges*, *Rahima Nenshi*, *P.J. Devereaux*. From McMaster University (Park, Marcucci, Ofori, Bogach, Serrano, Simunovic, Yang, Cadeddu, Marcaccio, Borges, Nenshi, Devereaux), and the Population Health Research Institute (Park, Marcucci, Ofori, Borges, Nenshi, Devereaux).**

**Background:** Perioperative bleeding remains a common complication in general surgery (GS). The POISE-3 (PeriOperative ISchemic Evaluation-3) trial demonstrated the efficacy of 2 prophylactic 1-g boluses of tranexamic acid (TXA), an antifibrinolytic agent, compared to placebo, in preventing major bleeding without increasing vascular outcomes among 9535 patients undergoing different types of noncardiac surgery. The objective of this sub-study was to determine the safety and efficacy of TXA specifically in GS. **Methods:** We performed sub-group analyses comparing randomized treatment of TXA or placebo according to whether patients underwent GS or non-GS in the POISE-3 trial. The primary efficacy outcome was a composite of life-threatening, major, or critical organ bleeding. The primary safety outcome was a composite of myocardial injury after noncardiac surgery, non-hemorrhagic stroke, peripheral arterial thrombosis, or symptomatic proximal venous thromboembolism at 30 days. We undertook Cox proportional hazards models incorporating tests of interaction. **Results:** Among 9535 POISE-3 participants, 3260 underwent GS. Among GS patients, 8.0% in the TXA group and 10.5% in the placebo group had the

primary efficacy outcome (hazard ratio [HR] 0.74, 95% confidence interval [CI] 0.59–0.93, $p = 0.01$) with no difference in the primary safety outcome (11.9% v. 12.5%, HR 0.95, 95% CI 0.78–1.16, $p = 0.63$). There was no significant interaction between TXA effects and the type of surgery (GS v. non-GS) on the primary efficacy ($p = 0.81$) and safety ($p = 0.37$) outcome. TXA decreased the composite bleeding outcome in hepatopancreaticobiliary (15.0% v. 25.0%, HR 0.55, 95% CI 0.34–0.91, $n = 332$) and colorectal surgery (9.3% v. 13.6%, HR 0.67, 95% CI 0.45–0.98, $n = 940$), without significant interaction. **Conclusion:** The POISE-3 trial provides the best estimate of effect for TXA in non-cardiac surgery, including GS. In POISE-3, TXA reduced the risk of perioperative bleeding without increasing cardiovascular risk, and there were no differences in effect between GS and non-GS patients.

**07**

**Emergency department presentation following ERCP in Nova Scotia: high rebound rates related to progressive pancreaticobiliary pathologies demonstrates the need for alternative acute care strategies.** ***Peter Urbanellis, Joanne Douglas, Evan Nemeth, James Ellsmere, Richard Spence*. From Dalhousie University.**

**Background:** Endoscopic retrograde cholangiopancreatography (ERCP) is a common procedure utilized in the diagnosis and treatment of a multitude of pathologies affecting the pancreaticobiliary tract. It is also a technically challenging procedure associated with known complications. In order to develop strategies to improve post-procedure outcomes and patient experience, we investigated the local rate and reasons for return to the emergency department (ED) following ERCP. **Methods:** We conducted a retrospective analysis of charts from Nova Scotia Central Zone sites between April 1, 2021, and June 24, 2022, for patients identified as having undergone ERCP from Canadian Classification of Health Interventions codes and having presented to the ED within 90 days. **Results:** A total of 3041 patients underwent ERCP, with 1230 (40.5%) presenting to an ED within 90 days. Two hundred charts were selected for review by computer-generated randomization schedule. Thirty-nine charts were excluded due to incorrect or incomplete records. In this cohort, ERCPs were performed primarily at QEII Health Sciences Centre (155/161 [96%], female 85/161 [52.8%], mean age 63.9 ± 16.4 yr). Of these visits, 107 (66.5%) were unrelated to the ERCP, with most common presentations relating to disease progression, chronic pain, deconditioning or other medical conditions relating to their underlying malignancy/pathology (87/161 [54%]). Visits relating to ERCP primarily included recurrent biliary obstruction/cholangitis (21 [13%]), or pancreatitis (12 [7.5%]). Fifty-six patients were admitted to hospital: 28 (50%) for treatment of complications related to ERCP and 28 (50%) for treatment of conditions related to their underlying condition, which was palliative in 15 (54%). **Conclusion:** Patients undergoing ERCP in Nova Scotia have a high rate of return to the ED; however, this is primarily unrelated to the procedure and rather due to progression of underlying disease. This suggests that alternative palliative/hospice strategies to manage acute medical conditions in patients with progressive and terminal pancreaticobiliary pathologies would help alleviate the strain on EDs while also improving the patient experience.

**08**

**Maintaining rural and remote surgical skills: a needs assessment survey for a surgical virtual education platform.** ***Joshua Cunningham, Ryan Falk, Tom Skinner, Nicole Ebert, Lauren Galbraith, Mark Prins, Shahrzad Joharifard, Emilie Joos*. From the University of British Columbia (Cunningham, Ebert, Galbraith, Joharifard, Joos), the Rural Coordination Centre of British Columbia (Falk, Skinner, Ebert), and the University of Alberta (Prins).**

**Background:** Family physicians with obstetrical/enhanced surgical skills (OSS/ESS) play a major role in supporting rural surgical care in Canada. Despite a strong foundational training program, technology could be utilized to offer increased opportunities for continuing medical education (CME). The aim of this study was to define high-yield CME topics in addition to desired functions of a virtual educational platform for OSS/ESS physicians. **Methods:** A multidisciplinary group created a survey with 4 categories based on existing key priorities: foundations of surgery, obstetrical procedures, nonobstetrical procedures, and continuing professional development. OSS/ESS physicians in Canada were recruited via snowball sampling to rate these topics on level of importance, suggest other topics, and comment on what further virtual functions would best support their continued education. We calculated average response ratings and standard error for each topic rating. **Results:** We analyzed 33 responses from 14 OSS (42%) physicians, 15 ESS (45%) physicians, and 4 (12%) in-training or retired OSS/ESS physicians. The highest rated topics from each category were intraoperative complications (89.7/100, standard error [SE] 2.6), complications during cesarean section (92.6/100, SE 2.6), endoscopic complications and emergencies (88.7/100, SE 2.3), and skills maintenance (81.6, SE 3.6). Relevant functions suggested for the virtual platform included quick refreshers of relevant literature/guidelines and the ability to connect with specialists willing to provide educational support. **Conclusion:** OSS/ESS physicians desire CME on topics regarding surgical complications that a virtual platform could address with specific modules. Respondents indicated that mentoring and skill enhancement opportunities were crucial functions for a virtual education platform. We could offer interactive learning for OSS/ESS providers through specialist interaction within the virtual education platform to bridge specialist–generalist communication gaps, benefiting surgical workforce training and surgical care provision in rural areas.

**09**

**Opioid prescribing following same-day general surgery procedures: a province-wide analysis.** ***Adele Orovec, Lynn Lethbridge, Richard Spence, Marius Hoogerboord*. From Dalhousie University.**

**Background:** Overprescription of opioid analgesia for management of short-term postoperative pain is widespread and associated with increased risk of drug diversion, new long-term opioid use, and the development of opioid use disorder. Given that opioid prescribing practices for patients who undergo day surgery procedures in Canada are not well known, the purpose of this study was to describe the type and proportion of opioids prescribed postoperatively to general surgery patients who

 

underwent common elective day surgeries and test for associations with adverse surgical outcomes in a Canadian province. **Methods:** The study population included patients undergoing day procedures (inguinal hernia repair, appendectomy, laparoscopic cholecystectomy, and open hemorrhoidectomy) between July 2016 and May 2022. Data from various administrative sources were linked by individual. Descriptive statistics were generated, and multivariate 3-level hierarchical linear model (HLM) analysis was carried out to test for associations between an opioid prescription filled at discharge and the primary study outcomes, an emergency department visit or hospital admission within 90 days. $\chi^2$ statistics at a 95% confidence level were used to test for statistical significance. **Results:** There were 15 825 cases included. Of these, 42% received an opioid prescription after surgery, and the mean morphine milligram equivalent was 49. The most common prescription types were codeine (43.5%), hydromorphone (32%), and oxycodone (12.7%). The HLM analysis showed the probability of being prescribed an opioid was lower with age and a higher Charlson Comorbidity Index score. The probability of an emergency department visit within 90 days increased if the patient was prescribed an opioid, but did not significantly impact the likelihood of hospital admission. **Conclusion:** The opioid prescribing rate following general surgery day procedures is high and is associated with emergency department visits. This provides further evidence for the need to develop consensus guidelines and reduce opioid prescription variability.

**10**

**Canadian survey of surgeons' knowledge and attitudes toward opportunistic salpingectomy during nongynecologic surgery.** ***Heather Stuart, Anne-Marie Bergeron, Ilun Yang, Jessica Bogach, Laura Nguyen, Clare Reade, Lua Eiriksson, Michelle Morais, Gillian Hanley, Sarah Mah*. From the University of British Columbia (Stuart, Hanley), and McMaster University (Bergeron, Yang, Bogach, Nguyen, Reade, Eiriksson, Morais, Mah).**

**Background:** As most ovarian cancers originate in the fallopian tubes, opportunistic salpingectomy (OS) during concurrent pelvic surgery has been identified as a potential method to prevent ovarian cancer. Increasing uptake of this procedure by nongynecologic surgeons could decrease the ovarian cancer incidence over time. Establishing the level of understanding that general and urologic surgeons in Canada have toward OS is a key step in knowledge translation and increasing patient access to this cancer-prevention opportunity. **Methods:** A survey was developed by a multidisciplinary team exploring the attitudes and knowledge of general and urologic surgeons toward OS. Following ethics approval, the survey was disseminated to surgeons and residents across Canada. Results included participant demographics, prior experience, motivating factors and perceived barriers to performing OS, including the consent process and technical aspects. **Results:** Two hundred eleven surveys were completed by 193 general surgeons, 18 urologists, 34 general surgery trainees and 4 urology trainees. Almost half of respondents were female (48.8%) and had been in practice between 6 and 20 years (48.8%). Although 89.1% would be motivated to perform OS to reduce the risk of future ovarian cancer, and 91.4% felt that trainees should have the opportunity to learn this procedure, only 41.0% were aware of recommendations endorsing this procedure, and only 19.4% had performed it. Perceived barriers to performing OS reported by more than half of respondents included technical issues related to performing OS, aspects of consent, and fee codes. A surgical video was the preferred method for learning the procedure by 94%, and 78% felt that intraoperative training with a gynecologist would increase their confidence in performing OS. **Conclusion:** Most general and urologic surgeons in Canada have not performed OS during a concurrent nongynecologic surgery but are motivated to learn and offer this procedure. Improving education and resources for OS could improve uptake among surgeons.

**11**

**Postoperative outcomes following revision or conversion metabolic and bariatric surgery after primary sleeve gastrectomy: a retrospective cohort analysis.** ***Karanbir Brar, Keri A. Seymour, Shaina R. Eckhouse, Ranjan Sudan, Jacob A. Greenberg, Dana Portenier, James J. Jung*. From the University of Toronto (Brar), and Duke University (Seymour, Eckhouse, Sudan, Greenberg, Portenier, Jung).**

**Background:** A significant proportion of patients who undergo primary sleeve gastrectomy (SG) require secondary metabolic and bariatric surgery (MBS). Despite a range of revision or conversion MBS performed in practice, comparative analyses of short-term outcomes remain limited. **Methods:** We conducted a retrospective analysis of postoperative outcomes of revision or conversion MBS following primary SG using the 2020–2022 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database. Our primary outcome was 30-day incidence of major complications, defined as Clavien–Dindo Grade > II. Secondary outcomes included readmission, reoperation, reintervention, and anastomotic or staple line leak within 30 days. The exposure variable was the type of procedure: Roux-en-Y gastric bypass (RYGB), revision SG (re-SG), biliopancreatic diversion with duodenal switch (BPD/DS), and single-anastomosis duodeno-ileal bypass (SADI). We performed multivariable regression analyses to determine the relationship between procedure type and outcomes after adjusting for patient- and procedure-level covariates. **Results:** Among 33 348 revision/conversion MBS procedures, RYGB was most common (27 393 [82.1%]), followed by re-SG (2406 [7.2%]). Compared to RYGB, re-SG was associated with lower odds of 30-day major complications (odds ratio [OR] 0.78, 95% confidence interval [CI] 0.64–0.94) and readmission (OR 0.82, 95% CI 0.68–0.98). However, re-SG resulted in longer hospital stays upon readmission (mean difference 1.41 d, 95% CI 0.47–2.45 d). Notably, both re-SG and SADI were associated with higher odds of anastomotic or staple line leak compared to RYGB (OR 2.73, 95% CI 1.77–4.1 and OR 2.45, 95% CI 1.35–4.18, respectively). There were no significant differences between BPD/DS and RYGB across our outcomes of interest. **Conclusion:** Re-SG was associated with lower odds of major complications than RYGB, but presented a significantly greater risk for staple line leak and had longer readmission length of stay. The potential for severe consequences from anastomotic or staple line leaks warrants careful consideration when selecting revision and conversion MBS procedures after primary SG.

**12**

**Survival outcomes in the Canadian Merkel cell carcinoma population and descriptive comparison with the AJCC 8th edition staging system.** ***Anne Light, Brittany Dingley, Megan Delisle, Sameer Apte, Ranjeeta Mallick, Trevor Hamilton, Heather Stuart, Martha Talbot, Gregory McKinnon, Evan Jost, Eve Thiboutot, Carolyn Nessim*. From the University of Ottawa (Light, Dingley, Delisle, Apte, Nessim), the Ottawa Hospital (Dingley, Delisle, Apte, Nessim), the Ottawa Hospital Research Institute (Dingley, Mallick, Nessim), the BC Cancer Agency (Hamilton, Talbot, Stuart), and the Alberta Health Cancer Agency (McKinnon, Jost, Thiboutot).**

**Background:** Merkel cell carcinoma (MCC) is an uncommon but aggressive skin malignancy, exhibiting an escalating incidence. Limited data exist on the prognosis of MCC patients in Canada. This study aims to analyze the survival outcomes of MCC patients in Canada diagnosed between 2000 and 2018, compared to the survival rates reported by the American Joint Committee on Cancer (AJCC) 8th edition. **Methods:** A multicentre retrospective cohort study included 899 MCC patients aged ≥ 18 with stage I-IV disease from 10 Canadian university centres and 3 provinces. Prognostic differences were assessed based on AJCC 8th edition staging, comparing survival estimates by disease extent. **Results:** Among 899 patients, most had stage I (36.4%), followed by stage II (21.7%), stage III (33.9%), and stage IV (8.0%) disease. Categorizing disease as local, nodal, or metastatic revealed higher 5-year survival for local (54.3%) than nodal (46.2%) and distant metastatic disease (13.9%, $p < 0.01$). Patients with stage IIB disease exhibited shorter survival (28%) than those with other disease substages, except stage IV. Canadian patients with stage IIB disease had the shortest disease-free survival (DFS). Compared to the AJCC 8th edition cohort, patients with stage IIIA and IIIIB disease in the Canadian cohort have a longer survival, whereas survival was similar for all other substages. Five-year cancer-specific survival (CSS) trended higher than disease-free survival (DFS) across stages, particularly for stage IV. **Conclusion:** Compared to AJCC 8th edition, Canadian prognosis is similar, except for higher overall survival in stage III. CSS is longer than OS, which is important in this older and comorbid population. Additionally, low DFS and high recurrence rates emphasize the need for improved treatment and an improved understanding of current therapies.

**13**

**Postoperative pain is a preventable cause of early emergency department visits following appendectomy.** ***Neba Katote, Ashley Drohan, Richard Spence, Katerina Neumann*. From Dalhousie University.**

**Background:** Patients encounter long wait times in emergency departments (ED) in Canada, particularly in the province of Nova Scotia. Appendectomy is a common procedure routinely performed by general surgeons, with postoperative presentation to the ED being a potential contributor to the burden on our publicly funded system. This study aimed to identify preventable causes of early ED visits following appendectomy. **Methods:** Patients who underwent an appendectomy at 2 tertiary care hospitals within the Nova Scotia Central Zone between April 1, 2016, and March 31, 2022, and subsequently visited any provincial ED within 90 days of discharge were identified through the Discharge Abstract Database and the National Ambulatory Care Reporting System. A retrospective chart review was conducted to differentiate between surgical (related to primary appendectomy) and nonsurgical (unrelated to primary appendectomy) reasons for ED visits. Descriptive statistics, including frequency, mean, median, and range, were calculated as appropriate. **Results:** Of 2199 patients who underwent appendectomy, 462 (21.0%) presented to any provincial ED within 90 days of discharge. The mean age of the cohort of patients who presented to an ED was 42.8 years, 254 (55.0%) were female, the median Charlson Comorbidity Index score was 0 (interquartile range [IQR] 0–1), and 56 (5.4%) had no primary care physician on record. Laparoscopic approach was used in 410 (88.7%) patients. The median time from discharge to ED presentation was 11 (IQR 4–33) days. Surgical reasons for presentation were found in 246 (53%) patients. The most common cause for ED presentation was uncomplicated surgical pain (117/340 [34.41%]) in patients who presented within 30 days. Of ED visits that occurred beyond 30 days post-discharge, 115/122 (94.3%) were for nonsurgical reasons. Only 70 (15.1%) patients who presented to an ED were readmitted. **Conclusion:** Uncomplicated surgical pain was the primary driver of ED presentation within 30 days postappendectomy. Exploring analgesia management at discharge may reduce unnecessary ED visits.

**14**

**Testing the HoloHands model: a comprehensive holographic tutor for surgical hand ties.** ***Ge Shi, Regina Leung, Christina Lim, Matthew Van Oirschot, Aaron Grant, Sarah Knowles, Julie Ann Van Koughnett*. From Western University.**

**Background:** Fundamental surgical skills, such as surgical hand tying, are taught following the gold standard Halstedian model of "see one, do one, teach one." The nature of such training is impacted by limited resources, such as time, expertise, and finances, making it less practical in reality. To supplement the limitations of in-person training, extended reality (XR) technologies and simulators are being studied in surgical education. We previously developed the first mixed reality (MR) application, HoloHands, for teaching surgical hand ties and validated its ability to teach single hand motions in an early pilot study. We now aim to determine if medical students can learn surgical hand ties from an interactive holographic curriculum and apply it in real-world scenarios. **Methods:** HoloHands was developed to teach surgical hand ties through a comprehensive mixed didactic and hands-on holographic curriculum. In this study, preclinical medical students were given a baseline didactic pre-test and hands-on skills assessment followed by a learning session using HoloHands. They then underwent the same post-test assessments as well as completed a questionnaire regarding their experience with the learning tool. The pre- and post-learning scores as well as qualitative and quantitative responses were analyzed. **Results:** Sixty preclinical medical students were enrolled in the study. Learners significantly improved their didactic knowledge following learning with HoloHands (46% v. 69%, $p < 0.0001$). On the practical assessment, their successful hand tying score improved dramatically (0.86 v. 5.41, $p < 0.0001$), and the number of errors made

 

significantly decreased (7.19 v. 3.29, $p < 0.0001$). Most (75%) learners agreed or strongly agreed that this was an effective way of learning hand ties, and 42% felt confident that they could master hand tying with HoloHands. **Conclusion:** HoloHands significantly improved learners' ability to perform and understand surgical hand ties. Learners enjoyed the application and felt it was an effective tool for learning hand ties.

**15**

**Point-of-care hemoglobin accuracy in noncardiac surgery (PREMISE): a prospective diagnostic cohort study.** ***Karine Brousseau, Leah Monette, Daniel McIsaac, Christopher Wherrett, Ranjeeta Mallick, Aklile Workneh, Tim Ramsay, Alan Tinmouth, Julie Shaw, François Martin Carrier, Dean Fergusson, Guillaume Martel*. From the University of Ottawa (Brousseau, Monette, McIsaac, Wherrett, Workneh, Tinmouth, Shaw, Fergusson, Martel), the Ottawa Hospital Research Institute (Brousseau, Monette, McIsaac, Wherrett, Mallick, Workneh, Ramsay, Tinmouth, Fergusson, Martel), the Eastern Ontario Regional Laboratories Association (Shaw), and Université de Montréal (Carrier).**

**Background:** Point-of-care testing for hemoglobin (POCT-Hgb) is often used to inform transfusion decisions in surgery. There is limited evidence of accuracy. This study aimed to examine the accuracy of commonly used classes of POCT-Hgb in surgery, with a primary focus on Hgb measurements within the clinically significant zone of 60–100 g/L. **Methods:** PREMISE was a prospective diagnostic cohort study focusing on method comparison, conducted at 2 tertiary-care hospitals. Consecutive adult patients undergoing major noncardiac surgery and needing intraoperative POCT-Hgb testing were eligible. Hgb was measured concurrently using 3 POCT-Hgb devices: HemoCue, i-STAT, and Rad-67. POCT-Hgb measures were compared concurrently with central laboratory Hgb (lab-Hgb). Repeated measurements within 1 operation were included. The primary outcome was the accuracy of pairwise comparisons between POCT-Hgb and lab-Hgb. Limits of agreement (the interval where 95% of differences lie) adjusted for repeated measurements were calculated. Agreement was defined as ±4 g/L. Secondary agreement thresholds were also considered (±7% and ±10 g/L). **Results:** A total of 1139 patients were enrolled, yielding 1735 blood samples. Limits of agreement with lab-Hgb < 100 g/L were –9.5 to 8.0 g/L for HemoCue, –16.2 to 11.5 g/L for i-STAT, and –14.7 to 40.5 g/L for Rad-67. HemoCue was associated with a 5.8% probability of clinically significant transfusion error, whereas i-STAT and Rad-67 were associated with 25.3% and 28.2%, respectively. Assuming a transfusion threshold of 70 g/L, a HemoCue reading of 75 g/L would imply a 96.4% probability that lab-Hgb is ≥ 70 g/L, whereas the same i-STAT or Rad-67 readings would yield probabilities of 77.8% and 87.7%, respectively. **Conclusion:** None of the POCT-Hgb devices examined can be considered interchangeable with the lab-Hgb at a 4 g/L agreement threshold. However, HemoCue was sufficiently accurate to inform intraoperative transfusion decisions, given its very low probability of error at transfusion thresholds.

**16**

**Enhancing access to semi-urgent cholecystectomy procedures: a retrospective observational study.** ***Matthew Cornacchia, Victoria Ivankovic, Shahad Abdulkhaleq Mamalchi, Dexter Choi, Peter Glen, Maher Matar, Fady Balaa*. From the University of Ottawa (Cornacchia, Ivankovic, Choi, Glen, Matar, Balaa), the Royal College of Surgeons in Ireland (Mamalchi), and the Medical University of Bahrain (Mamalchi).**

**Background:** In publicly funded health care systems, wait times for elective surgical services present significant challenges, impacting patient well-being and efficient health care resource utilization. Gallstone-related diseases often necessitate urgent surgical intervention, yet current practices may lead to unnecessary hospital admissions and prolonged stays. Surgeons increasingly turn to managing semi-urgent cases through inpatient emergency pathways to alleviate the constraints on elective surgery access. This study aimed to explore the rationale for and potential cost-effectiveness of implementing a system providing timely access to semi-urgent cholecystectomy procedures for patients with biliary disease. **Methods:** This retrospective observational study utilized data from the Canadian Management Information System Database to estimate the average cost per day on a general ward admission in an academic centre. Patients diagnosed with biliary diseases without features of cholecystitis who underwent operative intervention between July 2019 and December 2022 were included. Patient data were acquired using the MDClone data platform, which enabled filtering based on diagnosis, procedure codes, and surgical booking priority. Reference time-stamps related to the surgery were then obtained for analysis. The primary outcome was cost associated with the number of days between time of surgery booked to time of operation. The sum of values among included patients totalled the perceived unnecessary hospital costs associated with admission. **Results:** Among 560 patients included, the average time awaiting surgery following procedure booking was 23.8 hours, with 7% enduring a wait of 3 days or more. In this conservative estimate, the perceived health care spending from prolonged length of stay while awaiting urgent surgery in hospital totalled $829 552. **Conclusion:** Implementing a semi-urgent surgical program has the potential to reduce unnecessary length of stay, leading to cost savings and improvement in patient-centred outcomes. Future research with appropriate stakeholders is required to investigate barriers and facilitators to the design and implementation of such a program in Canada.

**17**

**Cost savings associated with on-site surgical care in a remote Indigenous community in Northern Quebec.** ***Natasha Caminsky, Sarah Mashal, Nathalie Boulanger, Larry Watt, Jonathon Campbell, Jeremy Grushka, Paola Fata, Evan Wong*. From the McGill University Health Centre (Caminsky, Mashal, Grushka, Fata, Wong), the Ungava Tulattavik Health Centre (Boulanger, Watt), and McGill University (Campbell).**

**Background:** Annually, more than 5000 patients fly to Montréal from Nunavik — about 1600 km — to receive specialized medical and surgical care. These visits can represent a cultural shock to patients, a financial loss for days away from work, and a significant financial burden to the health care system. Significant cost savings have already been documented with on-site travel of a general surgeon for consultations; however, total cost savings from on-site

operative care remain unknown. **Methods:** A costing evaluation was performed using all outpatient clinic visits and same-day surgeries performed in Puvirnituq between August 21–25, 2023. Direct costs included 1) surgeon remuneration; 2) travel, lodging, and food for the surgeon, patients, and escorts; and 3) operational and overhead costs related to each surgical procedure. Indirect costs were based on patient's lost income related to travel. Net savings were obtained by comparing costs of on-site travel to the traditional model of patient transport to Montréal. Sensitivity analyses were performed to account for varying villages of origin, lengths of stay, and need for escort. **Results:** Overall, 30 patients were seen in clinic, and 16 operations were performed, including 9 laparoscopic cholecystectomies and 7 hernia repairs (3 umbilical, 2 incisional, 1 epigastric, and 1 inguinal). Most patients (21 [70%]) flew in from a surrounding village. Direct and indirect costs associated with an on-site surgeon were estimated at $68 697.98 and $4857.30, respectively. Costs associated with patients travelling to Montréal for the same services was estimated at $515 129.61 and $19 238.70, respectively. Approximate cost savings associated with a surgeon travelling to Nunavik amounted to $460 813.03 per 1-week visit. Savings remained significant across all sensitivity analyses. **Conclusion:** Beyond the cultural advantages of providing care within communities, on-site surgical care in Northern Quebec represents an astoundingly cost-effective care model. Future studies should focus on methods to expand surgical capacity within these communities.

**18**

**Advancing health equity: unravelling disparities in preoperative health care utilization among immigrants undergoing elective surgery.** ***Michael Guo*****,** ***Ahmer Karimuddin*****,** ***Jason Sutherland*****. From the University of British Columbia.**

**Background:** Immigrants face language barriers and inexperience navigating the health care system, which may result in them using fewer publicly funded health care services than nonimmigrants in Canada. This discrepancy is especially important during the time period before elective surgeries. Lower health care utilization during this time, when patients need to address their functional deficits and symptoms, may signify systemic barriers to health care access. This study compares preoperative health care utilization between immigrants and nonimmigrants undergoing elective general surgeries in British Columbia. **Methods:** This study was based on population-based longitudinal data that linked citizenship and immigration data with administrative information and physician visit information. This study included all elective general surgery procedures performed between January 1, 2013, and December 31, 2021. Health care utilization was defined as encounters with a physician (stratified into primary care, non–general surgery specialist, and general surgery services), imaging services, emergency department (ED) visits, and hospitalizations in the year preceding elective surgery. Health care utilization within the 1-year interval were compared between immigrants and nonimmigrants. **Results:** Of 179 010 elective general surgery procedures, immigrants received 15.0%. After adjustment for age, gender, Charlson Comorbidity Index score, and socioeconomic quintile, immigrants were observed to use fewer primary care (relative risk [RR] 0.965, 95% confidence interval [CI] 0.956–0.973) and imaging services (RR 0.975, 95% CI 0.963–0.986) in the preoperative period. Immigrants used more non–general surgery specialist services (RR 1.057, 95% CI 1.039–1.075) and had more ED visits (RR 1.072, 95% CI 1.048–1.097) than nonimmigrants. More ED visits were observed in the preoperative period among immigrants of lower socioeconomic status, lower education level, those not fluent in English, and in visible minorities. **Conclusion:** While immigrants use fewer physician-based services before surgery, they access emergency and specialist services more frequently. These data suggest that immigrants exhibit lower engagement with regular outpatient physician services than nonimmigrants, leading to increased reliance on emergency departments.

**19**

**Surgical wait times in British Columbia: more of the same is not enough.** ***Christine Li*****,** ***Wenjie Lin*****,** ***Ahmer Karimuddin*****. From the University of British Columbia (Li, Lin, Karimuddin), and the Singapore General Hospital (Lin).**

**Background:** Surgical wait times in British Columbia have been evolving as a critical issue, even before the COVID-19 pandemic exacerbated an already complex problem. Managing a growing demand for surgical procedures against the backdrop of limited resources and an aging population is difficult. **Methods:** Using publicly available data regarding surgical wait times maintained by the Government of British Columbia, we analyzed trends in surgical wait times across procedures from 2009 to 2023. When possible, data around general surgery procedures were extracted. **Results:** Surgical wait times for all procedures have been increasing over the last decade. The number of patients waiting for surgery increases an average of 1.82%/year (1070 cases/yr). The number of cases completed per year also increases an average of 0.9%/year (1558 cases/yr). When general surgery procedures are isolated, the wait list increases an average 0.35%/year (7 patients/yr) and cases completed also increases an average 0.81%/year (230 cases/yr). For all surgical procedures in British Columbia, median wait time improved from previous years during the pandemic (7.1 wk in 2019, 6.7 wk in 2020, and 5.9 wk in 2021 v. 7.3 wk in 2016, 7.3 wk in 2017, and 7.1 wk in 2018) while 90th percentile wait times were more variable (31.1 wk in 2019, 38.3 wk in 2020, and 28.6 wk in 2021 v. 32.7 wk in 2016, 33.3 wk in 2017, and 32.0 wk in 2018). **Conclusion:** Despite increasing procedure volume yearly, our wait lists continue to grow. The rate of wait list growth coupled with the rate of case completion demonstrates an average additional 2638 cases compounded yearly, which our health system is straining to address. As wait list growth rate outpaces service provision increase, it is imperative to address the issue of surgical wait list management to better serve our patients and facilitate a sustainable health care system.

**20**

**Clinical artificial intelligence: customizing a large language model to generate SAGES guideline recommendations for the surgical management of GERD.** ***Bright Huo*****,** ***Elisa Calabrese*****,** ***Sunjay Kumar*****,** ***Bethany Slater*****,** ***Danielle S. Walsh*****,** ***Wesley Vosburg*****. From McMaster University (Huo), the University of Southern California (Calabrese), the Thomas Jefferson University Hospital (Kumar), the University of Chicago (Slater), the University of Kentucky (Walsh), and Harvard Medical School (Vosburg).**

**Background:** Large language models (LLMs) provide clinical guidance with inconsistent accuracy due to limitations with their training data set. We customized ChatGPT and evaluated its ability to provide recommendations for the surgical management of gastroesophageal reflux disease (GERD) to both surgeons and patients. **Methods:** Forty-five patient cases were developed using eligibility criteria from the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) guidelines for the surgical management of GERD. Standardized prompts were engineered for physicians as the end-user, with separate layperson prompts for patients. A customized GPT was developed to generate recommendations based on the SAGES guidelines, creating the SAGES GERD Tool for Surgery (SGTS). Both the SGTS and generic ChatGPT-4.0 were queried December 3, 2023. Their performance was evaluated according to SAGES guideline recommendations. Outcome data were presented using descriptive statistics including counts and percentages, while chatbot performance was assessed using a $\chi^2$ test. **Results:** The SGST provided accurate recommendations for the surgical management of GERD for 45/45 (100.0%) surgeon inquiries and 35/35 (100.0%) patient inquiries based on SAGES guidelines. The ChatGPT-4.0 model generated accurate guidance for 31/45 (68.9%) surgeon inquiries and 16/35 (45.7%) patient inquiries. There were no statistically significant differences in LLM performance between surgeon and patient inquiries for the generic ChatGPT-4.0 model ($\chi^2$ = 1.554, Cramer's V = 0.211, $p$ = 0.213). The SGST produced recommendations based on the 2021 SAGES guidelines on the surgical management of GERD, while the generic ChatGPT-4.0 model generated guidance without citing evidence to support its recommendations. **Conclusion:** ChatGPT-4.0 can be customized to overcome limitations with its training data set to provide recommendations for the surgical management of GERD with reliable accuracy and consistency. Clinicians, patients, policy-makers, and hospital managers should take note that this methodology may be applied to support surgical decision-making. Prospective clinical data are needed.

## CANADIAN ASSOCIATION OF THORACIC SURGEONS

**01**

**The impact of preoperative nutritional intervention on postoperative morbidity among sarcopenic patients undergoing esophagectomy: a prospective cohort study.** ***Uzair Jogiat, Simon Turner, Vickie Baracos, Dean Eurich, Heather Filafilo, Eric Bedard*. From the University of Alberta.**

**Background:** There exists a lack of prospective studies evaluating the impact of nutritional parameters on the relationship between sarcopenia and adverse clinical outcomes. **Methods:** A prospective cohort of patients with esophageal cancer undergoing trimodality therapy was created from November 2019 to February 2024. Body composition parameters from the staging and post-neoadjuvant re-staging scan were measured. Sarcopenia was defined as 52.4 $cm^2/m^2$ in males and 38.5 $cm^2/m^2$ in females. Clinical characteristics, oncologic data, operative characteristics, and 30-day morbidity and mortality were prospectively collected. Nutritional data collected included weight change over time, preoperative albumin, clinical history of dysphagia and weight loss, date and duration of preoperative feeding tube, and duration of postoperative jejunostomy feeding. A multivariable logistic regression model was developed to determine the effect of perioperative nutritional and clinical variables on the development of anastomotic leak (AL). **Results:** Of the 140 patients included, sarcopenia was present among 79 (56.43%) patients at the staging scan and 103 (73.57%) patients at the re-staging scan. In the overall cohort, 48 (34.29%) received a preoperative feeding tube. Sarcopenia at the staging scan was associated with increased odds of AL (odds ratio [OR] 2.89, $p$ = 0.019). There was significant interaction between sarcopenia status and preoperative feeding tube status. Patients who received a preoperative feeding tube and were sarcopenic had no significant increase in odds of AL (OR 2.74, $p$ = 0.160). Patients who did not receive a preoperative feeding tube and were sarcopenic did have a significance increase in odds of AL (OR 3.93, $p$ = 0.024). This association remained significant on multivariable analysis adjusting for anastomosis type (neck v. chest, OR 4.90, $p$ = 0.002) and hypoalbuminemia (OR 3.70, $p$ = 0.048). **Conclusion:** Sarcopenic patients who receive preoperative nutritional intervention experience decreased morbidity. Sarcopenia status may improve patient selection for preoperative nutritional intervention.

**02**

**ctDNA Lung DETECT: assessing ctDNA prospectively in resected early-stage non-small-cell lung cancers.** ***Sam Khan, Tom Waddell, Kazuhiro Yasufuku, Andrew Pierre, Shaf Keshavjee, Elliot Wakeam, Laura Donahoe, Marcelo Cypel, Najib Safieddine, Michael Ko, Natasha Leighl, Jamie Feng, Jonathan Yeung, Marc De Perrot, Alexandra Salvarrey, Negar Ahmadi, Carmine Simone, Gazala Sayf, David Parente, Victoria Cheung, Mary R. Rabey, Michael Cabanero, Lisa W. Le, Christodoulos Pipinikas, Amber Chevalier*. From the Princess Margaret Cancer Centre, University Health Network (Khan, Leighl, Feng, Rabey, Cabanero); University Health Network (Waddell, Yasufuku, Pierre, Keshavjee, Wakeam, Donahoe, Cypel, Yeung, De Perrot, Salvarrey); the Michael Garron Hospital (Safieddine, Ahmadi, Simone, Sayf); St. Joseph's Health Centre (Ko, Parente, Cheung); and NeoGenomics Laboratories (Le, Pipinikas, Chevalier).**

**Background:** ctDNA Lung DETECT is a multicentre investigator-initiated prospective study at 3 thoracic surgery centres in the Greater Toronto Area assessing circulating tumour DNA (ctDNA) detection and association with recurrence-free survival (RFS) in patients with early-stage non-small-cell lung cancer (NSCLC) (NCT05254782). Despite surgery, patients who have perioperative ctDNA detected have poor RFS and may benefit from adjuvant therapy (companion study NCT04966663) rather than standard observation. **Methods:** Patients with stage I (T1–2N0) or multifocal T3–4 < 4cm N0 NSCLC planned for resection consented to plasma ctDNA assessment before and after surgery and at 12 months postoperatively or relapse using the tumour-informed RaDaR

assay. **Results:** From July 2021 to March 2024, 190 patients were enrolled; 121 had sufficient tissue for ctDNA assessment. Most patients underwent lobectomy (74.4%), segmentectomy or wedge resection (10.7%), bilobar resection (2.5%), or lobectomy or segmentectomy with a wedge resection (12.3%). Approximately 80% of patients underwent video-assisted thoracoscopic surgery, 14.9% robotic surgery, 2.5% thoracotomy, and 1.7% blinded as part of another trial. Median length of stay was 2 (range 1–10) days. Most (99.1%)patients were American Society of Anesthesiologists class 3 or 4. Preoperative ctDNA was detected in 33/121 (27.3%) patients, and ctDNA clearance was achieved in all but 3 patients (90.9%), who were found to have occult stage 2/3 disease. Of the patients in whom preoperative ctDNA was detected, 18.6% had pathologic stage I, 50.0% had occult stage II and III NSCLC, and the remainder had 1 Tis/1 stage 4. Lung cancer recurred in 8/121 (6.6%) patients. New cancers were diagnosed in 7 patients (5 lung, 1 ovarian, 1 liposarcoma). Of the 4 patients who died, 2 died from recurrent lung cancer and 2 from new primaries (lung/liposarcoma). **Conclusion:** This study represents one of the largest prospective cohorts of early-stage NSCLC. Updated data on surgical procedure, pathological features, and recurrence with ctDNA detection will be presented.

**03**

**Same-day discharge after pulmonary wedge resection: a cost–utility analysis.** ***Richard Chaulk, David Sahai, Richard Malthaner, Mehdi Qiabi, Dalilah Fortin, Richard Inculet, Rahul Nayak*****. From Western University.**

**Background:** A recent prospective trial completed at our centre demonstrated that same-day chest tube removal and discharge after minimally invasive pulmonary wedge resection (MIS-WR) is safe and feasible. Thus, we conducted a cost–utility analysis comparing same-day chest tube removal and same-day discharge with patients who underwent standard postoperative admission following MIS-WR. **Methods:** The study included 2 phases from February 2022 to December 2023: phase 1 examined short-term outcomes for patients who had their chest tubes removed 4 hours postoperatively ($n$ = 30), and phase 2 included same-day discharge ($n$ = 24). Our control group consisted of patients who met study inclusion criteria but were not enrolled ($n$ = 32). Using automated electronic hospital case costing software and the mean length of stay (LOS) for patients, we completed a cost–utility analysis comparing each phase against our control group, reporting incremental case cost (ICC) in 2021 Canadian dollars for 1 hospital day. **Results:** The average ICC for phase 1 was $865.44 with a mean LOS of 1.44 days. For phase 2, the average ICC was $504.84 with a mean LOS of 0.84 days. The control group had a mean LOS of 2.3 days with an average ICC of $1364.27. This demonstrates a cost savings of $498.83 per case for phase 1 and $937.56 per case for phase 2. Our centre conducted 188 MIS-WR in 2023, representing 15% of provincial lung resection volumes. A provincial same-day discharge program could save approximately $1.1 million annually in hospital costs. **Conclusion:** Following MIS-WR, same-day chest tube removal leads to significant cost savings when compared to our control group who received standard admission and postoperative care. These savings are increased with the addition of same-day discharge following MIS-WR.

**04**

**Understanding global perspectives in diaphragmatic reconstruction during hiatal hernia repair by geography, specialty training, and experience.** ***John Campbell, Peter White, Adam Bograd, Alexander Farivar, Brian Louie*****. From the Swedish Medical Center Cancer and Digestive Health Institute.**

**Background:** Diaphragmatic reconstruction during hiatal hernia repair (HHR) involves a series of non-standardized manoeuvres and decisions. The choice of suture material and configuration, method of assessing adequate closure, and utilization of mesh and relaxing incisions vary. We conducted a survey to understand global trends. **Methods:** Surgeons were surveyed, via international thoracic and foregut societies, regarding methods used for diaphragmatic reconstruction. Responses were compared by geography, specialty training, and years of experience. **Results:** There were 280 responses across 5 continents with varying training pathways and surgical specialties. Their experience ranged from 1 to 20 or more years and they were practising in academic, community, and private hospitals. Simple interrupted sutures were most common. However, surgeons in the U.S. and Oceania and general surgeons use more running, horizontal mattress, and figure-of-8 configurations. Canadian and cardiothoracic surgeons predominately use braided suture material. Pledgets are more routinely used by U.S. (19 [17%]) and Canadian (7 [24%]) surgeons, without difference by specialty or experience. Methods of assessing hiatal closure differ by geography and experience. Visual inspection alone is used more in Oceania (20 [59%]), whereas surgeons with 1–5 years' experience rely less on visual inspection alone (8 [16%]) and used more endoscopy (23 [47%]). Canadian (22 [73%]) and cardiothoracic (39 [56%]) surgeons were more likely to not use hiatal mesh. Situational use is more common in the U.S. (68 [61%]) and Europe (19 [61%]), whereas routine use is most frequent in the U.S. (19 [17%]). Permanent mesh is used exclusively by surgeons with 10 or more years of experience. Relaxing incisions are used more by U.S. (77 [69%]) and Canadian (23 [77%]) surgeons, without difference by specialty or experience. **Conclusion:** Diaphragmatic reconstruction during HHR varies globally. Reconstruction varies more appreciably with geography than with surgeon experience or specialty training. Each geographical region demonstrated unique variations in hiatal closure.

**05**

**An evaluation of 986 consecutive endobronchial ultrasound-guided transbronchial needle aspiration procedures for reflex biomarker testing for lung cancer: a single-centre retrospective review.** ***Geraint Berger, Daniel French, Simon Houston*****. From Dalhousie University.**

**Background:** Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is a minimally invasive technique commonly used to biopsy intrathoracic lymph nodes and tumours. Given the high propensity of lung cancer to spread to intrathoracic lymph nodes, nodal sampling is commonly required for both diagnosis and staging. Moreover, determining the best treatment for non-small-cell lung

 

cancer (NSCLC) often requires characterization of tumour biomarkers that can potentially be targeted with systemic therapy. This study aimed to evaluate the utility of EBUS-TBNA for diagnosis and molecular profiling and quantification of PD-L1 expression on NSCLC samples fixed in formalin using reflex testing without rapid on-site evaluation (ROSE). **Methods:** We performed a retrospective chart review of all patients referred for EBUS-TBNA between May 2017 and December 2022. Patient demographics, radiographic features of the primary tumour and lymph nodes, histopathological subtype, and results of reflex testing were collected. **Results:** A total of 986 EBUS-TBNA procedures were completed during the study period, with 753 (76.3%) indicated for diagnosis and/or staging of suspected or known lung cancer. A total of 1260 lymph node samples in this patient group were placed directly in formalin; 1162 (92.2%) samples yielded sufficient diagnostic lymphoid tissue. Of these, 511 (44.0%) were positive for lung cancer, of which 407 (79.2%) were determined to be NSCLC. Adenocarcinoma was the most common subtype within lymph nodes (276/511 [67.8%]). Pathologist-initiated reflex testing was performed on 224 samples (43.8%), with a success rate of 96%. PD-L1 immunohistochemistry was successful in 209 samples (97%). **Conclusion:** Our findings indicate that EBUS-TBNA lymph node samples fixed directly in formalin can reliably be used for reflex testing during the evaluation of patients with lung cancer in the absence of ROSE.

**06**

**Endoscopic ultrasound-guided core needle biopsies (EUS-CNB): safe and effective approach for diagnosing lymphoma in patients with mediastinal lymphadenopathy.** ***Flyn Gallardo, Bryce Macek, Richard Liu, Biniam Kidane*. From the University of Manitoba.**

**Background:** In patients with suspected lymphoma, surgical excisional/incisional biopsy of their lymphadenopathy is considered the gold standard for diagnosis. However, in patients with mediastinal lymphadenopathy, surgical excision/incision is associated with higher rates of morbidity and mortality. Less risky, minimally invasive endoscopic ultrasound-guided core needle biopsies (EUS-CNB) with novel needle technology may be adequate for the diagnosis of lymphoma. **Methods:** A retrospective cohort study of 1878 patients biopsied at Health Sciences Centre between 2017 and 2021 was conducted. Eligible patients included consecutive patients undergoing CNB for mediastinal lymphadenopathy suspicious for lymphoma. Concordance was determined by calculating the proportion where diagnosis of lymphoma using the CNB and surgical specimen matched. Certain CNB diagnoses were described as "inconclusive," which included phrases where the pathologist stated "insufficient/inadequate material" or recommended a follow-up surgical biopsy. "Inconclusive" diagnoses were treated as "negative for lymphoma" statistically. Diagnostic test characteristics (e.g., specificity) were calculated. Cases that were and were not followed up by surgical biopsy were compared to determine factors influencing escalation to surgical biopsy. **Results:** Thirty-seven patients had CNB for mediastinal lymphadenopathy suspicious of lymphoma, 15 of whom were followed up with a surgical biopsy. Five of the 15 cases had an "inconclusive" diagnosis. All 15 cases were "negative for lymphoma" with CNB, which was confirmed with a follow-up surgical biopsy, resulting in a concordance, specificity, and negative predictive value of 100%. Cases that were escalated to surgical biopsy were characterized by a higher frequency of recommendations to perform a surgical biopsy by the pathologist compared to those that were not (15 [22.6%] v. 22 [4.5%], $p = 0.020$). **Conclusion:** CNB is adequate to rule out lymphoma in patients presenting with mediastinal lymphadenopathy, even patients for whom there is enough doubt in the clinician and pathologist to prompt surgical biopsies. This finding has practice and policy implications. Larger prospective studies are required for confirmation.

**07**

**Three-dimensional lung modelling improves the completion rate of segmental resection.** ***Nader M. Hanna, Yogita S. Patel, Ikennah Browne, Esther Provost, Forough Farrokhyar, Ehsan Haider, Waël C. Hanna*. From McMaster University.**

**Background:** Segmentectomy is the surgical approach of choice for lung preservation in early-stage non-small-cell lung cancer (NSCLC). However, minimally invasive complex segmental resection is a technically challenging operation, with rates of completion ranging between 60% and 72%. We hypothesize that robotic surgery with anatomical 3D modelling improves the completion rate of segmentectomy. **Methods:** This is a prospective cohort study in patients with NSCLC < 3 cm. In the first cohort, segmentectomy was planned based on computed tomography (CT) scan alone (control). In the second cohort, operative planning was performed using Synapse 3D (S3D) modelling software (Fujifilm, Tokyo, Japan; intervention). The primary outcome was rate of completion of segmental resection. $\chi^2$ and $t$ test analyses compared categorical and continuous variables, respectively. Univariable regression was used to identify independent predictors of the rate of completion. **Results:** There were no differences in patient characteristics between control ($n = 281$) and S3D ($n = 67$) cohorts. Mean tumour size was greater in the S3D cohort (2.20 ± 1.26 cm v. 1.85 ± 1.07 cm, $p = 0.02$). Rate of completion of segmentectomy was higher in the S3D cohort than controls (88.06% v. 76.16%, $p = 0.03$). In the S3D cohort, 8/8 (100%) conversions were to lobectomy compared with 45/67 (67.16%) in controls. Median lymph node stations sampled was greater in the S3D cohort (8 [interquartile range (IQR) 7–8] v. 6 [IQR 5–7], $p < 0.01$). There were no statistically significant differences between cohorts regarding operating room time, conversion to thoracotomy, intraoperative and postoperative adverse events, length of stay, or chest tube duration. Variables that were predictive of successful completion were lobe of resection (odds ratio [OR] 1.23, 95% confidence interval [CI] 1.03–1.48, $p = 0.03$), indocyanine green injection (OR 8.44, 95% CI 4.59–15.53, $p < 0.001$), and use of Synapse 3D (OR 2.31, 95% CI 1.05–5.08, $p = 0.04$). **Conclusion:** Use of 3D modelling during robotic segmentectomy results in a higher rate of completion of segmentectomy than operative planning with CT alone. A larger experimental cohort is required to determine if this is associated with statistically significant differences in adverse outcomes.

## CANADIAN SOCIETY OF COLON AND RECTAL SURGEONS

**01**

**Propofol for sedation during colonoscopy: a systematic review and meta-analysis.** ***Garrett Johnson, George Okoli, Nicole Askin, Ahmed Abou-Setta, Harminder Singh*. From the University of Manitoba.**

**Background:** Colonoscopy can be uncomfortable, so opioids and/or benzodiazepines are commonly administered. Propofol is an alternative used in many jurisdictions. We synthesized randomized controlled trials (RCTs) comparing relative efficacy, patient acceptance, and safety of propofol sedation for colonoscopy compared to opioids/benzodiazepines. We extensively updated a previous Cochrane review. **Methods:** MEDLINE, Embase, CENTRAL, CINAHL, LILACS, and Web of Science were searched up to April 2022 for RCTs comparing propofol to opioids/benzodiazepines during colonoscopy. Two authors independently identified RCTs, extracted data, assessed risk of bias (ROB 2.0 tool), and evidence certainty (Grading of Recommendation, Assessment, Development and Evaluation [GRADE] instrument). **Results:** Twenty-four unique studies (20 full texts, 4 abstracts) were included. Recovery time (mean difference [MD] –6.07 mins, 95% confidence interval [CI] –2.2 to –9.95, 13 RCTs, 1685 patients, low certainty of evidence), discharge time (MD –8.04 mins, 95% CI –2.63 to –13.46, 11 RCTs, 1941 patients, low certainty of evidence), patient satisfaction score (standardized mean difference [SMD] 0.53, 95% CI 0.22 to 0.84, 10 RCTs, 1262 patients, low certainty of evidence), and patients reporting controlled pain (relative risk [RR] 1.05, 95% CI 1.02 to 1.08, 5 RCTs, 858 patients, low certainty of evidence) were superior with propofol. Cecal intubation rate (RR 1.00, 95% CI 0.98 to 1.01, 6 RCTs, 1856 patients, moderate certainty of evidence), overall pain score (SMD 0.15, 95% CI –0.41 to 0.71, 8 RCTs, 1470 patients, very low certainty of evidence), proportion of satisfied patients (RR 1.05, 95% CI 0.92 to 1.20, 8 RCTs, 1239 patients, low certainty of evidence), and complications were similar between groups. Evidence certainty was limited by unexplained statistical heterogeneity and unclear risk of bias. **Conclusion:** Propofol sedation for colonoscopy may improve recovery and discharge times, patient satisfaction, and pain control without affecting cecal intubation or complication rates compared to opioids/benzodiazepines. Findings are particularly relevant to most Canadian endoscopy units, which have limited recovery room resources. Evidence certainty was generally low, indicating a need for better studies with standardized outcomes reporting.

**02**

**Development of the Low Anterior Resection Syndrome Impact and Consequences Assessment Tool (LARS ICAT).** ***Alexandra Coxon-Meggy, Julie Cornish, LARS ICAT Study Management Group*. From the Cardiff and Vale University Health Board (Coxon-Meggy, Cornish, LARS ICATS Study Management Group), Cardiff University (Coxon-Meggy, LARS ICATS Study Management Group); McGill University (LARS ICATS Study Management Group), the University of Auckland (LARS ICATS Study Management Group), the Cleveland Clinic (LARS ICATS Study Management Group), Aarhus University (LARS ICATS Study Management Group), Harvard University (LARS ICATS Study Management Group), and Vall d'Hebron University Hospital (LARS ICATS Study Management Group).**

**Background:** Low anterior resection syndrome (LARS) is a common bowel dysfunction condition, affecting up to 40% of patients following anterior resection for rectal cancer as diagnosed by the LARS Score. The definition of LARS was refined in 2020 to detail the 16 symptoms and consequences of the condition. A patient-reported outcome measure (PROM) that reflects this definition and aims to overcome the criticisms of the current LARS assessment tools is required. The aim of this study was to develop a new PROM for the assessment and diagnosis of LARS based on the 2020 international consensus definition. The PROM aims to accurately assess the presence of LARS, be sensitive to change over time and with treatment, and investigate the potential phenotypes of LARS. **Methods:** The definition was translated into a PROM by a group of clinicians, patients and qualitative researchers. Three patient focus groups were then held to review the proposed PROM. Thematic analysis was performed on the transcripts, and results were summarized. The results of the focus groups were discussed in 4 clinician consultation meetings before a final PROM was developed ahead of statistical validation. **Results:** The patient focus groups found the PROM easy to complete but required changes to the answering categories. Three additional elements were identified, including nighttime symptoms, the impact that treatments have on symptoms and life, and the importance of linking symptoms and consequences. One question of stool consistency was removed. **Conclusion:** The LARS ICAT is an important new development in the management of LARS that aims to overcome issues with the current LARS Score. The LARS ICAT has been developed with patients involved at all steps, and work to date confirms that all important symptoms and consequences are covered. The LARS ICAT requires statistical validation in the next phase of work.

**03**

**Postoperative recovery of colorectal patients enhanced with dexmedetomidine (PReCEDex): a systematic review and meta-analysis of randomized controlled trials.** ***Sahil Sharma, Jigish Khamar, Jo-Anne Petropolous, Amandeep Ghuman*. From McMaster University (Sharma, Khamar, Petropolous), and the University of British Columbia (Ghuman).**

**Background:** Intraoperative administration of dexmedetomidine has shown promise in improving postoperative gastrointestinal function. However, in the context of colorectal surgery, the results remain inconsistent. Therefore, this review aims to provide a synthesis of studies assessing the effect of dexmedetomidine on postoperative gastrointestinal function in colorectal surgery patients. **Methods:** CENTRAL, Emcare, Embase, and MEDLINE were searched up to September 2023. Randomized controlled trials involving adult patients (≥ 18 yr) undergoing elective colorectal surgery, comparing intraoperative dexmedetomidine

 

administration to a control group, and reporting on postoperative gastrointestinal function were included. The primary outcome was time to first flatus or bowel movement, and secondary outcomes included length of stay and time to solid oral intake. Inverse variance random-effects meta-analyses were used to pool effect estimates. **Results:** After screening 1194 citations, 8 studies were included. These studies comprised 570 patients in the dexmedetomidine group (mean age 65.8 yr, 43% female, mean body mass index [BMI] 22.7 kg/m$^2$) and 556 patients in the control group (mean age 70.6 yr, 40% female, mean BMI 22.5 kg/m$^2$). Dexmedetomidine administration resulted in a shorter time to flatus (mean difference [MD] –14.55 h, 95% confidence interval [CI] –20.14 to –8.95, $p < 0.005$, very low certainty of evidence), a shorter time to first bowel movement (MD –11.9 h, 95% CI –18.74 to –5.05, $p < 0.005$, very low certainty of evidence), a shorter time to solid oral intake (MD –14.34 h, 95% CI –17.43 to –11.24, $p < 0.005$, moderate certainty of evidence), and a shorter length of stay (MD –1.06 d, 95% CI –1.99 to –0.12, $p < 0.05$, very low certainty of evidence). **Conclusion:** In adult patients undergoing elective colorectal surgery, intraoperative use of dexmedetomidine results in clinically meaningful improvements in postoperative gastrointestinal function and, consequently, a shorter length of stay. Therefore, dexmedetomidine may serve as a valuable adjunct in enhancing postoperative recovery of patients following elective colorectal surgery, thereby reducing health care utilization, and improving patient outcomes.

**04**

**Failure to rescue in colorectal surgery: a systematic review.** ***Wenjie Lin*, *Christine Li*, *Carl Brown*, *Terry Phang*, *Manoj Raval*, *Amandeep Ghuman*, *Elizabeth Clement*, *Ahmer Karimuddin*. From St. Paul's Hospital (Lin, Li, Brown, Phang, Raval, Ghuman, Clement, Karimuddin), and Singapore General Hospital (Lin).**

**Background:** Failure to rescue (FTR) has emerged as an important quality metric in surgery in recent years. The FTR rate refers to mortality after a significant postoperative complication. Colorectal resection is one of the most common major abdominal surgeries performed. However, the literature on FTR in colorectal surgery remains fragmented. To our knowledge, this is the first comprehensive systematic review of current literature on this topic. **Methods:** This study conformed to PRISMA guidelines. A comprehensive search was performed in MEDLINE, CENTRAL, Embase, and CINAHL to identify all studies on FTR in colorectal surgery from inception to December 14, 2023. Articles discussing unrelated surgery and outcomes were excluded. A narrative systematic review was performed. Hospital structural and organizational factors, patient factors and surgical factors were analyzed for effects on FTR rates and themes discussed. Risk of bias was assessed using the Newcastle–Ottawa Scale by 2 independent reviewers. **Results:** A total of 24 registry-based cohort studies with data from 1 619 379 patients were included. FTR was shown to be an independent driver for variation in inpatient mortality (odds ratio [OR] 2.0–3.0). For patient characteristics, older age (OR 2.9–5.8) and comorbidities (OR 1.8–1.9) were associated with higher FTR rates. FTR was shown to be associated with level of intensive care facilities (OR 0.53–0.83), non-subspecialized surgeons (OR 2.28), open (v. laparoscopic) surgery (OR 1.6–2.1) and colectomies (v. proctectomies) (OR 1.89). Association of FTR rates with hospital academic status and procedure volume was not consistently shown. **Conclusion:** This study has identified drivers for FTR as potential quality improvement targets. We have also identified blind spots in the literature that require further research, including qualitative analysis of microsystems within hospitals, and the identification and preoperative optimization of patients to improve quality of care in colorectal surgery.

**05**

**Robotic versus laparoscopic colorectal surgery for patients with obesity: an updated systematic review and meta-analysis.** ***Tyler McKechnie*, *Jigish Khamar*, *Christopher Chu*, *Amin Hatamnejad*, *Ghazal Jessani*, *Yung Lee*, *Aristithes Doumouras*, *Dennis Hong*, *Cagla Eskicioglu*. From McMaster University (McKechnie, Khamar, Chu, Hatamnejad, Jessani, Lee, Doumouras, Hong, Eskicioglu), and St. Joseph's Healthcare (Doumouras, Hong, Eskicioglu).**

**Background:** Obesity poses significant challenges in colorectal surgery, affecting operative difficulty and postoperative recovery. The choice of a minimally invasive approach for this patient population remains a challenge during preoperative planning. This review aims to provide an updated synthesis of studies comparing laparoscopic and robotic approaches for adult patients with obesity undergoing colorectal surgery. **Methods:** MEDLINE, Embase, and CENTRAL were searched up to August 2023. Articles were included if they compared laparoscopic and robotic colorectal surgery outcomes in adults with obesity (body mass index ≥ 30 kg/m$^2$). Outcomes included overall postoperative morbidity, conversion to laparotomy, and operative time. Inverse variance random-effects meta-analyses were used to pool effect estimates. **Results:** After screening 2187 citations, 10 observational studies were included with 3281 patients with obesity undergoing robotic surgery (mean age 58.1 yr, 43.9% female) and 11 369 patients with obesity undergoing laparoscopic surgery (mean age 58 yr, 53.2% female). Robotic surgery resulted in longer operative times (mean difference [MD] 46.71 min, 95% confidence interval [CI] 33.50–59.92, $p < 0.01$, $I^2 = 93.79\%$) with statistically significant reductions in conversions to laparotomy (relative risk [RR] 0.50, 95% CI 0.39–0.65, $p < 0.01$, $I^2 = 67.15\%$). No significant differences were seen in postoperative morbidity (RR 0.94, 95% CI 0.82–1.08, $p = 0.40$, $I^2 = 36.08\%$). **Conclusion:** These data suggest that robotic colorectal surgery in patients with obesity may reduce the risk for conversion to laparotomy, but at the expense of increased operative times and with no overt benefits in postoperative outcomes. Further high-quality randomized controlled trials assessing the utility of robotic surgery in patients with obesity undergoing colorectal surgery are warranted.

**06**

**Laparoscopically assisted colonoscopic polypectomy: a 7-year retrospective analysis.** ***Giancarlo Sticca*, *Madeleine Poirier*, *Jean-François Tremblay*, *Jean-François Latulippe*, *Yves Bendavid*, *Jean-Sébastien Trépanier*, *Ariane Lacaille-Ranger*, *Margaret Henri*. From Université de Montréal.**

**Background:** Prevention and treatment of colorectal cancer is largely based on identification and removal of colorectal polyps through colonoscopy. However, 10%–15% of polyps remain

endoscopically unresectable. Laparoscopically assisted colonoscopic polypectomy (LACP) is a minimally invasive alternative to surgical segmental resection, which can be associated with morbidity and mortality. This study aimed to determine the value of LACP in terms of complete polypectomy, perioperative complications and local recurrence at 1 year or more of endoscopic follow-up. **Methods:** The study was conducted at a university-affiliated tertiary care centre. A retrospective analysis of all patients with benign polyps deemed endoscopically unresectable between September 2017 and September 2023 was conducted. **Results:** Fifty-one patients were scheduled for polyp removal under general anesthesia (GA). Ten underwent extended appendectomy because the polyp was at the appendiceal orifice. Fifteen had polypectomy under GA because colonoscopy was unsuccessful in the endoscopy suite. Twenty-six were scheduled for LACP because polyps were large or complex. Laparoscopic formal colectomy was decided in 7 patients due to macroscopic suspicion of malignancy or after incomplete polypectomy. Complete polypectomy was achieved in 19 patients (73.1%). Mean procedure time was 91 minutes, and 84.2% of patients experienced no perioperative complications. Colonic perforation occurred twice, with laparoscopic repair performed intraoperatively; both subsequently evolved uneventfully. Self-resolving intraluminal hemorrhage occurred on postoperative day 1 in 1 patient. Day surgery was possible for 73.6%. Final pathology showed benign adenoma in all cases. Mean follow-up colonoscopy time was 619 days. Absence of recurrence was noted for 82.4%. Two patients demonstrated an endoscopically unresectable recurrent polyp and later successfully underwent segmental or ileocecal resection. Overall, colectomy was avoided in 80.4% of patients. **Conclusion:** LACP is a safe procedure with a high success rate. This minimally invasive therapeutic option should be offered to all patients with complicated benign polyps instead of considering primary colonic resection.

**07**

**Preoperative very-low-energy diets for patients with obesity undergoing intra-abdominal colorectal surgery: a single-centre retrospective cohort study (RetroPREPARE).** ***Tyler McKechnie*, *Tania Kazi*, *Victoria Shi*, *Shan Grewal*, *Ahmed Aldarraji*, *Kelly Brennan*, *Sunil Patel*, *Nalin Amin*, *Aristithes Doumouras*, *Sameer Parpia*, *Cagla Eskicioglu*, *Mohit Bhandari*. From McMaster University (McKechnie, Kazi, Shi, Grewal, Aldarraji, Amin, Doumouras, Parpia, Eskicioglu, Bhandari), and Queen's University (Brennan, Patel).**

**Background:** Very-low-energy diets (VLEDs) prescribed prior to bariatric surgery have been associated with decreases in operative time, technical difficulty, and postoperative morbidity. To date, limited data are available regarding the impact VLEDs prior to colorectal surgery. At our centre, patients with obesity undergoing colorectal surgery have been prescribed VLEDs since 2018. Thus, we designed this retrospective cohort study to determine whether preoperative VLEDs benefit patients with obesity undergoing colorectal surgery. **Methods:** This is a single-centre retrospective cohort study. Individuals undergoing elective colorectal surgery between 2015 and 2022 with a body mass index (BMI) > 30 kg/m$^2$ were included. The exposure of interest was the use of Optifast 900 for 2–4 weeks immediately prior to surgery. The control group consisted of patients prior to January 2018 who did not receive preoperative VLED. The primary outcome was 30-day postoperative morbidity. A multivariable logistic regression model was fit to determine associations with 30-day postoperative morbidity. **Results:** Overall, 190 patients were included (median age 67 yr, mean BMI 34.7 kg/m$^2$, 46.3% female); 89 patients received VLEDs after January 1, 2018 (median age 66 yr, mean BMI 36.4 kg/m$^2$, 48.3% female) and 101 patients did not receive VLEDs prior to January 1, 2018 (median age 68 yr, mean BMI 33.2 kg/m$^2$, 44.6% female). Overall, 104 (54.7%) patients experienced 30-day postoperative morbidity: 34 patients (34/89 [38.2%]) receiving VLEDs and 70 patients (70/101 [69.3%]) not receiving VLEDs. Multivariable regression analysis identified 3 variables associated with postoperative morbidity: VLEDs (odds ratio [OR] 0.22, 95% confidence interval [CI] 0.08–0.61, $p < 0.01$), Charlson Comorbidity Index score (OR 1.25, 95% CI 1.03–1.52, $p = 0.02$), and rectal dissections (OR 2.71, 95% CI 1.30–5.65, $p < 0.01$). **Conclusion:** Preoperative VLEDs led to significant reduction in postoperative morbidity in patients with obesity prior to colorectal surgery. Confirmation of these findings requires a high-quality randomized trial, which is currently underway by our group.

**08**

**Fragility of statistically significant outcomes in randomized controlled trials focused on surgical management of anal fissures: a systematic review.** ***Gaurav Talwar*, *Tyler McKechnie*, *Jigish Khamar*, *Luke Heimann*, *Swati Anant*, *Cagla Eskicioglu*. From McMaster University (Talwar, McKechnie, Khamar, Anant), Liberty University (Heimann), and St. Joseph's Healthcare (Eskicioglu).**

**Background:** The American Society of Colon and Rectal Surgeons (ASCRS) provided 7 recommendations involving surgical management of anal fissures in their 2023 *Clinical Practice Guideline for the Management of Anal Fissures*. While some of these recommendations are strong and based on randomized controlled trial (RCT) data, the fragility of the trials upon which these recommendations rest has never been evaluated. This review aims to assess the robustness of the RCTs evaluating the surgical management of anal fissures using the fragility index (FI). **Methods:** RCTs with at least 1 arm including a surgical intervention were identified using the ASCRS 2023 *Clinical Practice Guideline for the Management of Anal Fissures*. Dichotomous outcomes with an effect size having a $p$ value < 0.05 were included. Walsh et al.'s method of calculating FI was utilized. RCT results were considered fragile if the FI was less than the loss to follow-up for a given outcome. Correlations between FI and research characteristics were assessed using Spearman rank correlation coefficients. Risk of bias was assessed using Cochrane recommended tools. **Results:** Of the 29 surgical RCTs directly referenced in the ASCRS guideline, 17 RCTs published between 2000 and 2020 had 68 statistically significant dichotomous outcomes. Six RCTs randomized 100 or more patients and contributed 26 significant outcomes. The overall median FI was 4 (interquartile range 1–8). The number of patients lost to follow-up exceeded the FI in 46 outcomes (67.65%). Higher FI was associated with studies that randomized more than 100 patients ($p = 0.0002$) and with studies having more than 50 outcome events ($p < 0.0001$). **Conclusion:** Surgical RCTs for anal fissure management have questionable robustness, with 67% of outcomes having more patients lost to follow-up than the FI. Results of these trials should be interpreted with caution.

 

**09**

**The impact of preoperative stoma education on postoperative outcomes for patients with new stomas after colorectal surgery: a systematic review and meta-analysis.** ***Victoria Shi, Tyler McKechnie, Swati Anant, Moeiz Ahmed, Sahil Sharma, Gaurav Talwar, Dennis Hong, Cagla Eskicioglu*. From McMaster University (Shi, McKechnie, Anant, Sharma, Talwar, Hong, Eskicioglu), and Western University.**

**Background:** In accordance with Enhanced Recovery After Surgery (ERAS) principles, it has recently been suggested that preoperative stoma education protocols be routinely introduced in perioperative care. Theoretical benefits of such programs include shorter postoperative length of stay (LOS) and decreased readmission following discharge. We designed this systematic review and meta-analysis to further investigate the effect of preoperative stoma education on postoperative outcomes. **Methods:** A search in MEDLINE, Embase, and CENTRAL from inception to February 2024 was performed. We included randomized controlled trials or observational cohort studies evaluating adult patients who underwent stoma formation during colorectal surgery and compared those receiving and not receiving preoperative stoma education. The main outcomes included stoma-related morbidity (concerning the stoma itself), peristomal complications (concerning the skin surrounding the stoma), overall morbidity, postoperative LOS, readmission, and quality of life (QoL). Meta-analyses were performed using inverse variance random-effects models. Certainty of evidence was assessed with Grading of Recommendation, Assessment, Development and Evaluation (GRADE). **Results:** Ten studies met the inclusion criteria. Overall, 438 patients (mean age 60.95 ± 9.49 yr, 39.54% female) received preoperative stoma education prior to stoma formation and 599 patients (mean age 61.77 ± 10.07 yr, 39.3% female) did not. Most stomas in both groups were ileostomies (stoma education: 54.58%; no education: 57.55%). Meta-analysis showed that peristomal skin complications were significantly reduced with preoperative stoma education (2 studies, 9.4% v. 19.5%, relative risk [RR] 0.45, 95% confidence interval [CI] 0.28 to 0.71, $p = 0.00$, $I^2 = 0\%$). There were no significant differences in mean LOS (6 studies, mean difference [MD] 0.46, 95% CI –2.73 to 3.66, $p = 0.78$, $I^2 = 95\%$), overall morbidity (2 studies, RR 1.08, 95% CI 0.59 to 2.0, $p = 0.79$, $I^2 = 80\%$), or readmission (4 studies, RR 1.02, 95% CI –0.53 to 1.98, $p = 0.94$, $I^2 = 42\%$). There were insufficient available data for meta-analysis of QoL and stoma-related morbidity. **Conclusion:** This study presents low-certainty evidence suggesting preoperative stoma education may benefit patients undergoing stoma formation, specifically through reduction of peristomal complications. Future studies are required to further investigate these findings.

**10**

**The impact of obesity on postoperative outcomes following surgery for colorectal cancer: analysis of the national inpatient sample 2015–2019.** ***Tania Kazi, Tyler McKechnie, Yung Lee, Rehab Alsayari, Gaurav Talwar, Aristithes Doumouras, Dennis Hong, Cagla Eskicioglu*. From McMaster University (Kazi, McKechnie, Lee, Alsayari, Talwar, Doumouras, Hong, Eskicioglu), and the Harvard T.H. Chan School of Public Health (Lee, Doumouras).**

**Background:** The global burden of obesity has reached epidemic proportions, placing great strain on the North American health care system. We designed a retrospective cohort database study comparing patients living with and without obesity undergoing surgery for colorectal cancer in terms of postoperative morbidity and health care resource utilization. **Methods:** Adult patients undergoing resection for colorectal cancer were identified from the 2015–2019 National Inpatient Sample (NIS) database. Patients were stratified according to obesity status (i.e., body mass index of 30 kg/m$^2$). Propensity score matching (PSM) with 1:1 nearest-neighbour matching was performed according to demographic, operative, and hospital characteristics. The primary outcome was postoperative morbidity. Secondary outcomes included system-specific postoperative complications, postoperative mortality, length of stay, total admission health care cost, and post-discharge disposition. McNemar and Wilcoxon matched pairs signed rank tests were performed. **Results:** After PSM, 7565 patients with and 7565 without obesity were included. Patients with obesity had a 10% increase in relative risk of overall in-hospital postoperative morbidity (25.6% v. 23.1%, $p = 0.0015$) and a $4564 increase in hospitalization cost ($74 812 USD v. $70 248 USD, $p = 0.0004$). Analysis of system-specific in-hospital postoperative morbidity amongst patients with obesity demonstrated significant increases in genitourinary morbidity (15.0% v. 11.9%, $p < 0.0001$), which was largely driven by significant differences in acute kidney injury (8.6% v. 5.4%, $p < 0.0001$) and urinary tract infection (3.4% v. 2.6%, $p = 0.0027$). Patients with obesity were also more likely to require postoperative intensive care unit (ICU) admission (8.0% v. 5.0%, $p < 0.0001$) and less likely to be discharged home after their index operation (64.2% v. 68.3%, $p = 0.0022$). **Conclusion:** Patients with obesity undergoing surgery for colorectal cancer may be at an increased risk of in-hospital postoperative morbidity. They may also be more likely to have increased hospitalization costs, postoperative ICU admissions, and to not be discharged directly home. Preoperative optimization via weight loss strategies should be further explored for these patients.

**11**

**The association between preoperative anemia and health care resource use and outcomes after colorectal surgery: a population-based cohort study.** ***Lily J. Park, Husein Moloo, Tim Ramsay, Kednapa Thavorn, Justin Presseau, Terry Zwiep, Guillaume Martel, P.J. Devereaux, Robert Talarico, Daniel I. McIsaac*. From McMaster University (Park, Devereaux), the Population Health Research Institute (Park); the University of Ottawa (Moloo, Martel, McIsaac), the Ottawa Hospital Research Institute (Ramsay, Thavorn, Presseau, McIsaac), ICES (Thavorn, McIsaac), and Western University (Zwiep).**

**Background:** Preoperative anemia is common in colorectal surgery patients. Understanding the population-level attributable costs of preoperative anemia will inform the development of anemia management at a health system level. The objective was to estimate the association of preoperative anemia with health system costs among adult elective colorectal surgery patients. **Methods:** This was a population-based cohort study utilizing linked health administrative data from ICES. Adult Ontario residents who underwent an elective colorectal resection between

April 1, 2012, and March 31, 2022, were identified. Primary exposure was preoperative anemia (hemoglobin < 130 g/L in males and < 120 g/L in females). The primary outcome was costs in 2022 Canadian dollars, from the perspective of the publicly funded health care system accrued within 30 days of surgery. Secondary outcomes included health system costs at 90 days after surgery, red blood cell transfusion, major adverse cardiac events (MACE), length of hospital stay (LOS), days alive at home (DAH), and readmissions. Generalized linear models were used with adjustment for prespecified confounders. **Results:** Among 54286 patients, 21264 (39.2%) had preoperative anemia. There was an absolute adjusted cost increase of $2671 per person at 30 days following surgery that was attributable to preoperative anemia (ratio of means [RoM] 1.05, 95% confidence interval [CI] 1.04–1.06). RoM at 90 days following index surgery was 1.10 (95% CI 1.08–1.11) with a cost difference of $4748. Compared to the control group, 30-day risk of transfusion (odds ratio [OR] 4.34, 95% CI 4.04–4.66), MACE (OR 1.14, 95% CI 1.03–1.27), LOS (RoM 1.08, 95% CI 1.07–1.10), and readmissions (adjusted OR 1.16, 95% CI 1.08–1.24) were higher in the anemia group with reduced DAH (RoM 0.95, 95% CI 0.95–0.96). **Conclusion:** We estimate that $2671 CAD in 30-day health system costs are attributable to preoperative anemia following colorectal surgery in Ontario, Canada.

**12**

**Effect of Kono-S anastomosis on reducing postoperative recurrence rates in Crohn disease: a systematic review and meta-analysis.** ***Madeline Lemke, Wenjie Lin, Carl Brown, Elizabeth Clement, Anu Ghuman, Terry Phang, Manoj Raval, Ahmer Karimuddin*****. From Western University (Lemke), and the University of British Columbia (Lin, Brown, Clement, Ghuman, Phang, Raval, Karimuddin).**

**Background:** Kono-S anastomosis has gained increasing interest, although evaluation of its impact on reducing Crohn disease recurrence shows conflicting results. This study aimed to evaluate the short- and long-term outcomes for patients with Crohn disease requiring surgery with Kono-S compared to conventional anastomosis. **Methods:** A systematic review and meta-analysis included patients with Crohn disease treated with bowel resection and Kono-S anastomosis reconstruction versus a comparator arm treated with a conventional anastomosis technique. Recurrence outcomes examined were endoscopic recurrence rates, mean postoperative Rutgeert score, surgical recurrence, clinical recurrence, and postoperative biologics use. Short-term postoperative outcomes included anastomotic leaks, surgical site infection, postoperative ileus and mean operative time. **Results:** A total of 873 studies were identified with 15 remaining after abstract review, encompassing 1501 patients: 765 with Kono-S and 736 with conventional anastomosis. Recurrence was significantly lower in the Kono-S arm, with endoscopic recurrence rates of 41% versus 48% (relative risk [RR] 0.86, 95% confidence interval [CI] 0.73–1.00, $p = 0.05$) and surgical recurrence rates of 2.7% versus 21.0% (RR 0.13, 95% CI 0.06–0.30, $p < 0.001$). There was a significantly lower anastomotic leak rate with Kono-S arm than with conventional anastomosis, 1.7% versus 4.9% (RR 0.37, 95% CI 0.19–0.74, $p = 0.005$). Mean operative time was similar between both groups. **Conclusion:** Kono-S is a safe and feasible anastomotic technique with lower rates of endoscopic and surgical postoperative recurrence. While we await further trials to substantiate this benefit, Kono-S anastomosis should be considered as an important tool in the armamentarium of a surgeon in anastomotic construction to reduce recurrence.

**13**

**Assessing radiologic pathologic concordance in direct to surgery rectal cancer patients.** ***Christine Li, Wenjie Lin, Elizabeth Clement, Amandeep Ghuman, Cameron Hague, Ahmer Karimuddin, P. Terry Phang, Manoj Raval, Pari Tiwari, Patrick Vos, Carl Brown*****. From St. Paul's Hospital (Li, Lin, Clement, Ghuman, Hague, Karimuddin, Phang, Raval, Tiwari, Vos, Brown), and the Singapore General Hospital (Lin).**

**Background:** Presentation at multidisciplinary conferences (MDC) is part of optimal management of rectal cancer patients. Variable data exist regarding the accuracy of magnetic resonance imaging (MRI) in staging rectal cancer. The subset of patients who proceed directly to surgery without neoadjuvant treatment can be used as a benchmark measure of accuracy of preoperative rectal cancer staging. **Methods:** After obtaining relevant ethics and departmental approval, we utilized our pre-existing rectal cancer database to access rectal cancer patients reviewed at our MDC between January 1, 2020, and December 31, 2023. Patients were included if they were aged 18 years or older, diagnosed with primary rectal adenocarcinoma, reviewed at MDC, had preoperative MRI staging, underwent primary surgical resection without neoadjuvant treatment, and had final surgical pathology available. **Results:** A total of 779 unique patients were reviewed. Of those, 102 (13%) patients were direct to surgery. There were 56 patients (55%) whose final pathology was different from their preoperative staging. This resulted in upstaging of 34 (61%) patients. Of the upstaged patients, a clinically significant difference was seen in 30 (88%) patients with stage migration that would have otherwise qualified for neoadjuvant therapy in 27 (90%) patients. The most common situation was preoperative determination of negative nodes and final pathology showing positive nodes (25/27 [93%]). Twenty-five (45%) patients had a change in T status, 17 (30%) had a change in N status, 13 (23%) had a change in both T and N status, and 1 (2%) had a change in T, N, and M status. **Conclusion:** More than half of direct to surgery rectal cancer patients had final pathology different from their preoperative staging at our institution. Within this group of patients, almost half had a clinically important difference in staging which, if known preoperatively, would have led to neoadjuvant treatment.

**14**

**A comparison of high-efficiency and non-high-efficiency benign anorectal operating room days — a cohort study.** ***Alessandro Ricci, Ameer Farooq, Sunil Patel, Kelly Brennan, Vanessa Wiseman, Tyler McKechnie*****. From Queen's University (Ricci, Farooq, Patel, Brennan, Wiseman), and McMaster University (McKechnie).**

**Background:** High-efficiency (HE) operating rooms (OR) intentionally group surgical cases of similar nature and anesthetic requirement to maximize patient volumes and minimize OR time and cost. These rooms streamline patient selection

 

and focus on low-risk cases amenable to regional blocks. Anecdotally, other centres have shown that this model can increase case volumes for anorectal surgery. This work examines the impact of an HE program on surgical efficiency metrics and patient outcomes. **Methods:** This is an ethics-approved single-institution retrospective cohort study assessing all patients undergoing ambulatory anorectal surgery between 2021 and 2023. We compared the postimplementation period (2023; post-HE) to the preimplementation period (2021–2022; pre-HE) using data abstracted from electronic medical records. The post-HE period included and assessed both HE days and non-HE days (reserved for complex ambulatory patients/cases). The primary outcome was case surgical efficiency (based on OR time, turnover, and anesthesia time). Secondary outcomes included post-anesthesia care unit (PACU) stay, length of hospital stay, readmission, and complications. **Results:** A total of 252 patients were included (pre-HE: 120 cases, 24 d; post-HE: 132 cases, 18 d). The case mix and American Society of Anesthesiologists scores were similar between periods. The post-HE period resulted in more procedures completed per day (7.05 v. 5.08, $p < 0.0001$), shorter surgical time (20 min v. 25 min, $p = 0.03$), shorter turnover time (19 min v. 23 min, $p = 0.002$) and shorter anesthesia time (22 min v. 27 min, $p < 0.0001$). PACU stay (post-HE 90.1 min v. pre-HE 84.1 min, $p = 0.27$), total length of stay (post-HE 6.2 h v. pre-HE 6.8 h, $p = 0.33$), readmission (post-HE 1.5% v. pre-HE 2.5%, $p = 0.58$) and emergency department visits (pre-HE 6% v. post-HE 1.7%, $p = 0.07$) were similar between both periods. **Conclusion:** Implementing an HE anorectal program reduced OR time, surgical time, anesthesia time, and turnover time at our centre, resulting in 2 additional cases completed per day.

**15**

**Indications, findings, and follow-up recommendations among patients who underwent frequent colonoscopy at a tertiary care centre.** ***Allison Keeping, Paul Johnson, Heidi Bentley*****. From Dalhousie University (Keeping, Johnson), and the University of Toronto (Bentley).**

**Background:** Appropriate intervals between colonoscopy exams are needed to ensure timely identification of pathology, avoid unnecessary exposure to procedural risk and optimize access to a valuable resource. The purpose of this research was to examine the indications and outcomes among patients who underwent frequent colonoscopy. **Methods:** Patients who received ≥ 3 colonoscopies within a 6-year period were identified. Patients with inflammatory bowel disease, symptomatic strictures or emergency scopes were excluded. Data were collected regarding patient demographics, scope indications, findings, and follow-up recommendation. These recommendations were compared to published guidelines and categorized as within guidelines, overuse, or underuse. **Results:** A total of 846 patients who underwent a total of 2538 colonoscopy procedures were included. The mean age was 61.8 (range 21–89) years, and 51.2% were male. Most patients were having colonoscopy for polyp and cancer surveillance, and 137 (16.2%) patients were scoped frequently for Lynch syndrome or familial adenomatous polyposis. Overall, the recommendations made after 527 procedures (20.8%) were classified as overuse, and 57 (2.2%) were considered underuse. The most common overuse recommendation was for reassessment after removal of polyps < 2 cm. Patient history of polyps and family history were also cited as reasons to perform the next scope before guideline recommendations. New symptoms were the most common reason (64%) for the 142 scopes that were unplanned based on the recommendations after the prior procedure. The majority of patients who had colonoscopy after an overuse recommendation had polyps < 1 cm, 19.6% were normal, 8.4% had polyps > 1 cm and 1.4% had cancer. **Conclusion:** Most patients who had colonoscopy sooner than recommended by guidelines had adenomas < 1 cm, and 10% had advanced neoplasia. If these scopes had been performed in accordance with guidelines, the impact on clinical outcomes is unclear. There may be a population of patients who benefit from short interval colonoscopy who are not identified in current guidelines.

**16**

**Lateral lymph nodes in rectal cancer: a cohort study.** ***Karim Messak, Jessica Bogach, Gregory Pond, Shawn Forbes, Vanja Grubac, Scott Tsai, Christian Van Der Pol, Marko Simunovic*****. From McMaster University (Messak, Bogach, Pond, Forbes, Grubac, Tsai, Van Der Pol, Simunovic), and Hamilton Health Sciences (Bogach, Pond, Tsai, Van Der Pol).**

**Background:** In primary rectal cancer, involvement of lateral lymph nodes (LLN) in the lateral compartments, namely the obturator and iliac compartments, is associated with an increased risk of recurrence and poorer prognosis. The Canadian experience in identifying and managing LLN is not described. **Methods:** Patients who underwent rectal cancer surgery between January 2016 and December 2016 were included. Charts were reviewed to extract clinical and treatment details and oncologic outcomes. Two surgeons reviewed preoperative computed tomography and/or magnetic resonance imaging scans to identify LLNs using internationally defined criteria for LLN positivity. Images with suspected pathologic LLNs were reviewed by specialized radiologists. Treatment and outcomes of patients with (+LLN) and without (–LLN) LLNs were compared. Outcomes included local and distant recurrence rates, time to recurrence, and survival. **Results:** Of 175 cases, 38 were identified from radiology reports or surgeon review as having suspicious LLN. Only 11/175 (6.3%) cases were confirmed as meeting criteria for LLN following expert radiology review. Patient measures and tumour stage were similar for cases with and without a LLN. All 11 cases with +LLN underwent neoadjuvant radiation. No patients underwent LLN dissection. Isolated local recurrence occurred in 1/11 (9.1%) +LLN patients and 10/164 (6.1%) –LLN patients ($p = 0.69$). Local or distant recurrence occurred in 6/11 (54.5%) +LLN patients and 55/164 (33.6%) –LLN patients ($p = 0.16$). Median time to recurrence was 26.9 months in +LLN patients and 31.5 months in –LLN patients. **Conclusion:** In this Canadian population-based review, lateral lymph node involvement in patients with rectal cancer shows a trend toward increased risk of local and distant recurrence. Given the prognostic and treatment implications, standardized reporting and recognition of these cases is critical to direct patient care to those with expertise in management of LLNs.

**17**

**Association of socioeconomic status and the receipt of adjuvant chemotherapy in stage III colon cancer: a population-based cohort study.** ***Adom Bondzi-Simpson*, *Ramy Behman*, *Tiago Ribeiro*, *Sheron Perera*, *Aisha Lofters*, *Rinku Sutradhar*, *Rebecca Snyder*, *Callisia Clarke*, *Natalie Coburn*, *Julie Hallet*. From the University of Toronto (Bondzi-Simpon, Ribeiro, Perera, Lofters Sutradhar, Coburn, Hallet), Memorial Sloan Kettering Cancer Center (Behman), MD Anderson Cancer Center (Snyder), and the Medical College of Wisconsin (Clarke).**

**Background:** Adjuvant chemotherapy decreases recurrence and improves overall survival. However, not all patients access care equally. We measured the association of marginalization on quality indicators in stage III colon cancer. **Methods:** We conducted a population-based retrospective cohort study of adults operated for stage III colon cancer (2007–2020). The primary exposures were socioeconomic status (SES) and ethnic diversity defined by ecologic measures from Census data, both captured as quintiles. Outcomes were receipt of medical oncology consultation and adjuvant therapy within 3 months of surgery. Logistic regression examined the association between each exposure and outcomes while adjusting for confounders. **Results:** Of 14511 patients, 6539 (45.6%) received medical oncology consultation and 8814 (61.4%) adjuvant chemotherapy within 3 months of surgery. After adjusting for age, sex, surgical approach, and comorbidities, the lowest SES quintile was associated with lower odds of medical oncology consultation (odds ratio [OR] 0.84, 95% confidence interval [CI] 0.75–0.93) and of adjuvant chemotherapy (OR 0.70, 95% CI 0.62–0.80) compared to the highest quintile. The highest ethnic diversity quintile was associated with lower odds of medical oncology consultation (adjusted OR 0.88, 95% CI 0.79–0.98) and adjuvant chemotherapy (adjusted OR 0.92, 95% CI 0.64–0.82) compared to the lowest diversity quintile. When extending outcomes to 6 months after surgery, these associations persisted. When restricting to patients who had a medical oncology consultation, the lowest SES quintile was associated with lower odds of adjuvant chemotherapy (OR 0.75, 95% CI 0.61–0.93), but there was no association for ethnic diversity. **Conclusion:** Within a universal health care system, lower SES and higher ethnic diversity were associated with lower odds of medical oncology consultation and adjuvant chemotherapy after resection for stage III colon cancer. These findings outline inequity in access to and receipt of care that may translate into differences in oncologic outcomes and suggest areas where physicians may intervene to improve the care of vulnerable patient groups.

**18**

**The burden of unmet needs in rectal cancer survivors: a single-centre cross-sectional study.** ***Natasha Caminsky*, *Alex Chen*, *Jeongyoon Moon*, *Paul Brassard*, *Daniel Marinescu*, *Teodora Dumitra*, *Ebram Salama*, *Carol-Ann Vasilevsky*, *Marylise Boutros*. From the Sir Mortimer B. Davis Jewish General Hospital (Caminsky, Chen, Moon, Marinescu, Dumitra, Salama, Vasilevsky, Boutros); McGill University (Brassard); Cedars Sinai Hospital (Dumitra); and the Cleveland Clinic Florida, Weston Hospital (Salama, Boutros).**

**Background:** Rectal cancer survivors live with long-term sequelae that impact their day-to-day lives, many of which are not recognized/addressed (unmet needs). The type and severity of cancer survivors' unmet needs is known to vary based on social and environmental factors. We aimed to characterize rectal cancer survivors' unmet needs and assess their association with social and community factors, and quality of life (QoL). **Methods:** Through a cross-sectional study of rectal cancer survivors who underwent primary resection (2011–2021) at a single university referral centre, consenting patients completed the Cancer Survivors' Unmet Needs (CaSUN), the EQ5D-5L QoL, and sociodemographic questionnaires. The Material and Social Deprivation Index (MSDI) was obtained using the participant's postal code at the time of surgery. Participants were categorized based on having no needs ≥ moderate severity (low unmet needs) or having ≥ 1 unmet need of ≥ moderate severity (high unmet needs). Descriptive statistics were used to characterize unmet needs and multivariate regression to identify factors associated with unmet needs and their association with QoL. **Results:** Of the 241 eligible patients identified and contacted for participation, 134 were reachable and consented to participate. Ninety-nine (73.9%) patients reported high unmet needs. Patients with high unmet needs were significantly less often employed (42.4% v. 71.4%, $p = 0.007635$) and were more often materially deprived (37.6% v. 17.6%, $p = 0.55021$) than those with low unmet needs, the latter of which remained significant on multivariate logistic regression, (odds ratio [OR] 2.89, 95% confidence interval [CI] 1.11–8.61). Twice as many participants with high unmet needs reported having problems with their usual activities (30.6% v. 14.3%, $p = 0.07431$), and these participants reported significantly worse overall QoL (OR 77, 95% CI 66.2–85.0 v. OR 85, 95% CI 80.5–90.0, $p = 0.0002264$). **Conclusion:** Rectal cancer survivors' unmet needs persist beyond normal follow-up time, and an important opportunity to improve care and screening for unmet needs at the time of surveillance visits may improve survivorship care.

**19**

**Management and outcomes of appendiceal cancer: a scoping review.** ***Kelly Brennan*, *Tyler McKechnie*, *Vanessa Wiseman*, *Alessandro Ricci*, *Ameer Farooq*, *Sunil Patel*. From Queen's University (Brennan, Wiseman, Ricci, Farooq, Patel), and McMaster University (McKechnie).**

**Background:** Appendiceal cancer (AC) is rare. Its incidence is increasing. Appendectomies are one of the most common procedures performed worldwide. ACs are found in 1%–2% of specimens. The histologic subtype impacts prognosis. Subtypes have undergone nomenclature reclassification, challenging research and management. Furthermore, current literature has shortcomings. Numerous case series exist, though they are plagued with usual biases. Historical population studies concentrated on disease incidence. Much of the literature focuses on advanced disease requiring cytoreductive surgery, a unique clinical scenario compared with the management of less aggressive disease. Herein, we review trends in management and determine the survival of AC using population-based studies. **Methods:** Best practices for scoping reviews was followed. A MEDLINE search was performed. It was decided a priori to report the distribution of histologic subtype, stage of disease, and details regarding surgical management and chemotherapy. Overall survival (OS) was the main outcome. **Results:** Thirty studies were identified with 84479 patients (22–13546 per

 

study) from 8 population-based databases. A single database (SEER) accounted for 18/30 studies. Diagnosis year ranged from 1973 to 2020. Eight studies focused on 1 histological subtype. Most studies included all stages of disease (21/30). Five-year OS for all ACs ranged from 5% to 95%: mucinous adenocarcinoma (MAC) 45%–93%, nonmucinous adenocarcinoma (NMAC) 40%–91%, signet ring cell carcinoma (SRCC) 18%–63%, goblet cell carcinoma (GCC) 70%–81%, and neuroendocrine tumour (NETs) 85%–96%. Surgical procedure was reported in 13 studies, 8 of which evaluated association with survival. No survival benefit was measured with right hemicolectomy (RH) over appendectomy for GCC and NET (4/8 studies). A survival benefit was demonstrated for RH for SRCC (2/8 studies). Contradictory findings were found for RH for MAC and NMAC (4/8 studies). Chemotherapy correlated with worse outcomes regardless of pathologic subtype (4 studies). **Conclusion:** A large, comprehensive population-based study is required to improve evidence for AC management.

**20**

**The use of preoperative enteral immunonutrition in patients undergoing elective colorectal cancer surgery: a systematic review and meta-analysis.** ***Tania Kazi, Tyler McKechnie, Ghazal Jessani, Victoria Shi, Niv Sne, Aristithes Doumouras, Dennis Hong, Cagla Eskicioglu.*** **From McMaster University (Kazi, McKechnie, Jessani, Shi, Sne, Doumouras, Hong, Eskicioglu), and the Harvard T.H. Chan School of Public Health (Doumouras).**

**Background:** Immunonutrition products, containing arginine, omega-3 fatty acids, glutamine, and/or nucleotides, are marketed as beneficial preoperative supplements for colorectal surgery. Although promising, they have not become standard practice. This study aims to compare outcomes of enteral immunonutrition versus conventional nutrition before elective colorectal surgery in adults. **Methods:** MEDLINE, Embase, and CENTRAL were searched from inception to March 2023. Eligible studies were randomized control trials or cohort studies evaluating adult patients undergoing elective colorectal cancer surgery, comparing preoperative enteral immunonutrition to conventional preoperative nutrition protocols. Primary outcomes included surgical site infection (SSI), anastomotic leak, and postoperative length of stay (LOS). Inverse variance random-effects meta-analyses were performed. Risk of bias was assessed with Cochrane tools. Grading of Recommendation, Assessment, Development and Evaluation (GRADE) was used to assess certainty of evidence. **Results:** After reviewing 2508 relevant citations, 7 observational studies met inclusion criteria. Overall, 483 patients (mean age 65.8 ± 10.2 yr, 42.7% female) received preoperative immunonutrition and 977 patients (mean age 63.3 ± 8.4 yr, 51.6% female) received conventional preoperative nutrition. The most common indication for colorectal surgery was colorectal cancer (68.9%). Across 5 studies, there was a 34% relative risk (RR) reduction in SSI in the immunonutrition group (10.9% v. 15.0%, 95% confidence interval [CI] 0.41 to 1.05, $p = 0.08$, $I^2 = 9\%$). Across 6 studies, there was a 43% RR reduction in anastomotic leak in the immunonutrition group (2.0% v. 2.6%, 95% CI 0.27 to 1.20, $p = 0.14$, $I^2 = 0\%$). Across 5 studies, LOS was 0.42 days shorter in the immunonutrition group (95% CI –0.03 to 0.87, $p = 0.07$, $I^2 = 33\%$). GRADE certainty of evidence was very low for all outcomes. **Conclusion:** The impact of preoperative enteral immunonutrition prior to colorectal surgery remains unclear. Point estimates derived from the present meta-analyses suggest important benefits; however, wide corresponding 95% CIs create significant uncertainty. Further study by way of large randomized controlled trials is required.

## CANADIAN SOCIETY OF SURGICAL ONCOLOGY

**01**

**The association between cirrhosis and outcomes among female patients undergoing surgery for breast cancer in Ontario: a population-based study.** ***Manisha Jogendran, Jennifer Flemming, Maya Djerboua, Martin Korzeniowski, Brooke Wilson, Shaila Merchant, Sean Bennett.*** **From Queen's University.**

**Background:** The relationship between cirrhosis and breast cancer treatment and outcomes has not been specifically explored. We evaluated the association between cirrhosis and surgical outcomes in female patients with breast cancer. **Methods:** We performed a retrospective cohort study of female patients undergoing surgery for breast cancer between 2007 and 2018 using health administrative data from Ontario, Canada. Outcomes were 90-day operative mortality and morbidity, as well as overall (OS) and cancer-specific survival (CSS) from time of surgery to December 2021. **Results:** A total of 910 patients with breast cancer and cirrhosis were compared to 82 970 patients with breast cancer but without cirrhosis. The median age at diagnosis was 65 years in patients with cirrhosis, and 61 years in those without ($p < 0.001$). The most common etiology of cirrhosis was nonalcoholic fatty liver disease (602 [66%]) followed by alcohol-related (144 [16%]). Model for end-stage liver disease score (MELD-Na) was a median score of 8 (interquartile range 6–11). Patients with cirrhosis had higher 90-day postoperative mortality than those without (1.4% v. 0.3%, $p < 0.001$). After adjusting for age, income quintile, and breast cancer surgery, cirrhosis was independently associated with 90-day postoperative mortality (relative risk 3.66, 95% confidence interval 2.12–6.31). OS in patients with cirrhosis was lower than those without (5-year OS 77% v. 87%, $p < 0.0001$). CSS was also lower in patients with cirrhosis (5-year CSS 88% v. 91%, $p = 0.017$). **Conclusion:** This large population-based study demonstrates that while patients with cirrhosis have lower OS and CSS, their outcomes remain favourable and should be considered for curative-intent therapies.

**02**

**Feasibility of a hyperthermic intraperitoneal chemotherapy (HIPEC) program for gastrointestinal and gynecological cancer care in Newfoundland and Labrador.** ***Kala Hickey, Stephanie Gill, Zoë Breen, Kaitlyn Harding, Hannah Yaremko, Patti Power, Alex Mathieson, David Pace, Joannie Neveu.*** **From the Memorial University of Newfoundland.**

**Background:** Peritoneal carcinomatosis is a common presentation found in advanced-stage gastrointestinal and gynecological

cancers. Combined cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) is associated with significant survival benefit for select patients in this population. Currently, CRS/HIPEC is not provided in Newfoundland and Labrador (NL). The Canadian HIPEC Collaborative Group recommends centres complete a minimum of 1 case monthly to maintain competency and achieve good outcomes. Thus, we aimed to demonstrate that an appropriate number of patients in NL require this therapy annually to support the feasibility for implementation of a CRS/HIPEC program. **Methods:** A retrospective chart review of the NL Cancer Care Registry identified patients with stage IV colorectal, appendiceal or gastric cancer and stage III–IV epithelial ovarian cancer or fallopian tube carcinoma over a 1-year period (January 1, 2020, to January 1, 2021) to identify the number of patients meeting criteria for CRS/HIPEC or those referred out of province to receive the treatment. Results are presented as proportions and percentages. **Results:** Thirty-one patients were eligible to receive CRS/HIPEC during the study period (11 gastrointestinal, 20 gynecological). Of the gastrointestinal patients, only 45% were referred out of province for the procedure. Gynecological patients underwent CRS and systemic +/– intraperitoneal chemotherapy in NL. **Conclusion:** Allowing patients to receive this standard of care near home reduces financial, social, and emotional stressors. These results confirm a sufficient patient volume to safely support a CRS/HIPEC program in NL. Implementation of this program will require multidisciplinary collaboration, specialized training and equipment and protocol development.

**03**

**Small bowel cancers: a population-based analysis of epidemiology, treatment and outcomes in Ontario, Canada, from 2005 to 2020.** ***Sean Bennett, Brooke Wilson, Nan Chen, Weidong Kong, Sunil Patel, Christopher Booth, Shaila Merchant*****. From Queen's University.**

**Background:** Small bowel cancers are uncommon malignancies comprising several histologies with variable treatments and prognoses. The current study describes the epidemiology, treatment, and outcomes of a large, population-based cohort of patients with small bowel cancers. **Methods:** We performed a retrospective cohort study using linked administrative health care data from Ontario, Canada. Patients diagnosed with a small bowel cancer between 2005 and 2020 were included. Trends in incidence, treatments, and survival were explored by histology (adenocarcinoma, neuroendocrine tumours [NET], gastrointestinal stromal tumours [GIST], and lymphoma). **Results:** A total of 5306 patients with small bowel cancers were identified. The most common histologies were NET (40.5%) and adenocarcinoma (31.6%). Over the study period, the annual incidence of small bowel cancers increased from 1.54 to 2.78 per 100000 and the likelihoods of receiving surgery and systemic therapy within 1 year of diagnosis both increased for all histologic subtypes except lymphoma. Median overall survival from diagnosis was 1.0 year for adenocarcinoma, 13.2 years for NET, 14.2 years for GIST, and 10.1 years for lymphoma. There was no trend toward improved median survival for adenocarcinoma by year of diagnosis: 0.94 years (2005–2010), 1.07 years (2011–2015), and 0.98 years (2016–2020). **Conclusion:** Small bowel cancers are increasing in incidence, with increasing use of surgery and systemic therapies. While survival is favourable for many small bowel cancers, it remains poor for adenocarcinoma. Better availability of cancer stage data and detailed histopathology within the database would facilitate future research.

**04**

**The epidemiology, treatment and outcomes of males diagnosed with breast cancer in Ontario, 2007–2017: a population-based analysis.** ***Sean Bennett, Georgia Nelson, Nouf AlMarzooqi, Manisha Jogendran, Maya Djerboua, Brooke Wilson, Jennifer Flemming, Shaila Merchant*****. From Queen's University (Bennett, Nelson, Jogendran, Wilson, Flemming, Merchant), McGill University (AlMarzooqi), and ICES-Queen's (Djerboua).**

**Background:** Breast cancer in male patients is uncommon. Its treatment is largely extrapolated from data in female patients. The objective of this study was to describe the cohort of males diagnosed with breast cancer and their treatments, outcomes, and trends over time. **Methods:** We performed a retrospective cohort study of male patients diagnosed with breast cancer between 2007 and 2017 in Ontario. Descriptive statistics were used for basic demographics, stage at diagnosis, and cancer subtype. Treatments including systemic therapy, radiation, and surgery for the breast and axilla were reported. Treatment trend analysis was performed using the Cochran–Armitage test. Overall and cancer-specific survival were calculated from the time of diagnosis. **Results:** A total of 868 males with breast cancer were identified, with a mean age of 68.6 years. At diagnosis, 26% were stage 1, 39% stage 2, 14% stage 3, and 7% stage 4, with 14% missing. Breast cancer subtype was missing in 55%, but in those with subtyping, 82% were $ER^+/PR^+/HER2^-$, 10% were $HER2^+$, and 3% were triple-negative. Surgery was performed in 78% of patients. Of those undergoing surgery, 70% underwent mastectomy and 30% lumpectomy. Lymph node surgery was performed in 55% of patients undergoing surgery. This increased to 73% over the last 3 years of the cohort. Systemic therapy within 6 months after surgery was given in 49%, increasing to 73% over the last 3 years. Radiation was given in 36% of patients within 6 months after surgery with no significant change over time. Five-year cancer-specific survival by stage was 96%, 88%, 79%, and 16% for stages 1–4, respectively. **Conclusion:** Males with breast cancer have predominantly $ER^+/PR^+/HER2^-$ subtype. They more commonly undergo mastectomy over lumpectomy, and axillary surgery is increasingly being utilized. Cancer survival statistics remain favourable for nonmetastatic disease and comparable to those seen in females with breast cancer.

**05**

**Safety and efficacy of perioperative intravenous tranexamic acid administration in oncologic surgery: a systematic review and meta-analysis.** ***Lily J. Park, Carol Wang, Vicki Archer, Tyler McKechnie, Dan Cohen, Jessica Bogach, Marko Simunovic, Pablo E. Serrano, Rodney H. Breau, Paul Karanicolas, P.J. Devereaux*****. From McMaster University (Park, Archer, McKechnie, Cohen, Bogach, Simunovic, Serrano, Devereaux), the Population Health Research Institute (Park, Devereaux), Western University (Wang); the University of Ottawa (Breau), and the University of Toronto (Karanicolas).**

 

**Background:** Surgical oncology patients are considered high risk for both perioperative bleeding and thromboembolic disease. The objective of this review was to investigate the safety and efficacy of prophylactic tranexamic acid (TXA) use in noncardiac surgical oncology. **Methods:** MEDLINE, Embase, and CENTRAL were searched from inception to June 2023. Randomized controlled trials (RCTs) that compared perioperative TXA versus placebo among surgical oncology patients were included. Outcomes included perioperative transfusion rate, estimated blood loss (EBL), and thromboembolic complications. Pairwise meta-analyses were performed using the Mantel–Haenszel method for dichotomous outcomes and inverse variance model for continuous outcomes. Fixed-effects models were used to account for large discrepancies in trial sizes. Random-effects models were utilized for sensitivity analyses. **Results:** We included 21 RCTs involving 6200 patients (3116 TXA v. 3804 placebo) undergoing genitourinary ($n$ = 2061), hepatobiliary ($n$ = 1677), other intra-abdominal ($n$ = 1454), head and neck ($n$ = 449), uncategorized noncardiac ($n$ = 256), thoracic ($n$ = 200), and orthopedic ($n$ = 103) oncologic surgeries. Meta-analysis demonstrated reduction in transfusion rates with TXA (448/2770 v. 541/2781, relative risk [RR] 0.79, 95% confidence interval [CI] 0.68 to 0.90, $p < 0.001$, $I^2 = 67\%$) and a risk difference (RD) of 41 fewer transfusion events per 1000 (from 62 fewer to 19 fewer). TXA use was associated with reduced EBL by 120.3 mL (95% CI –189.6 to –51.0, $p < 0.001$, $I^2 = 95\%$) and no difference in thromboembolic complications (57/2705 v. 44/2691, RR 1.29, 95% CI 0.87 to 1.92, $p = 0.21$, $I^2 = 0\%$, RD 0.00, 95% CI –0.008 to 0.01) compared to placebo. Sensitivity analyses demonstrated similar results. **Conclusion:** Evidence demonstrates TXA use reduces perioperative transfusion rates and blood loss, although high heterogeneity suggests efficacy may have differed in some trials. Clinical interpretation of thromboembolic complications is limited by low event rates.

**06**

**Axillary lymph node management of clinically N0 male breast cancer: a systematic review.** ***Georgia Nelson, Nouf AlMarzooqi, Shaila Merchant, Sean Bennett.*** **From Queen's University (Nelson, Merchant, Bennett), and McGill University (AlMarzooqi).**

**Background:** Axillary management of clinically node negative (cN0) male breast cancer (MBC) can be achieved through either sentinel lymph node biopsy (SLNB) or axillary lymph node dissection (ALND). MBC is a rare disease lacking clinical trials, with most management extrapolated from data in female breast cancer. Our aim was to synthesize the available data regarding sentinel node detection rate, predictive value, morbidity, and recurrence following SLNB or ALND for cN0 MBC. **Methods:** A systematic search was performed to identify studies of axillary management in cN0 MBC patients. Cancer-related outcomes (recurrence, survival), morbidity, demographic/descriptive data (tumour size/grade/receptor status, SLN status, treatments, diagnostic technique), SLNB accuracy (positive predictive value, negative predictive value, identification rate) and SLNB technique were evaluated and described. Methodological quality was evaluated using the JBI Critical Appraisal tool. **Results:** Eleven studies were identified, with a combined total of 2895 cN0 MBC patients: 1951 SLNB, 118 SLNB followed by ALND, and 826 ALND. The majority of included patients ($n$ = 2646) came from 1 NCDB study. Of the 157 patients who underwent SLNB and have reported pathology results, 70 had a positive SLN (44.6%). SLN identification rate was 98%. The reported mean number of SLNs sampled ranged from 1.5 to 3.5. In patients undergoing both SLNB and ALND, the positive predictive value of SLNB to predict further positive nodes at ALND was 56%, while the negative predictive value was 100%. The recurrence of breast cancer following SLNB was below 3%. Two studies reported comparable overall survival between SLNB and ALND groups. In ALND patients there was a 12% incidence of postoperative morbidity, including lymphedema, paresthesias and pain, compared to a 4% incidence in SLNB alone. **Conclusion:** In cN0 MBC patients, SLNB has comparable survival to ALND, a high negative predictive value, high identification rates, low recurrence, and lower morbidity. These data support SLNB as the standard of care for clinically node negative male breast cancer patients.

**07**

**Predictive value of C-reactive protein for infectious complications after cytoreductive surgery and hyperthermic intraperitoneal chemotherapy: a single-centre prospective study.** ***Janyssa Charbonneau, Mai-Kim Gervais, Alexandre Brind'Amour, Narcisse Singbo, Mikaël Lefebvre Soucisse, Lucas Sidéris, Guy Leblanc, Jean-François Tremblay, Pierre Dubé.*** **From Université Laval (Charbonneau, Brind'Amour), Université de Montréal (Gervais, Lefebvre Soucisse, Sidéris, Leblanc, Tremblay, Dubé), and the CHU de Québec – Université Laval (Singbo).**

**Background:** Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) are associated with a high morbidity rate and prolonged hospital stay. Diagnosis of infectious complications can be challenging. This study aimed to assess the predictive value of postoperative C-reactive protein (CRP) levels for overall infectious complications and anastomotic leaks, and their clinical repercussions. **Methods:** This is a single-centre prospective study. After CRS and HIPEC, CRP serum levels were measured daily for 10 days. Patients with and without infectious complications were compared. **Results:** Ninety-nine surgeries were completed between 2018 and 2020. CRP levels typically increased until postoperative day 2 for all patients. A physiological second peak of CRP levels was identified from postoperative day 7, but appeared sooner for patients with infectious complications. The rate of infectious complications was 30.3%. CRP levels were significantly higher with infectious complications, from postoperative day 2 to 10. Daily cut-off values predicted infectious complications most accurately on day 8 (94.3 mg/L, area under the curve [AUC] 0.85, sensitivity 76.2%, specificity 94.7%, positive predictive value [PPV] 88.9%, negative predictive value [NPV] 87.8%, $p < 0.0001$) and day 9 (72.7 mg/L, AUC 0.89, sensitivity 95.2%, specificity 81.8%, PPV 76.9%, NPV 96.4%, $p < 0.0001$). Patients with infectious complications had longer operative times (420 v. 468 min, $p = 0.03$), higher peritoneal carcinomatosis index (median 14 v. 9, $p = 0.03$) and a higher number of intestinal anastomoses (median 0.00 v. 1.00, $p = 0.04$). These complications were strongly associated with noninfectious ones (30% noninfectious complication group v. 67% infectious complication group, $p = 0.001$). Due to only 4 cases of anastomotic leak recorded, specific analyses could not be conducted. **Conclusion:** CRP measurement may help predict

infectious complications following CRS and HIPEC. Cut-off values are more accurate after the first postoperative week, especially in ruling out infectious complications. A second physiological peak in CRP level is to be expected from postoperative day 7, but it may mandate further testing if recorded earlier.

**08**

**Axillary surgery after neoadjuvant chemotherapy: population-based trends over time.** ***Ekaterina Kouzmina, Matthew Castelo, Nicole Look Hong, Julie Hallet, Natalie Coburn, Frances Write, Lena Nguyen, Sonal Gandhi, Katarzyna Jerzak, Andrea Eisen, Amanda Roberts*. From the University of Toronto (Kouzmina, Castelo), the Sunnybrook Health Sciences Centre (Look Hong, Hallet, Coburn, Write, Gandhi, Jerzak, Eisen, Roberts), and ICES (Nguyen).**

**Background:** Sentinel lymph node biopsy (SLNB) after neoadjuvant chemotherapy (NAC) has recently become the standard of care for patients with cN1 disease that convert to cN0 in response to systemic treatment. Our study aimed to describe the real-world population-level trends of axillary surgery de-escalation after NAC over an 8-year period. **Methods:** A population-based cohort study was completed including women aged 18 years or older undergoing NAC followed by surgery for cT1–3N1 breast cancer between April 1, 2012, and January 31, 2020, in Ontario, Canada. Axillary surgery (SLNB, axillary lymph node dissection [ALND] or SLNB followed by ALND) trends over time were evaluated using the Cochran–Armitage test and grouped by procedure type and receptor subtype. **Results:** Between 2012 and 2020, 2692 patients were included, with 40% of patients diagnosed with hormone receptor positive HER2$^-$ cancers [HR$^+$]). Over time, SLNB and SLNB + ALND increased by 24.1% ($p < 0.01$) and by 2.9% ($p < 0.01$), respectively. ALND decreased by 26.9% ($p < 0.01$). Similar trends were identified by receptor groups. SLNB use increased by 12.6% ($p < 0.01$) for HR$^+$ cancers, 33% ($p < 0.01$) for HER2$^+$ cancers, and 29.6% ($p < 0.01$) for triple negative (TN) cancers. HR$^+$ cancers had a decrease in ALND of 18.7% ($p < 0.01$), HER2$^+$ cancers of 35.6% ($p < 0.01$), and TN cancers of 28.4% ($p < 0.01$). HR$^+$ cancers had an increase in SLNB + ALND of 6.1% ($p < 0.01$), HER2$^+$ cancers of 2.6% ($p < 0.01$), and TN cancers of 4% by 2017, then a decrease of 5% by 2020 ($p < 0.01$). **Conclusion:** In alignment with current practice guidelines, de-escalation of axillary surgery to SLNB has increased over time for appropriately selected cN1 patients following NAC.

**09**

**Intralesional interleukin-2-based therapy is effective in the treatment of high-risk cutaneous squamous cell carcinoma.** ***Dejan Vidovic, Brianne Cruickshank, Lucy Helyer, Carman Giacomantonio*. From Dalhousie University.**

**Background:** Non-melanoma skin cancers, particularly cutaneous squamous cell carcinoma (cSCC), are often underestimated in Canada due to underreporting in tumour registries and in-office treatment of small lesions without tissue confirmation. While most are easily treatable surgically, challenges arise with tumours in sensitive areas or those that are recurrent or locally advanced. Systemic immunotherapy is currently used for inoperable or metastatic cSCC, but poses risks of severe immune-related toxicities, especially in elderly patients or those with comorbidities. Herein, we present outcomes of locally advanced cSCC patients treated with intralesional interleukin-2 (IL2) and, in some cases, topical imiquimod, aiming to reduce systemic toxicities in this subset of patients. **Methods:** Patients with locally advanced cSCC, recurrent cSCC, with significant comorbidities precluding surgery, or disease in anatomically sensitive areas were referred to our immunotherapy program. These patients were offered intralesional IL2 therapy, with or without imiquimod. We prospectively documented responses to treatment for these patients between 2017 and 2024. Clinical, histological, and radiographic outcomes were collected and reported. **Results:** Between 2017 and 2024, 19 patients with cSCC were treated with intralesional IL2. Five of these 19 received imiquimod in addition to IL2. The average age was 77.7 years, and median American Society of Anesthesiologists classification was 3. Twelve of 19 involved the head and neck, 3 of 19 the perianal region, and the remainder were in extremities. Average number of IL2 treatments was 10, and mean treatment duration was 7 months. The complete response rate was 78.9%, and the overall response rate was 89.5%. All patients remain alive as of abstract submission. **Conclusion:** In this small, nonrandomized cohort, intralesional IL2 with or without imiquimod achieved a durable overall response rate of 89.5%, suggesting it may have clinical use in this subset of elderly, comorbid or recurrent patients; however, further study is required.

## CANADIAN HEPATO-PANCREATO-BILIARY ASSOCIATION

**01**

**Oncologic outcomes of interventions to minimize allograft ischemia-reperfusion injury within patients undergoing liver transplantation for hepatocellular carcinoma: a systematic review.** ***Zuhaib Mir, Matheus Faleiro, Stephanie Hiebert, Scott Livingstone, Mark Walsh, Boris Gala-Lopez*. From Dalhousie University.**

**Background:** Numerous studies demonstrate associations between ischemia-reperfusion injury (IRI) during liver transplantation and recurrence of hepatocellular carcinoma (HCC). The objective of this systematic review was to synthesize and evaluate the evidence surrounding interventions to decrease IRI during liver transplantation for HCC, and subsequent effects on oncologic outcomes. **Methods:** A comprehensive literature search was performed, and 2 reviewers independently screened studies for inclusion. Studies performing a comparative analysis of any clinical intervention to reduce IRI were included. Relevant study details were abstracted and quality assessment was performed using the Cochrane Risk Of Bias In Non-Randomized Studies of Interventions (ROBINS-I) tool. **Results:** Four studies met the final inclusion criteria. All studies were retrospective. In total, 938 patients with HCC were analyzed, with 239 receiving an intervention to reduce IRI during liver transplantation. These interventions

 

included postoperative prostaglandin administration (1 study), hypothermic machine perfusion (2 studies), and normothermic machine perfusion (1 study). Treated patients showed significantly less hepatocellular injury and inflammation in the immediate postoperative period, and a significantly higher rate of recurrence-free survival (RFS). Effect estimates and 95% confidence intervals (CI) for RFS were 5.09 (1.64–15.76) and 3.73 (1.17–11.9) after prostaglandin and normothermic machine perfusion, respectively. Hypothermic machine perfusion demonstrated significantly higher 5-year RFS in 1 study (92% v. 73%, $p$ = 0.027), and a slightly higher RFS in the other study (1.34 [95% CI] 0.5–3.4). There was no appreciable difference in overall survival with any intervention. There was a low to moderate risk of bias within the included studies. **Conclusion:** Prostaglandin administration and machine perfusion are emerging but understudied strategies to decrease IRI during transplantation in patients with HCC. Although improved post-transplant RFS is noted, a clear effect on overall survival has not yet been demonstrated. These findings warrant further prospective study to fully appreciate the benefit of such interventions in patients undergoing transplantation.

**02**

**Cirrhosis, retransplant and mortality outcomes secondary to recurrent disease after liver transplant for MASH/NASH: a systematic review and pooled proportion analysis.** ***Sukhdeep Jatana, Daniel Krys, Uzair Jogiat, Janice Kung, Kevin Verhoeff*. From the University of Alberta.**

**Background:** Metabolic dysfunction-associated fatty liver disease (MAFLD) is expected to be the number one indication for liver transplant. A systematic review evaluating recurrent MAFLD-related outcomes is lacking in the literature. We aimed to assess the rate of development of outcomes in patients transplanted for MAFLD, previously known as nonalcoholic fatty liver disease (NAFLD), due to disease recurrence. **Methods:** A systematic review and meta-analysis was performed with a search up to January 2023 of MEDLINE, Embase, Scopus, Web of Science Core Collection, and Cochrane Library. Inclusion criteria were adult patients, liver transplant due to MAFLD or cryptogenic cirrhosis, with development of recurrent disease or outcomes related to recurrent disease. **Results:** Of 5859 identified records, 41 were included (16 120 patients). Outcomes were assessed from < 6 months to ≥ 5 years. Recurrent MAFLD (29 studies) and metabolic dysfunction-associated steatohepatitis (MASH; previously known as nonalcoholic steatohepatitis [NASH], 28 studies) occurred in frequencies of 35%–49% and 11%–24%, respectively. Factors associated with MAFLD recurrence included increasing age, body mass index, and comorbidities, and for MASH recurrence, increasing comorbidities. Fibrosis occurred in 4%–25% (13 studies). Recurrent disease-related cirrhosis (13 studies), graft failure (8 studies), and retransplant (9 studies) occurred in 0%–2%, 3%–9%, and 0%–1%, respectively. Recurrent disease-related hepatocellular carcinoma (1 study) and mortality (17 studies) both had a prevalence of 0%. Studies were of moderate or high quality using the MINORS tool. **Conclusion:** Recurrent MAFLD and MASH after liver transplant occurs frequently. However, outcomes due to disease recurrence, such as cirrhosis, graft failure, retransplant, and death, are infrequent. Long-term outcomes after transplantation for MAFLD are favourable, and identifying those more likely to have progressive recurrent disease leading to adverse outcomes will help with clinician decision-making.

**03**

**Hypovolemic phlebotomy in major hepatic resection: a randomized controlled trial (PRICE-2).** ***Tori Lenet, François Martin Carrier, Karine Brousseau, Franck Vandenbroucke-Menu, Yves Collin, Richard W. D. Gilbert, Maja Segedi, Jad Abou Khalil, Kimberly A. Bertens, Fady Balaa, Dean A. Fergusson, Guillaume Martel, Christopher Wherrett, Katlin Mallette, Leah Monette, Aklile Workneh, Monique Ruel, Elham Sabri, Heather Maddison, Melanie Tokessym, Patrick B.Y. Wong, Luc Massicotte, Michaël Chassé, Michel-Antoine Perrault, Élodie Hamel-Perreault, Jeieung Park, Shirley Lim, Véronique Maltais, Philemon Leung, Timothy Ramsay, Alan Tinmouth*. From the Ottawa Hospital (Lenet, Gilbert, Khalil, Bertens, Balaa, Fergusson, Martel, Wherrett, Mallette, Monette, Workneh, Tokessym, Wong, Tinmouth); the Ottawa Hospital Research Institute (Lenet, Brousseau, Khalil, Bertens, Fergusson, Martel, Monette, Workneh, Sabri, Tokessym, Tinmouth); the Centre Hospitalier de l'Université de Montréal (Carrier, Vandenbroucke-Menu, Ruel, Massicotte, Chassé, Ramsay); the Centre Hospitalier Universitaire de l'Université de Sherbrooke (Collin, Perrault, Hamel-Perrault); the Vancouver General Hospital (Gilbert, Segedi); Canadian Blood Services (Fergusson, Tinmouth); the Eastern Ontario Regional Laboratory Association (Maddison); and the Vancouver General Hospital, University of British Columbia (Park, Lim, Maltais, Leung).**

**Background:** Blood loss and red blood cell (RBC) transfusion are common in liver surgery. Hypovolemic phlebotomy (HP) has been associated with decreased blood loss and RBC transfusion in observational studies. This trial aimed to investigate whether HP is superior to usual care in reducing RBC transfusions in patients undergoing liver resection. **Methods:** PRICE-2 was a multicentre randomized controlled trial. Patients undergoing major liver resection for any indication were randomized to HP or usual care. HP consisted of the removal of 7–10 mL/kg of whole blood, without volume replacement, prior to liver transection. The primary outcome was the administration of perioperative RBC transfusion up to 30 days post-randomization. Secondary outcomes included mortality, morbidity, blood loss, blood products transfusion, and surgeon perception of operative conditions. Surgeons and outcome assessors were blinded. **Results:** We included 446 patients who underwent liver resection (223 in each group). The groups were well balanced for baseline characteristics. Thirty-day perioperative RBC transfusion occurred in 7.6% of patients allocated to HP and 16.1% allocated to usual care (risk ratio 0.47, 95% confidence interval 0.27–0.82). There was no significant difference in overall or severe complications, including end-organ ischemic complications. No deaths occurred. Blood loss and blinded surgeon-reported operative conditions were significantly improved with HP. **Conclusion:** In patients undergoing major liver resection, hypovolemic phlebotomy reduced perioperative RBC transfusion and improved operative conditions, without added significant complications compared to usual care. The observed reduction in RBC transfusion was clinically significant, supporting hypovolemic phlebotomy as standard care in major liver resection. (Funded by the Canadian Institutes of Health Research; PRICE-2 ClinicalTrials.gov number NCT03651154).

**04**

**Evaluating the safety and tumorigenicity of stem cell-derived islet cells in immunodeficient mice.** ***Zofia Czarnecka, Nidheesh Dadheeech, Rena Pawlick, Haide Razavy, James Shapiro*. From the University of Alberta.**

**Background:** Type 1 diabetes (T1D) is characterized by the autoimmune destruction of insulin-producing pancreatic β-cells. Islet cell transplantation for T1D is limited by donor cell supply and has prompted exploration into induced pluripotent stem cells (iPSCs). iPSCs are differentiated into islet-like cells through 6 stages. Off-target cell populations remain a challenge and may form tumours and cysts in vivo. With efficient differentiation in the pancreatic progenitor stage, stage 4 (S4), we hope to generate fewer off-target cells in stage 6 (S6). Furthermore, the microvascular environment at different transplant sites may impact tumour or cyst formation. **Methods:** iPSCs derived from a non-diabetic patient were differentiated to S4 and S6. Cells were transplanted into immunodeficient mice in the kidney capsule, portal vein, subcutaneous tissue, epididymal fat pad, and omentum. Mice were tested for intraperitoneal glucose tolerance (8 and 12 wk). Serum was analyzed for human C-peptide. At 12 weeks post-transplant, grafts were assessed for endocrine maturation and off-target growth. **Results:** In total, 87.5% (14/16) of S6 and 75.0% (9/12) of S4 transplanted mice survived to endpoint. Cystic and teratogenic growths were seen in 100% of mice transplanted at S4 under the kidney capsule ($n$ = 3) and omentum ($n$ = 3) and 50% of mice transplanted at the epididymal fat pad ($n$ = 2). Non-endocrine tissue was seen with retinal, gastric, alveolar, and intestinal tissues. At 12 weeks post-transplant, human C-peptide (4–10 pmol) was detected in all S4 mice. S6 cells demonstrated minimal cyst formation in only 21.4% (3/14) of surviving mice at 12 weeks post-transplant (kidney capsule ($n$ = 2) and omentum ($n$ = 1)). However, S6 transplanted mice did not secrete C-peptide, suggesting that cells did not survive transplantation. **Conclusion:** S4 cells result in large cystic and teratogenic growths while more mature S6 cells form only small, simple cysts. Further work remains to optimize differentiation and transplant protocols and improve survival of cells after transplant.

**05**

**Exploring the impact of the Median Meld at Transplant Minus 3 (MMaT-3) exception points system on wait list mortality for liver transplant patients.** ***Panthea Pouramin, Susan Allen, Boris Gala-Lopez*. From Dalhousie University.**

**Background:** Globally, liver transplants are prioritized based on mortality risk, as estimated by the Model of End-Stage Liver Disease (MELD) score. Given that hepatocellular carcinoma (HCC) patients typically present with lower MELD scores, it has been common practice to artificially increase their score with additional exception points. However, evidence suggests these exception points overly prioritize HCC patients, leading to disproportion wait list mortality. The Median Meld at Transplant Minus 3 (MMaT-3) scoring system, which allocates exception points based on the previous year's patient MELD scores, promises more equitable allocation. We aimed to assess whether implementation of MMaT-3 balanced wait list mortality and transplantation rates between HCC and non-HCC patients. **Methods:** We conducted a retrospective chart review of patients who were listed for a liver transplant between 2015 and 2023. We compared wait list mortality and transplantation rates between 2 cohorts pre-MMaT-3 and post-MMaT-3 implementation. Multivariate analysis was conducted using Fine–Gray proportional hazard regression. **Results:** We included 240 patients (143 pre- v. 97 post-MMaT-3). Non-HCC patients were younger than HCC patients (median 55 yr, interquartile range [IQR] 47–60 yr v. median 63 yr, IQR 58–65 yr, $p < 0.0001$). MMaT-3 implementation significantly increased 1-year liver transplantation (74.4% v. 55.7%, $p = 0.037$) and reduced 1-year wait list mortality (14.1% v. 27.8%, $p = 0.031$) among non-HCC patients, while having limited impact on HCC 1-year liver transplantation (72.7% v. 82.6%, $p = 0.292$) and 1-year mortality (18.2% v. 6.5%, $p = 0.066$). Furthermore, pre-MMaT-3 gaps in transplantation ($p = 0.002$) and wait list mortality rates ($p = 0.003$) between non-HCC and HCC patients were eliminated post-implementation ($p = 0.337$ and $p = 0.72$, respectively). In multivariate analysis, after correcting for MELD score, age, and body mass index, implementing MMaT-3 significantly reduced wait list mortality among non-HCC patients (hazard ratio [HR] 0.42, 95% confidence interval [CI] 0.20–0.89), while having limited impact on HCC patients (HR 2.27, 95% CI 0.55–9.34). **Conclusion:** Implementing the MMaT-3 exception system decreased wait list mortality of non-HCC patients with limited impact on outcomes for HCC patients listed for a transplant.

**06**

**Exploring the therapeutic potential of VSVd51-LIGHT oncolytic virus in pancreatic cancer: effects on tumour microenvironment and survival outcomes.** ***Nawal Ambis*. From Université de Sherbrooke.**

**Background:** Pancreatic ductal adenocarcinoma (PDAC) is characterized by immune cell scarcity, dense stroma, and immunosuppressive cell abundance. Overcoming these hurdles is crucial for improving therapeutic efficacy. Oncolytic viruses offer promise by remodelling the tumour microenvironment. VSVd51, with its safety profile and immunomodulatory potential, emerges as a compelling candidate, especially when combined with the LIGHT protein to enhance immune cell infiltration and anti-tumour response. **Methods:** C57BL/6J mice were inoculated with 2e5 murine pancreatic tumour cells (Panc02) in the pancreatic head. After 7 days, mice were randomly allocated into 4 treatment groups: saline, VSVd51, VSVd51-LIGHT, or Folfirinox. Treatments were administered on days 7, 8, and 9 post-inoculation. Tumour tissues were collected 2 and 9 days post-treatment, minced, dissociated, and stained with antibodies for flow cytometry analysis. Additionally, mice injected with 1e3 KPC murine pancreatic tumour cells (mutated for KRAS and TP53) underwent treatment (saline, VSVd51-LIGHT, Folfirinox and a combination of VSVd51-LIGHT with Folfirinox) and were monitored for survival. **Results:** The application of oncolytic virus treatment yielded notable reductions in the levels of anti-inflammatory and immunosuppressive myeloid cells within pancreatic cancer, specifically targeting M2 macrophages and myeloid-derived suppressor cells. Notably, in comparison to Folfirinox treatment, the utilization of VSVd51-LIGHT significantly augmented the presence of activated CD8 T lymphocytes in the orthotopic Panc02 PDAC model. Additionally, when

 

administered alongside systemic chemotherapy, VSVd51-LIGHT exhibited a synergistic effect, leading to prolonged survival among KPC tumour-bearing mice in comparison to chemotherapy alone. **Conclusion:** VSVd51-LIGHT oncolytic virus therapy emerges as a promising strategy for remodelling the tumour microenvironment in PDAC, fostering enhanced lymphocyte activation compared to traditional chemotherapy. Moreover, the combination of this virus with systemic Folfirinox demonstrates considerable potential, improving survival outcomes in an aggressive KPC model. These findings underscore the therapeutic promise of oncolytic virus therapy in reshaping the landscape of pancreatic cancer treatment.

## CANADIAN HERNIA SOCIETY

**01**

**Robotic abdominal wall reconstruction decreases total postoperative opioid exposure, not daily opioid use, compared to open approach: the Retrospective Hernia Repair and Opioids (Retro-HERO) Study.** ***Rachel Liu Hennessey*, *Yuwei Yang*, *Rochelle Guan*, *Yolanda Zhang*, *Adam Meneghetti*, *Chieh Chiu*. From the Vancouver General Hospital (Hennessey, Yang, Meneghetti, Chiu), and the University of British Columbia (Guan, Zhang).**

**Background:** Many surgical specialties have shown a significant reduction in postoperative opioid use with adoption of the robotic platform. This has not been shown in general surgery or in ventral hernia repairs. We compared postoperative opioid usage after open and robotic-assisted abdominal wall reconstruction (AWR). **Methods:** This was a retrospective cohort analysis of all patients with ventral hernias ranging between 5 cm and 15 cm who underwent either open AWR or robotic AWR between January 2020 and November 2022. Patient characteristics, surgery, and length of hospital stay (LOS) information, postoperative opioid usage, and patient-reported pain scores were reviewed. **Results:** Seventy-four patients undergoing open AWR and 27 undergoing robotic AWR during the study period met the inclusion criteria. There was no difference in age, sex distribution, body mass index, comorbidities, size, and hernia characteristic between the 2 groups. Median LOS was significantly longer for open repairs (5 [range 4–6] d v. 2 [range 2–3] d, $p < 0.05$). Median total in-hospital opioid use measured in milligram oral morphine equivalents was significantly higher for open repairs (71.25 [range 15–159] v. 7.5 [range 0–60], $p < 0.05$). However, there was no difference in daily opioid use, multimodal pain control, or total discharge opioid prescription. Multivariable logistic regression analysis indicates younger age is a significant contributor to high opioid use (odds ratio [OR] 0.95, 95% confidence interval [CI] 0.9–0.99, $p = 0.02$), but the use of the robot platform was not (OR 1.7, 95% CI 0.56–4.95, $p = 0.88$). **Conclusion:** Open AWR patients had higher total postoperative opioid exposure, but there was no difference in daily opioid use. Future studies should explore the potential of the robotic approach at minimizing opioid use by way of standardized multimodal pain management protocols.

**02**

**Clinical outcomes of mesh versus non-mesh repairs for management of hiatal hernias: a retrospective cohort study.** ***Dhuvaraha Srikrishnaraj*, *Jeffrey Hawel*, *Christopher Schlachta*, *Ahmad Elnahas*. From Western University (Srikrishnaraj), and the London Health Sciences Centre (Hawel, Schlachta, Ahmad Elnahas).**

**Background:** The use of mesh reinforcement for the repair of hiatal hernias remains a topic of controversy. The objective of this study was to evaluate 30-day clinical outcomes between the use of mesh and no mesh in the management of hiatal hernia repairs using a large multicentre registry. **Methods:** A retrospective cohort study using the National Surgery Quality Improvement Program (NSQIP) database from 2011 to 2021 was conducted. *International Classification of Diseases* 9/10 codes were used to determine the study population, consisting of those who underwent diaphragmatic hernia repair. Elective and emergency cases were included. Current Procedural Terminology codes were used to group mesh use and non-mesh repair groups. Primary outcome was the 30-day complication rate, and secondary outcomes were readmission, mortality, and reoperation rates. Multivariate logistic regression analysis was used to adjust for clinically relevant confounding variables. **Results:** A total of 14 135 and 22 309 were in the mesh and non-mesh groups, respectively. There was no statistically significant difference between the 2 groups with respect to 30-day complication rates. Non-mesh repair was associated with a significantly higher ($p = 0.024$) rate of reoperation. There was no statistically significant difference with respect to readmission and mortality rates. After adjustment, non-mesh repair was significantly associated with an increase in odds of 30-day reoperation (odds ratio 1.171, 95% confidence interval 1.029–1.332, $p < 0.0164$). However, there was no significant difference with respect to 30-day readmission and mortality. **Conclusion:** Patients with hiatal hernias who underwent mesh repair had comparable 30-day complication, readmission, and mortality outcomes to those who underwent non-mesh repair. These findings suggest that mesh repair is a safe approach for the management of hiatal hernias.

**03**

**Preoperative opioid-sparing multimodal analgesia in primary open unilateral inguinal hernia repair: effect on postoperative pain and narcotic use.** ***Ayse Yilbas*, *Marguerite Mainprize*, *Anton Svendrovski*, *Christoph Paasch*, *Fernando Spencer Netto*. From the Shouldice Hospital (Yilbas, Mainprize, Paasch, Netto), UZIK Consulting Inc., (Svendrovski), the University Hospital Brandenburg an der Havel (Paasch), and the Hamad General Hospital (Netto).**

**Background:** The primary objective was to determine if receiving opioid-sparing multimodal analgesia prior to surgery would reduce postoperative pain after primary unilateral open inguinal hernia repair. Secondary objectives were assessing differences in postoperative narcotic use, adverse effects (nausea/vomiting), and patient-reported satisfaction with pain management. **Methods:** Patients undergoing primary unilateral inguinal

hernia repair between June 28, 2022, and February 22, 2024, were selected by participating surgeons to receive standard care (control) or additional treatment. The treatment group patients received a combination of 200 mg celecoxib and 500 mg acetaminophen. Data were collected using surveys and chart review. Descriptive statistics are presented as frequency, mean and standard deviation, or regression coefficient. The Mann–Whitney test, nonparametric analysis of covariance (Quade ANCOVA test, controlling for age) and binary logistic regression were used to compare the groups, with $p < 0.05$ reported as significant. **Results:** There were 692 controls (mean age 62.46 ± 12.66 yr, mean body mass index [BMI] 25.29 ± 2.61 kg/m$^2$, 665 males) and 165 treatment patients (mean age 59.97 ± 13.91 yr, mean BMI 25.21 ± 2.77 kg/m$^2$, 157 males). The controls were slightly older ($p = 0.039$). There were no significant differences in postoperative pain scores between the groups. On postoperative day 0, the treatment group received less narcotics (morphine milligram equivalents) after surgery than controls (0 ± 0 v. 0.51 ± 3.39, $p = .017$). On postoperative day 3 the treatment group received more narcotics than controls (0.14 ± 1.30 v. 0.02 ± 0.57, $p = .045$), and on postoperative day 4 more nonsteroidal anti-inflammatory drugs (NSAIDs) than controls (0.12 ± 1.56 mg v. 0.00 ± 0.00 mg, $p = .046$). However, the effect on the other secondary outcomes, adverse effects, and patient satisfaction were not statistically significant. **Conclusion:** The use of preoperative opioid-sparing multimodal analgesia for patients undergoing primary open unilateral inguinal hernia repair did not influence postoperative pain scores but did reduce narcotic consumption on postoperative day 0, increased narcotic use on postoperative day 3, and increased NSAID use on postoperative day 4. The use of preoperative opioid-sparing multimodal analgesia did not influence adverse effects or patient satisfaction.

**04**

**The modified frailty index predicts postoperative morbidity in elective hernia repair patients: analysis of the national inpatient sample, 2015–2019.** ***Jigish Khamar, Tyler McKechnie, Amin Hatamnejad, Yung Lee, Bright Huo, Edward Passos, Niv Sne, Cagla Eskicioglu, Dennis Hong.*** **From McMaster University (Khamar, McKechnie, Hatamnejad, Lee, Huo, Passos, Sne, Eskicioglu, Hong), the Hamilton General Hospital (Passos, Sne), and St. Joseph's Healthcare (Eskicioglu, Hong).**

**Background:** Frailty has shown promise in predicting postoperative morbidity and mortality following hernia surgery. This study aimed to evaluate the predictive capacity of the 11-item modified frailty index (mFI) in estimating postoperative outcomes following elective hernia surgery using the National Inpatient Sample (NIS) database. **Methods:** A retrospective analysis of the NIS from 2015 to 2019 was performed including adult patients who underwent elective hernia repair. All hernia subtypes were included, spanning inguinal, femoral, umbilical, ventral, and parastomal classifications. The mFI was used to stratify patients as either frail (mFI ≥ 0.27) or robust (mFI < 0.27). The primary outcomes were in-hospital postoperative morbidity and mortality. The secondary outcomes were system-specific morbidity, length of stay (LOS), total in-hospital health care cost, and discharge disposition. Univariable and multivariable regressions were utilized. **Results:** In total, 14 125 robust patients and 1704 frail patients were included. Frailty was associated with older age (mean age 66.4 yr v. 52.6 yr, $p < 0.001$) and prevalence of ventral hernias (51.9% v. 44.4%, $p < 0.001$). Adjusted analyses demonstrated that frail patients had increased in-hospital mortality (adjusted odds ratio [aOR] 3.89, 95% confidence interval [CI] 1.50–10.11, $p = 0.005$), postoperative overall morbidity (aOR 1.98, 95% CI 1.72–2.29, $p < 0.001$), postoperative LOS (adjusted mean difference [aMD] 0.78 d, 95% CI 0.51–1.06, $p < 0.001$), total in-hospital health care costs (aMD $7562, 95% CI $3292–$11 832, $p = 0.001$), and were less likely to be discharged home (aOR 0.61, 95% CI 0.53–0.69, $p < 0.001$). Specific subgroup analyses based on hernia subtype were not completed due to limitations of the database. **Conclusion:** The mFI may be a reliable predictor of postoperative morbidity and mortality in elective hernia surgery. Utilizing this tool can aid in patient education and identifying high-risk patients who may benefit from tailored prehabilitation. Future studies looking at applying this tool for specific hernia subtypes may provide further information regarding the most applicable clinical scenarios for its implementation.

**05**

**Abdominal wall hernia repair in patients with cirrhosis: a population-level analysis.** ***Sean Bennett, Jennifer Flemming, Maya Djerboua, Vanessa Wiseman, Jonah Moore, Peter Szasz, Sulaiman Nanji.*** **From Queen's University (Bennett, Flemming, Wiseman, Moore, Szasz, Nanji), and ICES-Queen's (Djerboua).**

**Background:** Abdominal wall hernias are common in patients with cirrhosis and associated with perioperative morbidity and mortality. We aimed to describe the perioperative risks and risk factors in a contemporary cohort of patients with cirrhosis undergoing hernia repair. **Methods:** We conducted a population-level retrospective cohort study of adults with cirrhosis undergoing abdominal wall hernia surgery in Ontario between 2009 and 2018 using linked administrative health care data sets. Cirrhosis was identified using validated algorithms. Procedures were identified using surgical billing codes and classified as elective or emergent. Postoperative outcomes were described, and risk factors explored using adjusted logistic regression. **Results:** We identified 6040 adults with cirrhosis who underwent hernia repair (inguinal $n = 2494$, umbilical $n = 1199$, ventral/incisional $n = 1893$, incarcerated $n = 454$). Median age was 61 years, 76% were male, 79% underwent an elective operation, and 12% had previous hepatic decompensation. Overall 90-day mortality was 4% (15.5% for emergency repair, 1.1% for elective repair). Factors associated with 90-day overall mortality were age, hepatitis C or alcohol-associated cirrhosis, MELD-Na score, Charlson Comorbidity Index score, emergent operation, and non-inguinal hernia. For elective repairs the same associations were seen except for alcohol-associated cirrhosis and umbilical hernias. Overall 90-day postoperative complications occurred in 12.5% (23.8% emergency, 9.5% elective): surgical site infection (15.0% and 4.8%), venous thromboembolism (2.4% and 0.7%), and any blood product transfusion (42.4% and 4.7%). **Conclusion:** The rates of 90-day postoperative complications and mortality

 

after elective hernia repair were low, with emergency surgery associated with a 15-fold higher odds of mortality. These data support elective hernia repair in most patients with cirrhosis.

**06**

**Abdominal wall hernia repair in patients with cirrhosis: a systematic review and meta-analysis.** ***Jonah Moore, Vanessa Wiseman, Peter Szasz, Isis Lunsky, Sulaiman Nanji, Jennifer A. Flemming, Sean Bennett, Sandra McKeown*****. From Queen's University.**

**Background:** Patients with cirrhosis have a high incidence of hernias and are at risk for developing hernia-associated complications. We reviewed the literature concerning hernia repair surgery in patients with cirrhosis to quantify the associated perioperative morbidity and mortality. **Methods:** We conducted a systematic review according to PRISMA guidelines. Included papers were published since 1992 and included at least 25 patients with cirrhosis who underwent hernia repair. Primary outcomes of interest included severity and etiology of cirrhosis, type of hernia repair, surgical site infections, other wound complications, hernia recurrence, and death. **Results:** After abstract screening and full text review, 35 studies comprising 64 259 patients (72.3% male, mean age 55 yr) were included. Type of hernia repair was inguinal in 59.4%, umbilical in 31.1%, and other in 9.5%. Within this population 56.5% of the hernia repairs were conducted in an emergent setting, whereas 43.4% were elective. Of the papers that reported the Child–Pugh classification of each patient, 27% of these patients were Class A, 49.8% Class B, and 23.2% Class C. Overall reported mortality was 4.1% (range 3.0%–5.3%) for the overall cohort, 2.0% (range 1.1%–2.9%) for elective procedures, and 13.3% (range 8.6%–17.9%) for emergent procedures. Surgical site infections were reported in 3.9% (range 2.8%–5.0%), other wound complications in 11.1% (range 9.0%–13.3%), and recurrences in 6.9% (range 4.6%–9.3%). **Conclusion:** Mortality is 6 times more likely after emergent hernia repair compared to elective surgery. This may support the role of elective hernia repair in most patients with cirrhosis.

**07**

**Transversus abdominis muscle release for complex ventral hernias: outcomes from a Canadian abdominal wall reconstruction program.** ***Omar Mouhammed, Colton Gibb, Kevin Verhoeff, Michael Kim, Matt Strickland, Ram Anantha*****. From the University of Alberta.**

**Background:** Large complex ventral hernias are associated with significant patient morbidity. Transversus abdominis release (TAR) is an advanced reconstructive technique that facilitates the functional repair of complex abdominal wall hernias. By incising the posterior rectus sheath, developing a retrorectus plane, and releasing the transversus abdominis muscle medial to the semilunar line, a broad plane extends from the central tendon of the diaphragm superiorly to the space of Retzius inferiorly, and laterally to the retroperitoneum for the placement of mesh. We sought to evaluate the clinical characteristics of patients undergoing TAR within a Canadian abdominal wall reconstruction program. **Methods:** We retrospectively reviewed 182 patients who underwent TAR by abdominal wall reconstruction surgeons at the University of Alberta between January 1, 2018, and December 31, 2022. Patient characteristics, operative details, postoperative complications, and hernia recurrences were analyzed. **Results:** Of 182 patients, 71 (39%) were female. Mean age was 57 years, and mean body mass index (BMI) was 32 kg/m$^2$. Fifty-five patients (30%) had BMI > 35 kg/m$^2$, 68 patients (37%) had prior hernia repair, and 142 (78%) of patients received synthetic mesh. Median length of hospitalization was 6 days. After TAR, 18% developed a surgical site infection and 2.7% developed mesh infection. Mean postoperative follow-up was 19 months, with 16 recurrences (8.8%). **Conclusion:** TAR provides a robust repair for complex ventral hernias. We report outcomes from the largest retrospective review of this technique by a Canadian abdominal wall reconstruction program. Our results demonstrate a favourable recurrence rate, although prospective studies with longer follow-up will be essential to demonstrate durability.

**08**

**When urine trouble – recall the basic principles of general surgery.** ***Ilinca Georgescu*****. From Dalhousie University.**

**Background:** Inguinal hernias are common general surgical consults. However, inguinal hernias involving the ureter remain a rare phenomenon. **Case presentation:** A 56-year-old male with a remote history of a right kidney transplant presented with significant graft dysfunction in the context of a groin hernia. His medical history included diabetes requiring insulin, hypertension, dyslipidemia, gastroesophageal reflux disease, gout, and nonalcoholic steatohepatitis. The patient remained on the usual immunosuppressive medications and had no history of prior surgeries outside of previous transplant. His body mass index was 23 kg/m$^2$. Physical examination revealed a hemodynamically stable patient with a soft, non-tender abdomen, and a non-tender, non-reducible right inguinal hernia. The patient was largely asymptomatic, with no fever or urinary symptoms reported. Laboratory workup was significant for a creatinine of 643 μmol/L but no leukocytosis. Computed tomography of the abdomen and pelvis demonstrated hydronephrosis of the transplanted kidney, with a dilatated ureter extending into a right inguinal hernia. **Methods:** Obstructive uropathy was queried. The patient received emergent surgery for graft salvage and obstruction relief. The hernia was accessed via an open inguinal approach. Careful dissection revealed an indirect inguinal hernia. The sac was noted as soft and fat-containing, with no obvious ureter palpable. The defect was repaired using mesh repair with the Lichtenstein technique. **Results:** The patient had an uneventful postoperative course. Hospital admission totalled 5 days. Urine output and creatinine were improved at time of discharge. Graft function and creatinine remained favourable at 2-week follow-up. **Conclusion:** Qualities that make this case worthy of reporting include its asymptomatic presentation, its unique patient population, and its rarity. Additionally, despite being a rare occurrence, knowledge of ureteroinguinal hernia diagnosis, and management involves basic general surgery principles that belong in the armamentarium of any practising general surgeon, especially new graduates and those practising in an acute care setting.

## CANADIAN ASSOCIATION OF GENERAL SURGEONS | ENDOSCOPY

**01**

**Artificial intelligence in bariatric surgery: comparative analysis of ChatGPT-4, Bing, and Bard in generating clinician-level bariatric surgery recommendations.** ***Yung Lee, Thomas Shin, Lea Tessier, Arshia Javidan, James Jung, Dennis Hong, Tyler McKechnie, Andrew Strong, Matthew Kroh, Jerry Dang*. From McMaster University (Lee, Tessier, Hong, McKechnie), the Brigham and Women's Hospital (Shin), the University of Toronto (Javidan), Duke University (Jung), and the Cleveland Clinic (Strong, Kroh, Dang).**

**Background:** The formulation of clinical recommendations pertaining to bariatric surgery is essential in guiding health care professionals. Artificial intelligence (AI) has the potential to streamline access to the salient points of clinical recommendations in bariatric surgery. This study aimed to appraise the quality and readability of AI-chat-generated answers to frequently asked clinical inquiries in the field of bariatric and metabolic surgery. **Methods:** Question prompts inputted into AI large language models (LLMs) were created based on pre-existing clinical practice guidelines regarding bariatric and metabolic surgery. The prompts were queried into 3 LLMs: OpenAI ChatGPT-4, Microsoft Bing, and Google Bard. The responses from each LLM were entred into a spreadsheet for randomized and blinded duplicate review. Accredited bariatric surgeons in North America independently assessed the appropriateness of each recommendation using a 5-point Likert scale. Scores of 4 and 5 were deemed appropriate, while scores of 1–3 indicated a lack of appropriateness. A Flesch Reading Ease (FRE) score was calculated to assess the readability of responses generated by each LLM. **Results:** There was a significant difference between the 3 LLMs in their 5-point Likert scalel scores, with mean values of 4.46 ± 0.82, 3.89 ± 0.80, and 3.11 ± 0.72 for ChatGPT-4, Bard, and Bing, respectively ($p < 0.001$). There was a significant difference between the 3 LLMs in the proportion of appropriate answers, with ChatGPT-4 at 85.7%, Bard at 74.3%, and Bing at 25.7% ($p < 0.001$). The mean FRE scores for ChatGPT-4, Bard, and Bing were 21.68 ± 2.78, 42.89 ± 4.03, and 14.64 ± 5.09, respectively, with higher scores representing easier readability. **Conclusion:** LLM-based AI chat models can effectively generate appropriate responses to clinical questions related to bariatric surgery, though the performance of different models can vary greatly. Therefore, caution should be taken when interpreting clinical information provided by LLMs, and clinician oversight is necessary to ensure accuracy.

**02**

**Predictors of anemia recovery in patients with pre-existing anemia undergoing bariatric surgery.** ***Muhammad Faran, Tyler McKechnie, Emma O'Callaghan, Sama Anvari, Taylor Hughes, Mark Crowther, Mehran Anvari, Aristithes Doumouras*. From the Centre for Surgical Invention and Innovation (Faran, Anvari, Hughes), McMaster University (McKechnie, O'Callaghan, Anvari, Crowther, Doumouras), St. Joseph's Healthcare (Anvari, Doumouras), and ICES (Anvari, Doumouras).**

**Background:** Obesity is a risk factor for anemia given the associated chronic systemic inflammation. Bariatric surgery, the most effective treatment for morbid obesity, is also thought to potentially exacerbate anemia postoperatively due to malabsorption. Yet, other data suggest that weight loss postoperatively may aid in recovery from anemia. There have been few data investigating factors associated with postoperative recovery from anemia following bariatric surgery. We designed this study to investigate how frequently patients recover from anemia following bariatric surgery and factors associated with recovery. **Methods:** We conducted a retrospective study of patients with preoperative anemia who underwent a primary bariatric procedure between 2010 and 2020 using data from the Ontario Bariatric Registry. The primary outcome was recovery from anemia, defined by World Health Organization thresholds, at 6 months following bariatric surgery. We created a binary logistics regression model, which included 6 covariates: sex, age, preoperative hemoglobin, body mass index (BMI) at surgery, percentage of body weight lost, and type of surgery. **Results:** Of 1664 patients with preoperative anemia, 952 (57.2%) recovered. Female sex (odds ratio [OR] 1.90, 95% confidence interval [CI] 1.40–2.58, $p < 0.001$), age (45–54 yr: OR 1.49, 95% CI 1.08–2.05, $p = 0.016$; age 55–64 yr: OR 1.46, 95% CI 1.00–2.12, $p = 0.048$; age < 35 yr: referent) and receiving a sleeve gastrectomy (OR 1.43, 95% CI 1.08–1.90, $p = 0.014$) as compared to gastric bypass were associated with significantly higher odds of recovery from anemia. Preoperative hemoglobin levels 11–20 g/L below normal were associated with less odds of recovery as compared to levels 0–10 g/L below normal (OR 0.52, 95% CI 0.40–0.69, $p < 0.001$). **Conclusion:** More than half of patients with pre-existing anemia recover from their anemia after bariatric surgery. The patient's age, sex, preoperative hemoglobin, and surgery type influence recovery. The body weight lost after 6 months or surgical BMI did not significantly impact recovery.

**03**

**Single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S): long-term outcomes from a prospective cohort study.** ***Amin Andalib, Ali Safar, Philippe Bouchard, Sebastian Demyttenaere, Olivier Court*. From McGill University.**

**Background:** The literature on long-term outcomes of single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S) compared to duodenal switch (DS) procedures is lacking. We evaluated the long-term outcomes of SADI-S compared to those after the classic DS procedure. **Methods:** This is a follow-up report from a single-institution prospective cohort study comparing long-term outcomes of SADI-S versus DS both as 1- and 2-stage procedures (ClinicalTrials.gov: NCT02792166). Data are depicted as count (percentage) or median (interquartile range [IQR]). **Results:** Forty-two patients underwent SADI-S, of whom 11 had it as a 2-stage procedure (26%). Of 20 patients who underwent DS, 12 had it as a 2-stage procedure (60%). Both groups were similar at baseline. Median follow-up times for 1-stage SADI-S and DS were 57 (IQR 24) and 57 (IQR 9) months, respectively ($p = 0.93$). Similar BMI reductions were observed after 1-stage SADI-S (median 16.5 kg/m$^2$, IQR 8.5) and DS

 

(median 18.9 kg/m², IQR 7.2) ($p$ = 0.42). At median follow-up of 51 (IQR 21) and 60 (IQR 15) months after 2-stage SADI-S and DS, respectively ($p$ = 0.60), surgical procedures yielded reductions in BMI of 20.5 kg/m² (IQR 14.0) and 24.0 kg/m² (IQR 13.9), respectively ($p$ = 0.52). Follow-up rates were similar for 1-stage (≥ 88%; $p$ = 0.29) and 2-stage procedures (≥ 83%; $p$ = 0.16). Similar diabetes and hypertension remissions were found ($p$ = 0.77 and $p$ = 0.54, respectively). Despite fat-soluble vitamin deficiencies at baseline, after supplementation, they were either eliminated or less prevalent long term after SADI-S. Daily bowel movements were also less frequent. **Conclusion:** Long-term weight and comorbidity outcomes after SADI-S are similar to those of DS both as 1- and 2-stage surgeries. SADI-S procedure may allow for similar beneficial outcomes with less burden from gastrointestinal symptoms and fat-soluble vitamin deficiencies.

**04**

**Weight-specific prehabilitation in elective total hip and knee arthroplasty.** ***Simran Parmar, Brianna Brand, Noah Switzer, Richdeep Gil, Sunawer Aujla.*** **From the University of Calgary (Parmar, Gil, Aujla), and the University of Alberta (Brand, Switzer).**

**Background:** Hip and knee osteoarthritis (OA) are highly prevalent and disabling. Prehabilitation prior to orthopedic surgery has shown reduced costs and improved functional outcomes among patients who have undergone total hip arthroplasty (THA) and total knee arthroplasty (TKA). The purpose of this study was to evaluate the efficacy of the Alberta Obesity Centre (AOC) prehabilitation program in collaboration with the Edmonton Bone and Joint patients. This is a unique weight-specific program that involves lifestyle modification, anti-obesity medication and very-low-calorie diets (Optifast). **Methods:** Patients enrolled in 2022 with at least 6-month follow-up at the AOC undergoing THA and TKA were included. Prior bariatric surgery patients were excluded. The AOC provided appointments with bariatricians, behavioural medicine, and a dietitian/nutritionist at least every 6 months. **Result:** A total of 169 patients were screened, and 100 patients met the inclusion criteria, of which 57 patients were followed for over 1 year. Overall average age was 65 years, with average initial body mass index of 44.7 kg/m², with 35 male and 65 females enrolled. At 6 months ($n$ = 100), average weight loss of > 5%, 10%, and 15% was seen in 52%, 13%, and 5% of patients, respectively. At 1 year ($n$ = 57), average weight loss of > 5%, 10%, and 15% was seen in 65%, 35%, and 18% of patients, respectively. **Conclusion:** Obesity represents one of the most important risk factors for both the incidence and progression of OA at weight-bearing joints. This AOC program facilitates weight-specific prehabilitation in patients undergoing TKA or THA. Clinically significant weight loss is defined as > 5% reduction in body weight over 6–12 months. This was demonstrated in 52% and 65% of patients at 6 months and 1 year, respectively. The reduction in body weight from 6 months to 1 year further highlights a sustained safe and gradual weight-reduction program.

## CANADIAN ASSOCIATION OF GENERAL SURGEONS | ACUTE CARE SURGERY & TRAUMA

**01**

**When is it safe to start VTE prophylaxis after blunt solid organ injury? A prospective multi-institutional trial.** ***Morgan Schellenberg, Natthida Owattanapanich, Brent Emigh, Jan-Michael Van Gent, Tanya Egodage, Patrick B. Murphy, Chad Ball, Audrey L. Spencer, Kelly N. Vogt, Jessica A. Keeley, Stephanie Doris, Kenji Inaba.*** **From the LAC+USC Medical Center (Schellenberg, Owattanapanich, Emigh, Inaba), UT Houston (Van Gent), Cooper Health (Egodage), the Medical College of Wisconsin (Murphy), the University of Calgary (Ball), the Arizona College of Medicine Tucson (Spencer), the London Health Sciences Centre (Vogt), UCLA-Harbo (Keeley), and Ohio Health (Doris).**

**Background:** The optimal time to initiate venous thromboembolism (VTE) chemoprophylaxis (VTEp) after blunt solid organ injury remains controversial as VTE mitigation must be balanced against bleeding promulgation. Evidence from primarily small, retrospective, single-centre work suggests VTEp ≤ 48 hours is safe and effective. This study was undertaken to validate this clinical practice. **Methods:** Blunt trauma patients presenting to 19 participating trauma centres in North America were screened over a 1-year study period beginning between August 1 and October 1, 2021. Inclusion criteria were age > 15 years; ≥ 1 liver, spleen, or kidney injury; and initial nonoperative management (NOM). Exclusions were transfers, death in the emergency department, pregnancy, and concomitant bleeding disorder/anticoagulation/antiplatelet medication. A priori power calculation stipulated the need for 1158 patients. Time of VTEp initiation defined study groups: early (≤ 48 h of admission) versus late (> 48 h). Bivariate and multivariable analyses compared outcomes. **Results:** In total, 1173 patients satisfied study criteria, with 571 (49%) liver, 557 (47%) spleen, and 277 (24%) kidney injuries. Median patient age was 34 (interquartile range [IQR] 25–49) years, and 67% ($n$ = 780) were male. Median ISS was 22 (IQR 14–29) with AIS Abdomen 3 (IQR 2–3) and median American Association for the Surgery of Trauma grade of solid organ injury 2 (IQR 2–3). Early VTEp patients ($n$ = 838 [74%]) had significantly lower rates of VTE ($n$ = 28 [3%] v. $n$ = 21 [7%], $p$ = 0.008), comparable rates of NOM failure ($n$ = 21 [3%] v. $n$ = 12 [4%], $p$ = 0.228), and lower rates of post-VTEp blood transfusion ($n$ = 145 [17%] v. $n$ = 71 [23%], $p$ = 0.024) when compared to late VTEp patients ($n$ = 301, 26%). Late VTEp was independently associated with VTE (odds ratio 2.251, $p$ = 0.046). **Conclusion:** Early initiation of VTEp was associated with significantly reduced rates of VTE, with no increase in bleeding complications. VTEp initiation ≤ 48 hours is therefore safe and effective and should be the standard of care for patients with blunt solid organ injury.

**02**

**Short- and long-term outcomes of acute diverticulitis in patients with transplanted kidneys.** ***Jordan Nantais, Nancy Baxter, Refik Saskin, Andrew Calzavara, David Gomez.*** **From the Li Ka Shing Knowledge Institute, St. Michael's**

**Hospital (Nantais, Baxter, Gomez); the University of Manitoba (Nantais); the University of Toronto (Nantais, Baxter, Gomez); ICES (Baxter, Saskin, Calzavara, Gomez); the University of Melbourne (Baxter); and St. Michael's Hospital, Unity Health Toronto (Gomez).**

**Background:** Acute diverticulitis occurs at least as frequently in solid-organ transplant patients, such as patients with transplanted kidneys (PTKs), as in the general population. Suitability of these patients for nonoperative treatment when it would otherwise be appropriate is controversial. Our study aimed to evaluate the long-term outcomes of the nonoperative management of diverticulitis in this group. **Methods:** We performed a population-based retrospective cohort study of patients in Ontario using linked administrative databases through ICES. Adult (≥ 18 yr) patients hospitalized for an episode of acute diverticulitis between April 2002 and December 2019 were included, and PTKs were compared to those without a transplant. Our primary outcome was delayed failure of conservative management (operation, drainage procedure, or death due to acute diverticulitis) beyond 30 days. We used the cumulative incidence function and a Fine–Gray subdistribution hazard model to account for associated competing risks. **Results:** A total of 74 259 patients were included, and 165 were PTKs. Conservative management at index event was successful in 114 PTKs and 56 383 non-transplant patients allowing for long-term follow-up. Delayed failure of conservative management at 5 years was seen in 5.6% (95% confidence interval [CI] 2.3–11.1) of PTKs as opposed to 2.1% (95% CI 2.0–2.3) in non-transplant patients. Events of readmission for acute diverticulitis were also more frequent in PTKs at 5 years (16.7%, 95% CI 10.1–24.7) versus 11.6% (95% CI 11.3–11.9). Following adjustment for confounding variables, there was increased failure of conservative management (subdistribution hazard ratio [sHR] 3.24, 95% CI 1.69–6.22) and readmissions (sHR 1.55, 95% CI 1.02–2.36) for patients with transplanted kidneys, but very few PTKs died or required elective surgery (< 6 for each event). **Conclusion:** Despite controversy regarding management, most PTKs are managed conservatively for acute diverticulitis. This group experiences delayed failure of conservative management and readmission for acute diverticulitis more frequently than non-transplant patients. However, serious sequelae of this approach happen infrequently, suggesting that this approach is safe for most patients.

**03**

**Failure to rescue or failure to measure? Evaluating the relevance of failure to rescue in emergency general surgery.** ***Alex Le*, *Philip Dawe*, *Morad Hameed*. From the University of British Columbia (Lee, Dawe), and Stanford University (Hameed).**

**Background:** Failure to rescue (FTR), the risk of death after a postoperative complication, has been increasingly adopted for institutional quality measurement that is sensitive to surgical processes and microsystem practices. However, its application in emergency general surgery (EGS) has been minimal compared to elective practices. We evaluated the relevance of FTR in EGS to determine whether its current definition captures actual failures in timely rescue. **Methods:** Patients who underwent EGS over a 45-month period were included. The overall FTR rate was calculated based on the proportion of patients who died within 30 days after a complication (FTR case) to all patients with complications. Procedure type and incidence of complications were compared between FTR and non-FTR cases (patients who survived after a complication). Subgroup analysis of FTR patients was performed to evaluate preoperative laboratory values, indications for surgery, disposition before and after surgery, and causes of death. **Results:** Of 205 patients with postoperative complications, 40 died (19.5%). The most frequent indications for surgery in FTR patients were perforated viscus (27.5%) and bowel ischemia (25.0%). Mean preoperative lactate and pH levels were 4.5 and 7.28, respectively. Patients were most often in the critical care unit prior to (32.5%) and after (72.5%) surgery. Primary causes of death included multiorgan failure (47.5%) and respiratory failure (20.0%). Most patients transitioned to end-of-life care prior to death (77.5%). **Conclusion:** EGS patients are often critically ill prior to and after surgery. Emergency surgery in FTR cases likely reflect heroic measures for otherwise critical, life-threatening diagnoses that confer high risk of death. A more nuanced definition of FTR, such as one that includes adverse events (e.g., unplanned intensive care unit admission and reoperation), may be better suited to capture true failure in quality in EGS.

**04**

**Acute cholecystitis management at a tertiary care centre: Are we following current guidelines?** ***Andrea Spota*, *Amir Hassanpour*, *Eran Shlomovitz*, *David Gomez*, *Eisar Al-Sukhni*. From the University Health Network (Spota, Hassanpour, Al-Sukhni, Shlomovitz), the University of Toronto (Shlomovitz, Gomez, Al-Sukhni), and St. Michael's Hospital – Unity Health (Gomez).**

**Background:** Current evidence (2018 CHOCOLATE trial) and guidelines (Tokyo [TG2018]) support early cholecystectomy for acute cholecystitis (AC), even in high-risk patients. This study aimed to investigate AC management at our centre in the years following these publications. **Methods:** A retrospective cohort study was performed of patients with AC admitted through the emergency department at our tertiary care centre between 2018 and 2023. AC severity was graded using TG2018 definitions. Comorbidities were summarized using the Charlson Comorbidity Index (CCI) and frailty using the 5-item modified Frailty Index (mFI). Compliance with TG2018 recommendations for management strategy were investigated. Outcomes were compared between patients who underwent surgery versus nonoperative management (NOM). **Results:** Among 642 AC patients, 57% underwent cholecystectomy and 43% NOM (22% percutaneous cholecystostomy, 21% antibiotics only). NOM patients had greater length of stay (LOS), complications, deaths, readmissions, and discharge to nursing/rehab than surgery patients. In 70% of NOM patients, TG2018 were not followed; this did not vary with surgeon subspecialty or experience. Patients managed nonoperatively despite TG2018 were more likely to undergo delayed cholecystectomy than those in whom guidelines were followed (17% v. 4%, $p = 0.005$). In subset analysis, healthy octogenarians were significantly less likely to be managed according to TG2018. Healthy octogenarians who underwent surgery had a trend toward shorter LOS (3.1 v. 4.8 d, $p = 0.114$) than those managed nonoperatively but no difference in other outcomes.

 

**Conclusion:** Most patients undergoing NOM at our centre could potentially undergo cholecystectomy if guidelines are considered. A more objective approach to risk assessment may optimize patient selection and outcomes.

**05**

**Patients with acute cholecystitis are safe to wait at home for their cholecystectomy — a tertiary care centre perspective.** ***Vanessa Wiseman, Sunil Patel, Sean Bennett, Zuhaib Mir*. From Queen's University (Wiseman, Patel, Bennett), and Dalhousie University (Mir).**

**Background:** Patients with acute cholecystitis typically receive cholecystectomy at their index admission. Resource limitations may delay definitive surgery, resulting in prolonged hospital stay. Ambulatory surgery may be a safe alternative for selected patients. The objective of this study was to determine the feasibility and safety of ambulatory cholecystectomy in patients with acute cholecystitis. **Methods:** We performed a retrospective cohort study of patients undergoing urgent surgery for acute cholecystitis between January 1, 2022, and December 31, 2023. Patient demographics, diagnostic details, treatments, and outcomes were obtained from the patient record. Comparison between those undergoing inpatient and ambulatory cholecystectomy was conducted. Outcomes of interest included the need for readmission, and/or biliary complications requiring intervention prior to definitive surgery. **Results:** A total of 227 patients including 86 (37%) ambulatory patients and 141 (73%) inpatients were included. Ambulatory patients were younger (mean age 31 v. 35 yr, $p = 0.0008$), had a lower body mass index (31 v. 35 kg/m$^2$, $p = 0.002$) and a higher proportion of American Society of Anesthesiologists class 1 or 2 (29% v. 13%, $p = 0.005$). Of those receiving ambulatory surgery, few were readmitted (7%). Few had biliary complications requiring intervention (3.5% v. 9.9%, $p = 0.07$). Mean wait time was longer in the ambulatory group (3.2 v. 2.1 d, $p < 0.0001$) and surgical time was shorter (102 v. 118 min, $p = 0.0149$). Postoperative length of stay was shorter in the ambulatory group (0.4 v. 1.3 d, $p < 0.0001$). There was no difference in the ambulatory group and inpatient group for postoperative emergency department visit (13% v. 17%, $p = 0.4$) and no difference in hospital readmissions (3.5% v. 7%, $p = 0.265$). **Conclusion:** Ambulatory patients had a low risk of readmission and biliary complications prior to definitive surgery. Ambulatory cholecystectomy is thus a safe alternative, which reduces hospital resources, in well selected patients.

**06**

**Mapping the trauma registry data analysis process in British Columbia: opportunities for modernized efficiency.** ***Stephanie Roberts, Harvey Hawes, Khalil Merali*. From the University of British Columbia.**

**Background:** Approximately 325 000 people are injured annually in British Columbia and require medical attention. The British Columbia Trauma Registry (BCTR) collects information on patients receiving trauma-related care at facilities across the province to assess and improve trauma care and inform systems-level performance. All patients who meet BCTR inclusion criteria are individually reviewed and manually analyzed, requiring extensive human resources. Our goal was to construct a comprehensive process map outlining the workflow of trauma registry data collection in British Columbia to identify opportunities to improve process efficiency. **Methods:** Seven sessions were conducted with a BCTR data analyst over a 5-month period to observe the registry process. Cases were reviewed until data saturation was achieved over a representative sample of injury presentations. Process mapping was facilitated by separating analyst activities into discrete components. These were subdivided to determine where time was spent, which tasks required specialized training and to determine which data sources were being accessed to populate the registry. **Result:** Fifteen cases were reviewed, at which point saturation was achieved. Review time of individual cases ranged from 2 to 22 hours. Review time increased with injury severity, number of interventions, and length of stay. A comprehensive process map was created to outline the BCTR data analysis procedure. Significant challenges were identified: time spent reviewing documents prior to the trauma registry coding process, need to access several databases to obtain the necessary data, inconsistent or missing data when reviewing documentation, and human error when transcribing information from records to the BCTR database. **Conclusion:** Analysts manually evaluate and transcribe patient documentation before coding BCTR data, a time-consuming process prone to error. To increase the fidelity of transcribed data and facilitate expeditious data extraction, we intend to develop natural language processing tools to facilitate effective and efficient trauma registry data collection.

**07**

**Direct to surgery for suspected choledocholithiasis — a decision tree analysis.** ***Rachel Morris, Marc de Moya, Todd Neideen, Andrew Kastenmeier, Lewis Somberg, Dan Holena, Patrick Murphy*. From the Medical College of Wisconsin.**

**Background:** Two distinct treatment pathways exist to formally assess for choledocholithiasis in patients with abnormal laboratory or imaging findings in the emergency setting. Two ways exist to formally assess for choledocholithiasis: preoperative common bile duct (CBD) assessment consists of magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP) and/or endoscopic ultrasonography (EUS). The direct to surgery approach assesses the CBD at the time of cholecystectomy (LC) via intraoperative cholangiography (IOC). The objective of this study was to evaluate the cost-effectiveness of preoperative versus intraoperative clearance in patients with a clinical suspicion for choledocholithiasis based on pre-test probability of choledocholithiasis and develop a real-time tool for cost estimation. **Methods:** We modelled a decision tree to compare the costs associated with the different strategies for a patient with suspected choledocholithiasis. The model parameters included pre-test probability of CBD stones and associated costs of each of 4 decision strategies. Decision nodes were assigned an expected cost based on the pre-test probability of choledocholithiasis, probability of treatment success, and cost. The primary outcome was overall expected cost from each strategy. Costs were from the perspective of Medicare, and sensitivity analyses were performed on all model parameters. **Results:** Direct to surgery via LC with IOC had the lowest expected costs at all probabilities of choledocholithiasis. MRCP is the next favoured strategy from a cost standpoint until the pre-test probability of choledocholithiasis reaches 80%. Pre-test

probability of choledocholithiasis, probability of laparoscopic common bile duct exploration success and cost of IOC have the greatest impact on expected costs in our model. An online tool was created to allow users to vary model inputs: (https://mcwgallstones.shinyapps.io/publish/). **Conclusion:** In patients with suspected choledocholithiasis, a direct to surgery approach with LC and IOC is more cost-effective than multistage management. The online cost comparison tool calculates system-specific cost differentials for each approach.

**08**

**Hospital-level variation in emergency general surgery outcomes.** ***Jordan Nantais*, *Nancy Baxter*, *Refik Saskin*, *Andrew Calzavara*, *David Gomez*. From the Li Ka Shing Knowledge Institute, St. Michael's Hospital (Nantais, Baxter, Gomez); the University of Manitoba (Nantais); the University of Toronto (Nantais, Baxter, Gomez); ICES (Baxter Saskin, Calzavara); the University of Melbourne (Baxter); and St. Michael's Hospital – Unity Health Toronto (Gomez).**

**Background:** The degree to which the treating hospital is related to emergency general surgery (EGS) outcomes is incompletely elucidated and has potential implications for triaging care, transfers, and appropriate resource use. Our aim was to quantify the variation in EGS mortality at the hospital level while accounting for differences in patient characteristics. **Methods:** We performed a population-based analysis of adult (≥ 18 yr) patients with urgent hospitalizations in Ontario between 2015 and 2019 with an EGS diagnosis (appendicitis, cholecystitis, symptomatic abdominal hernia, intestinal obstruction, diverticulitis, intestinal ischemia, pancreatitis, perforated ulcer, or unspecified peritonitis/perforation). Data were derived from linked administrative databases at ICES. We used hierarchical models to evaluate the hospital-specific odds ratio (OR) for death within 30-days, adjusting for patient-level covariates (age, sex, comorbidity burden, diagnosis, disease complexity, income, rurality, and year of hospitalization). Outcome variability at the hospital level was reported as the median odds ratio (mOR) and proportion of explained variance (PEV) for all EGS events and for individual conditions. **Results:** We identified 249 708 patients hospitalized at 126 hospitals, and 108 852 (44%) required an operative procedure. Among EGS patients, 10 605 (4%) died, and 14 486 (6%) had a major complication. A hierarchical model of 30-day death for all EGS conditions accounting for patient covariates demonstrated an mOR of 1.17 and a PEV of 2.1%. The association of hospital with the outcomes was not consistent across conditions, with the magnitude of hospital variation ranging from an mOR of 1.52 and PEV of 19.3% for intestinal ischemia to an mOR of 1.12 and PEV of 1.6% for symptomatic abdominal hernias. **Conclusion:** The hospital where patients receive EGS treatment is associated with differing odds of death. Given the differences in this association between conditions, targeted improvements should be considered for diseases with high variability to achieve consistent quality of care across institutions.

**09**

**The role of pelvic binders for hemostasis in traumatic pelvic fractures: a systematic review and meta-analysis.** ***Asad Naveed*, *Umang Deshpande*, *David Gomez*, *Joao Rezende-Neto*, *Najma Ahmed*, *Andrew Beckett*. From St. Michael's Hospital (Naveed, Deshpande, Gomez, Rezende-Neto, Ahmed, Beckett), and the University of Toronto (Naveed).**

**Background:** Rapid hemostasis in hemodynamically unstable pelvic fracture patients prevents death and reduces transfusions. Pelvic binders are a critical intervention in the management of traumatic pelvic fractures, serving as an immediate stabilizing measure by providing circumferential compression, helping to reduce pelvic hemorrhage. However, their use varies depending on the location and practitioner. This study aims to compare the outcomes of patients with hemodynamically unstable pelvic fractures receiving pelvic binders versus no external emergency stabilization (EES) and pelvic binders versus other devices. **Methods:** A systematic search was conducted through MEDLINE, Embase, and other standard databases to identify studies comparing pelvic binders versus control and other devices in adult trauma patients. Outcome data were extracted and synthesized. Risk of bias analysis was done using the Cochrane Risk Of Bias In Non-Randomized Studies — Of Interventions (ROBINS-I) tool. **Results:** Nine retrospective cohort studies accounting for 2017 patients compared pelvic binder alone (935 patients) with no-EES (1082 patients). All studies were retrospective, and although the crude 30-day mortality rate leaned toward no-EES, this relationship was nonsignificant. When compared to no-EES, the odds ratio (OR) of 30-day mortality in pelvic binder patients was 1.33 (95% confidence interval [CI] 0.84–2.11, $I^2 = 48$, $\tau^2 = 0.19$). The analysis had moderate heterogeneity. Two retrospective cohort studies accounting for 271 patients compared pelvic binder alone (75 patients) with C-clamp (196 patients). The crude 30-day mortality rate was nonsignificant (OR 1.12, 95% CI 0.55–2.29, $I^2 = 0$, $\tau^2 = 0$). **Conclusion:** This systematic review indicates that in hemodynamically unstable pelvic fracture patients, there is no difference in mortality benefit between pelvic binders versus no-EES and pelvic binders versus C-clamp. The overall risk of bias was high, and many unmeasured confounders exist. A future randomized control trial is warranted to guide treatment and policy decisions accurately.



 