

## ABSTRACTS

of presentations to the Annual  
Meetings of the

Canadian Association  
of General Surgeons

Canadian Association  
of Thoracic Surgeons

Canadian Society  
of Colon and Rectal  
Surgeons

Canadian  
Hepato-Pancreato-Biliary  
Society

Canadian Society of  
Surgical Oncology

## RÉSUMÉS

des communications présentées  
aux congrès annuels de

l'Association canadienne  
des chirurgiens généraux

l'Association canadienne  
des chirurgiens thoraciques

la Société canadienne  
des chirurgiens du côlon  
et du rectum

la *Canadian*  
*Hepato-Pancreato-Biliary*  
*Society*

la Société canadienne  
d'oncologie chirurgicale

## CANADIAN SURGERY FORUM

Halifax, NS  
September 11-14, 2008

## FORUM CANADIEN DE CHIRURGIE

Halifax, N.-É.  
du 11 au 14 septembre 2008

# Canadian Surgery Forum 2008

## Forum canadien de chirurgie 2008

### Canadian Association of General Surgeons

### Association canadienne des chirurgiens généraux

**AUTOCRINE MOTILITY FACTOR RECEPTOR EXPRESSION PREDICTS RECTAL CANCER PATIENT OUTCOMES.** *M.R.C. Dickeson, S.K. Chan, O.L. Griffith, P.T. Phang, H. Masoudi, S.J.M. Jones, I.R. Nabi, S.M. Wiseman.* Department of Surgery, St. Paul's Hospital, Departments of Medical Genetics, Cell Biology and Pathology, University of British Columbia, Genetic Pathology Evaluation Centre, Prostate Research Centre, Vancouver General Hospital, British Columbia Cancer Agency, Michael Smith Genome Sciences Centre, Vancouver, BC.

The identification of molecular markers that aid in predicting outcomes for individuals diagnosed with rectal adenocarcinoma could provide important prognostic information beyond that of clinical and pathological characteristics alone. The purpose of this study was to identify molecular markers that predict outcomes for individuals diagnosed with rectal cancer.

A retrospective analysis was carried out for 130 consecutive patients undergoing resection for rectal adenocarcinoma at a single institution over a 6-year period. Clinical characteristics evaluated were: age, sex, tumour location, pre- and postoperative chemo- and radiotherapy, and surgical procedure. Pathologic variables evaluated included: margin status, TNM stage and the presence of vascular and lymphatic invasion. Significant variables were identified by Kaplan–Meier survival analysis and log-rank test. The tumour specimens from these 130 patients were used to prepare a tissue microarray (TMA) that was stained for 10 molecular markers involved in tumourigenesis. The markers evaluated were: autocrine motility factor receptor (AMF-R), Aurora-A, Aurora-C, Cav-1, HER2, HER3, HER4, MDM2, MRAS and PGI. Statistical analysis was used to compare the expression of the markers and correlate their expression with the clinical and pathologic variables.

The clinicopathologic variables and virtually all molecular markers analyzed in the study did not significantly predict patient outcomes. However, increased expression of AMF-R did significantly predict decreased overall survival ( $p < 0.001$ ), disease-free survival ( $p = 0.036$ ) and disease-specific survival ( $p = 0.005$ ).

The failure of clinical and pathologic variables to predict patient outcomes reemphasizes the need for better tools to predict rectal cancer prognosis. AMF-R warrants further study as a molecular prognosticator, and potential target for therapy, for rectal cancer.

#### 2

**SHORT-TERM BLOCKADE OF T CELL COSTIMULATORY AND ADHESION PATHWAYS PREVENTS NEONATAL PORCINE ISLET XENOGRAFT**

**REJECTION.** *D.C.M. Mok, H. Arefanian, R.V. Rajotte, G.R. Rayat.* Alberta Diabetes Institute, Department of Surgery, University of Alberta, Edmonton, Alta.

The objective of this study was to determine if a combination of short-term blockade of the CD28/B7 costimulatory pathway using CTLA4-Ig in combination with short-term blockade of other costimulatory, or the LFA-1/ICAM-1 adhesion pathway using monoclonal antibody (mAb) therapy could lead to long-term neonatal porcine islet (NPI) xenograft survival.

Six- to 8-week-old, male streptozotocin-induced diabetic ( $\geq 17$  mmol/L) C57BL/6J mice were transplanted with 2000 NPIs under the kidney capsule. Transplanted mice were treated with an intraperitoneal injection of CTLA4-Ig (50  $\mu$ g on days -1 to 15) either alone or in combination with anti-LFA-1 (200  $\mu$ g on days 0, 1, 7, 14), anti-ICOS (200  $\mu$ g on days 0–14) or anti-CD45RB (300  $\mu$ g on day -1 and 100  $\mu$ g on days 0–5) mAbs. Upon graft rejection or  $> 100$  days post-transplantation in long-term functioning grafts, mice were euthanized and their graft examined by immunohistochemical staining. Flow cytometry was used to phenotype systemic immune cell populations.

Single therapy of CTLA4-Ig (0/6), anti-CD45RB (0/10) and anti-ICOS (0/6) mAbs did not prevent rejection of NPI xenografts in mice. Single therapy with anti-LFA-1 mAb, however, resulted in long-term graft function in 67% (4/6). Meanwhile, combination therapy of CTLA4-Ig with anti-LFA-1 mAb, anti-CD45RB mAb or anti-ICOS mAb prolonged graft survival in 67% (4/6), 33% (2/6) and 50% (3/6) of mice, respectively, but immune cell infiltration of the graft was still detected. Immune cell infiltration in functioning islet xenografts were predominantly CD4<sup>+</sup> T cells. In contrast, systemic CD4<sup>+</sup> T cell populations in combination therapy-treated islet xenograft recipients were reduced to levels found in naive nontransplanted B6 mice.

Simultaneously targeting the CD28-B7 costimulatory pathway and the LFA-1/ICAM-1 adhesion pathway was most effective in preventing NPI xenograft rejection and controlled systemic CD4<sup>+</sup> T cell expansion. Combination therapy targeting T cell costimulatory and adhesion pathways may form a future component of antirejection therapy for islet xenotransplantation with the potential to induce xenograft tolerance.

#### 3

**THE ROLE OF SCREENING EVALUATIONS IN PATIENTS WITH GERMLINE MUTATIONS OF THE E-CADHERIN/CDH1 GENE (HEREDITARY DIFFUSE GASTRIC CANCER).** *P. Hebbard, D. Fontaine, J. McCarthy, K. Laing, F. Bursery, N. Wadden,*

**A. Macmillan, J. Green, A. Kwan, D.A. Wirtzfeld.** Departments of Surgery, Pathology, Oncology, Medicine, Radiology and Genetics, Memorial University of Newfoundland, St. John's, NL.

Hereditary diffuse gastric cancer (HDGC) is an autosomal-dominant condition associated with germline mutations in the *e-cadherin/CDH1* gene. Currently, mutation carriers have an approximate 80% lifetime risk of developing gastric cancer and, in women, about a 40% lifetime risk of breast cancer.

We performed a retrospective chart review of 17 mutation-positive individuals who underwent prophylactic total gastrectomy and 17 mutation-positive women to evaluate the efficacy of standardized breast screening protocols.

Standardized screening oesophagogastroduodenoscopy (OGD) with random biopsies of normal-appearing mucosa was not effective in identifying early gastric malignancy. Forty percent of gastrectomy specimens had occult foci of signet-ring gastric cancer, only 1/7 (14%) being identified preoperatively. All patients were attributed a T1N0M0 stage, and no adjuvant treatment was offered.

Standardized screening with annual magnetic resonance imaging (MRI) and mammogram has been offered to all mutation-positive women. The role of prophylactic mastectomy and chemoprophylaxis is discussed. Prophylactic bilateral mastectomies with reconstruction have been offered to patients requesting surgery. Diagnoses of breast cancer have been treated according to recognized standards.

Prophylactic surgery is an essential consideration in families with *e-cadherin* mutations. To date, screening examinations have been ineffective for gastric cancer. Healthy patients should be offered prophylactic gastrectomy. With regards to breast cancer risk, high-risk screening regimens or prophylactic surgery are acceptable options.

#### 4

**ILEOCOLONIC ANASTOMOSIS RESULTS IN A COLONIC BACTERIAL PROFILE IN THE NEO-TERMINAL ILEUM AND AN ANTIGEN-DRIVEN IMMUNE RESPONSE.** *A.M. Borowiec, R. Foshaug, L. Guan, S. MacFarlane, B.C. Sydora, J. Doyle, T.A. Churchill, R.N. Fedorak.* University of Alberta, Edmonton, Alta.

The cascade of luminal microflora and systemic immune changes following terminal ileum (TI) resection was investigated in interleukin 10 gene-deficient (IL-10KO) mice predisposed to develop Crohn disease.

A validated surgical model of TI resection and ileocolonic anastomosis was established in control wild type (WT) and in IL-10KO mice. Male WT and IL-10KO mice 7 weeks of age were divided into 2 groups: 1) a TI transection and ileocolonic anastomosis group and 2) a control group handled in the same way but with no operation. Mice were euthanized at 6 and 15 weeks postoperatively. Luminal microbial changes within the colon and ileum were analyzed using 16S rRNA amplification. Systemic immune changes, reflected by secreted IFN- $\gamma$  and IL-17, were assessed by splenic lymphocytes stimulation with enteric bacterial antigens.

Eighteen WT and 18 IL-10KO mice underwent successful surgery. In nonoperated control mice there was 45% and 57% bacterial similarity between the colon and ileum in the WT

and IL-10KO mice, respectively. In contrast, following the ileocolonic anastomosis, this similarity increased to 80% in WT mice and 84% in IL10KO mice. In conjunction with the colon-like bacterial profile in the ileum, a significant increase in the systemic immune response occurred, as indicated by a rise in IFN- $\gamma$  and IL-17 secretion in IL-10KO mice and IFN- $\gamma$  in WT mice at 15 weeks after surgery.

The bacterial "colonization" of the neo-terminal ileum after ileocolonic anastomosis leads to stimulation of an immune response that may in fact be an essential step in the postoperative disease recurrence.

#### 5 (CAGS BASIC SCIENCE AWARD)

**TARGETING CXCR4 WITH A SMALL MOLECULE INHIBITOR IN A TRANSGENIC MOUSE MODEL INHIBITS PRIMARY TUMOUR GROWTH AND DISTANT METASTASIS IN BREAST CANCER.** *S. Hassan, M. Buchanan, O. Salvucci, W.J. Muller, M. Basik.* Lady Davis Institute for Medical Research, Segal Cancer Centre, McGill University, Montréal, Que.

To improve patient survival, a better understanding of the metastatic process is required. One model that helps explain metastasis is the chemokine-receptor model: Stromal-cell derived factor-1 is overexpressed by those organs to which breast cancer metastasizes and serves as a chemoattractant to home in those cancer cells which overexpress its receptor, CXCR4. We hypothesized that the downregulation of CXCR4, using a small molecule inhibitor called CTCE-9908, would inhibit primary tumour growth and distant metastasis in a transgenic, HER2-expressing breast cancer mouse model: polyoma middle T oncoprotein.

Using 15–16 mice per treatment group, we investigated the effect of CTCE-9908 at 25 mg/kg and 50 mg/kg in comparison to its scrambled peptide administered after the onset of the primary tumour, for a 4.5-week duration. We also tested CTCE-9908 in combination with DC101, an anti-VEGFR2 monoclonal antibody, using 6–9 animals per group.

In the CTCE-9908 dosing cohort, a 45% reduction in the number of macroscopic lung nodules ( $p < 0.05$ ) was identified, and a delay in growth of the primary tumour after 3 weeks of treatment ( $p_{trend} < 0.05$ ) was also observed. In the combination cohort, a comparable effect of inhibition in lung metastasis was observed at 62% for CTCE-9908 50 mg/kg and 60% for DC101. When CTCE-9908 was administered together with DC101, a 72% decrease in lung metastasis was observed ( $p = 0.02$ ).

Therefore, CTCE-9908 demonstrated efficacy in inhibition of the primary tumour growth and lung metastasis in vivo as a single agent, and also further enhanced the inhibition of metastasis in combination with an antiangiogenic agent.

#### 6

**VALIDATION OF THE OBESITY SURGERY MORTALITY RISK SCORE IN PATIENTS UNDERGOING OBESITY SURGERY IN CANADA.** *E. Efthimiou, N.V. Christou.* Section of Bariatric Surgery, Division of General Surgery, McGill University, Montréal, Que.

The Obesity Surgery Mortality Risk Score (OS-MRS) has been suggested for risk stratification of patients undergoing bariatric surgery.

We aimed to assess the validity of the OS-MRS in predicting mortality in patients undergoing bariatric surgery (BS) in a Canadian bariatric surgery centre.

We identified patients who underwent BS from our prospectively collected database (since 1983) and assigned the designated points from the scoring system (DeMaria EJ et al. *Ann Surg* 2007;246:578-82), in each case based on the comorbidity and relevant demographics. We included in our analysis cases of both open and laparoscopic BS as well as revision cases. Our results can be seen in Table 1.

**Table 1, abstract 6. Assessed risk and mortality of patients undergoing bariatric surgery, according to procedure**

Bariatric procedure	Cases, no. (%)	OS-MRS, mean (range)	Deaths, no. (%)
Open gastric bypass	1272 (51.1)	1.1 (0-5)	13 (1)
Lap gastric bypass	867 (34.8)	1.3 (0-5)	4 (0.5)
Lap BPD/DS	25 (1.0)	1.6 (1-3)	0 (0)
Lap sleeve gastrectomy	43 (1.7)	1.9 (0-3)	0 (0)
Lap adjustable banding	162 (6.5)	1.0 (0-4)	0 (0)
Revisional surgery	121 (4.8)	1.1 (0-4)	0 (0)
Total	2490	1.2 (0-5)	17 (0.68)

BPD/DS = biliopancreatic diversion/duodenal switch; Lap = laparoscopic; OS-MRS = Obesity Surgery Mortality Risk Score.

Predicted and actual mortality can be seen in Table 2.

**Table 2, abstract 6. Mortality of patients undergoing bariatric surgery, according to OS-MRS class**

OS-MRS class	Group; no. (and %)		
	Cases	Predicted mortality	Actual mortality
A	1623 (65.2)	5 (0.3)	5 (0.3)
B	796 (32)	15 (1.9)	10 (1.2)
C	71 (2.9)	5 (7.5)	2 (2.8)
Total	2490	25 (1.0)	17 (0.68)

OS-MRS = Obesity Surgery Mortality Risk Score.

There was no difference between the OS-MRS predicted deaths rate and actual mortality in our series in the individual groups and overall ( $\chi^2$  test).

The OS-MRS accurately predicts operating mortality for patients undergoing a whole range of bariatric procedures in a Canadian centre. These observations need further validation from other centres.

## 7

**EPIDEMIOLOGY OF TRAUMA-RELATED DEATH IN ONTARIO.** *D. Gomez, W. Xiong, A.B. Nathens.* St. Michael's Hospital, Toronto, Ont.

Trauma-related mortality is 4-fold higher in rural regions. The explanation for this might be multifactorial, ranging from increased risk of injury to differential access to trauma care. We set out to evaluate the epidemiology of trauma-related

death in Ontario to better understand the causal factors related to this higher mortality.

Deaths were identified through a population-based registry of all trauma-related deaths in the province (2002 and 2003). Deaths due to asphyxiation, burns, drowning, electrocution, intoxication and same-level falls were excluded. Municipality of death was categorized by the proportion of the population living in a rural environment to provide insights into associations of death and rurality. The rural population of each municipality was derived from 2001 census data.

There were 3486 trauma deaths over this time interval: a death rate of 14.6 per 100 000 population. The distribution of site of death differed by rurality (see Table 1). Patients were half as likely to die in the field in more urban environments. The relative risk of death in the emergency department (ED) among those surviving to reach hospital was 1.5-fold greater in the most rural municipalities compared with the most urban.

**Table 1, abstract 7. Site of death according to rurality**

Site	Proportion of the population living in a rural environment		
	50%-100%	1%-49%	< 1%
Municipalities, no.	35	97	38
Site of death, %			
Field	77.63	59.14	39.32
Operating room	1.34	2.13	6.31
Emergency department	12.75	20.58	23.89
Hospital	8.28	18.15	30.49

These data provide insights into where efforts should be directed. Delays in discovery time are likely causal in the high proportion of scene deaths. However, there might be opportunities for interventions in rural EDs to reduce the likelihood of early deaths.

## 8

**ARE THERE ADVANTAGES TO ROBOT-ASSISTED SURGERY OVER LAPAROSCOPY FROM THE SURGEON'S PERSPECTIVE?** *J.A.M. Van Koughnett, S. Jayaraman, R. Eagleson, D. Quan, C.M. Schlachta.* Canadian Surgical Technologies and Advanced Robotics (CSTAR), Lawson Health Research Institute, University of Western Ontario, London, Ont.

Where a procedure can be performed laparoscopically, the advantages of a robotic approach are often difficult to quantify. Using a newly developed scale, this study aims to measure surgeon preferences for ease of use by comparing a complex operation performed robotically and laparoscopically.

As part of a larger study comparing outcomes of laparoscopic and robotic biliary-enteric anastomosis, a surgeon performing 20 choledochojejunal anastomoses in an ex vivo pig model completed a subjective assessment scale after each procedure. The surgeon had no previous experience performing choledochojejunal anastomoses laparoscopically or using robot assistance. Ten anastomoses were performed laparoscopically and 10 using da Vinci robot assistance. The scale, developed by a panel with expertise in laparoscopic and robotic surgery as well as human factors analysis, included 13 task-related

factors assessing operative challenges and ease of use. Overall difficulty was also assessed on a 10-cm visual analog scale.

Robotic surgery was associated with superior ease to laparoscopy in 8 of the 13 factors, including image quality ( $p < 0.001$ ), depth perception ( $p < 0.001$ ), comfort ( $p < 0.001$ ), eye fatigue ( $p < 0.001$ ), dexterity ( $p < 0.001$ ), precision of motion ( $p = 0.02$ ), speed of motion ( $p < 0.001$ ) and range of motion ( $p = 0.04$ ). The visual analog scale also showed a significant benefit in overall ease of the robotic over laparoscopic procedure (2.5 cm v. 7.5 cm,  $p < 0.001$ ). Non-significant trends favouring robotics were seen with fluidity of motion ( $p = 0.07$ ) and equipment set-up ( $p = 0.33$ ).

This study suggests that surgeon ease of use may be quantified by using this assessment scale and that robot assistance may be advantageous over laparoscopy when performing complex surgical tasks in an ex vivo model from the surgeon's perspective. Further evaluation is planned.

9

**LAPAROSCOPIC MANAGEMENT OF ACUTE SMALL BOWEL OBSTRUCTION. A REVIEW OF 177 CASES.** *S. Drolet, G. Larochelle, R.C. Grégoire, J.P. Gagné.* Centre for Minimally Invasive Surgery, Centre hospitalier universitaire de Québec, Québec, Que.

The objective of this study was to review the outcomes of patients treated laparoscopically for small bowel obstruction (SBO) in an academic health sciences centre.

All patients who underwent an attempt at laparoscopic management of SBO between April 1998 and April 2007 were included. Data recorded included demographics, SBO etiology, operative findings, surgical management, complications and postoperative course.

One-hundred and seventy-seven charts were reviewed. The mean age of patients (63% female) was 57.3 (19.7–93.31) years. The etiology of SBO, sometimes multiple, was as follows: adhesions (82%), small bowel volvulus (14.5%), Crohn disease (4.4%), small bowel neoplasia (2.2%) and others (5.6%). In 3 patients, abdominal wall hernia was the cause of obstruction. One-hundred and sixteen patients were treated laparoscopically (LS), 50 received mini-laparotomy (ML) and 11 were converted to laparotomy (LP). Complications occurred in 27.1% of patients: enterotomy (11.3%), wound infection (4.5%), pneumonia (1.7%) and others (9.6%). Twenty-six patients (14.7%) had a prolonged postoperative ileus. All enterotomies were identified and repaired during the initial procedure (6 LS, 12 ML, 2 LP). Median hospital stay was 8 days (LS 8, ML 7, LP 10 d). There were no deaths.

Laparoscopic management of acute SBO is safe, feasible and avoids a laparotomy in a majority of patients. Enterotomy is a frequent complication with this technique and must be recognized during surgery. In some patients, this complication can be managed with laparoscopic repair; otherwise a conversion with mini-laparotomy can be used without increased morbidity.

10

**FIVE-YEAR OUTCOMES OF LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING (LAGB) AND LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS (LRYGBP) IN A COMPREHENSIVE BARIATRIC SURGERY PROGRAM IN CANADA.** *E. Efthimiou,*

*N.V. Christou.* Section of Bariatric Surgery, Division of General Surgery, McGill University, Montréal, Que.

Bariatric surgery remains the most effective modality to induce effective and sustainable weight loss in the morbidly obese.

This is a retrospective outcomes study of 958 laparoscopic bariatric procedures performed over 5 years since the introduction of minimally invasive bariatric surgery in our comprehensive weight loss surgery program.

Data were extracted from our prospectively collected electronic bariatric surgery registry from February 8, 2002 (the day of our first completed laparoscopic RYGBP), to December 2007. Patient demographics, weight loss, short- (within 30 days) and long-term complications and mortality by procedure type were evaluated (Table 1).

**Table 1, abstract 10. Characteristics and outcomes of patients receiving LAGB and LRYGBP**

Characteristics	LAGB	LRYGBP	All cases
No. of cases (%)	124 (12.9)	834 (87.1)	958
Mean BMI (range)	45.5 (32.8–63.9)	51.3 (36.7–107.2)	50.5 (32.8–107.2)
Mean age (range), y	43 (21–66)	39 (17–65)	40(17–66)
Mortality, no. (%)	0 (0)	3 (0.4)	3 (0.3)
STC, %	12	9.7	11.7
LTC, %	22.6	9	10.7
Excess weight loss, %			
at 1 y	41	73	68
at 2 y	44	84	78
at 3 y	37	76	71
at 4 y	49	84	75
at 5 y	47	83	70

BMI = body mass index; LAGB = laparoscopic adjustable gastric banding; LRYGBP = laparoscopic Roux-en-Y gastric bypass; LTC = long-term complications; STC = long-term complications.

Ten cases (8.1%) of LAGB needed conversion to LRYGBP for poor weight loss, and 5 cases (4%) necessitated removal for band erosion/slippage. The anastomotic leak rate for LRYGBP was 2.7%. Pouch outlet stenosis (3.6%) and anemia (10%) were the most frequent long-term complications.

Laparoscopic weight loss surgery can be performed safely with acceptable mortality. Our study tends to suggest superior weight loss for LRYGBP, making this a more durable procedure in inducing weight loss, particularly in a public-funded health system.

11

**IS RIGHT LAPAROSCOPIC DONOR NEPHRECTOMY RIGHT?** *M. Sawatzky, A. Altaf, J. Ellsmere, D. Klassen, M.J. Walsh, M. Molinari, B. Nashan, H.J. Bonjer.* Department of Surgery, Queen Elizabeth II Health Sciences Centre, Dalhousie University, Halifax, NS.

A retrospective review was performed to compare our experience of right and left laparoscopic donor nephrectomies. A total of 26 right and 24 left consecutive donor nephrectomies

and their recipients were reviewed during the study period. Patient demographics and preoperative, perioperative and postoperative data were recorded and compared.

Patient demographics were similar between groups. Multiple vessels were encountered more frequently on the right side, 10 versus 3 ( $p = 0.04$ ), with multiple arteries accounting for 5 versus 3 ( $p = 0.52$ ) and multiple veins accounting for 7 versus 0 ( $p = 0.007$ ). The donated kidney had lesser preoperative function in the right group as determined by nuclear medicine imaging, 46.5% versus 49.4% ( $p < 0.001$ ).

Donor operating times were less in the right group, 198 versus 226 minutes ( $p = 0.016$ ). There was no difference in recipient implantation difficulty as demonstrated by similar total operating and warm ischemia times. Complication rates were similar between groups of both donors and recipients. Postoperative donor and recipient renal function was similar between groups.

Right laparoscopic donor nephrectomy requires less operating time and is associated with similar outcomes for donors and recipients as left laparoscopic donor nephrectomy. Right laparoscopic donor nephrectomy may be preferable in general and should be considered when multiple renal vessels are present on the left side and/or when preoperative function of the left kidney is greater than the right.

## 12

**ABDOMINAL IMAGING IN THE DIAGNOSIS OF ACUTE APPENDICITIS. THE EXPERIENCE OF AN ACADEMIC HEALTH SCIENCES CENTRE IN CANADA.** *J.F. Ouellet, V. Brisson, P. Langis, M.C. Dufresne, S. Cloutier, S. Morin, G. Bouchard, C. Mailloux, G. Dionne, E. Légaré, F. Côté, J.P. Gagné.* Centre hospitalier universitaire de Québec, Québec, Que.

The objective of this study was to prospectively assess the use of abdominal imaging (AI) — ultrasound (US) and computed tomography (CT) — for the diagnosis of acute appendicitis (AA) in an academic health sciences centre in Quebec.

Over a 3-month period, from September to December 2007, patients referred for AI for suspected AA were listed. Data included demographics, Alvarado Score (AS), specialties of ordering physicians, results of AI, surgical procedures, operative findings and pathology reports. Charts of all patients booked for an appendectomy during the study period were also reviewed.

Seventy-four patients (72% female) with a median age of 35 years underwent AI: 50 underwent US, 5 underwent CT and 18 had both. Median AS was 3. Emergency department physicians (EDPs) ordered 85% (58/68) of the US scans. CTs were ordered by EDPs (61%), radiologists (22%) and surgeons (17%). Five patients with a median AS of 7 were referred directly for a surgical consultation. The consultant ordered AI in 4 of these cases. In these 5 patients, AA was confirmed at surgery. Upon receiving AI results, EDPs discharged 40 patients (median AS of 3, mean length of stay 10 h), referring 20 patients for a surgical consultation and 6 to another specialty. AI was useless in 65% of discharged patients. Nineteen patients, with a median AS of 5, 18 with positive AI, were taken to surgery; 18 underwent a laparoscopic appendectomy and 1 a laparoscopic right hemicolectomy for unsuspected cecal mass. There was 1 negative appendectomy (1/19).

Although the diagnosis of AA was formerly made on clinical grounds, most patients now undergo AI ordered by EDPs. Precise criteria remain to be defined. Surgeons also seem reluctant to operate without AI. The issues of costs and radiation need to be addressed in parallel with the low rate of negative appendectomies. Surprisingly, the management of AA remains a complex issue.

## 13

**SHORT-TERM OUTCOMES FOLLOWING COLORECTAL RESECTION FOR DIVERTICULAR DISEASE IN CANADA.** *L. Dubois, P.J. Karanicolas, P.H.D. Colquhoun, G.H. Guyatt.* Department of Surgery, University of Western Ontario, London, Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ont.

We examined the perioperative outcomes following colorectal resection for diverticular disease in Canada and explored factors predictive of mortality.

We extracted data from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database on all adult patients undergoing colorectal resection for diverticular disease during 2005 in Canada (excluding Quebec). Logistic regression identified variables associated with a higher risk of mortality.

In total, 3407 patients underwent colorectal resection for diverticular disease with a mean age of 60.9 (standard deviation 14.5) years. We classified approximately half of cases as urgent or emergent (52.9%), with 11.5% completed laparoscopically. Among urgent or emergent procedures, surgeons performed segmental resection with primary anastomosis in 41.8% of cases and segmental resection with colostomy in 46.3%. The overall in-hospital mortality rate was 4.3%. Increasing age (odds ratio 1.1/y,  $p < 0.001$ ), urgent versus elective cases (OR 2.5,  $p = 0.003$ ) and end-colostomy versus primary anastomosis (OR 1.7,  $p = 0.001$ ) were independently associated with a higher risk of death.

Patients undergoing elective colorectal resection for diverticular disease have a low risk of perioperative death, but the risk increases substantially in the urgent or emergent setting. Primary anastomosis appears to be a safe option for selected patients undergoing urgent colorectal resection, although inferences are weak due to potential unmeasured confounding variables. One or more randomized controlled trials are needed to provide stronger evidence of the risks and benefits of primary anastomosis in the urgent setting.

## 14

**SSI PREVENTION IN COLORECTAL SURGERY: EVIDENCE V. PRACTICE.** *D.S. Fenech, J. Chung, C. Eskicioglu, A.B. Nathens, A.R. Gagliardi, M. McKenzie, R.S. McLeod.* University of Toronto, Toronto, Ont.

Despite level I evidence for appropriate antibiotic prophylaxis, normothermia, supplemental oxygen and appropriate hair removal in preventing surgical site infections, compliance with these measures may be poor. This retrospective chart review was undertaken at 7 teaching hospitals at 1 university to determine how well the evidence is employed in practice. The chart review was conducted as part of a larger initiative to shorten

the gap between the time evidence is published and its use in practice across the University of Toronto.

A retrospective chart review was conducted at 7 teaching hospitals at the University of Toronto. A minimum of 50 consecutive elective colorectal procedures were identified at each of the hospitals before April 30, 2007. Emergency and outpatient procedures were excluded.

Approximately 50 charts were reviewed at each hospital (48–83): 52.2% percent of patients were male and 60% had a diagnosis of colorectal neoplasm. The ASA class was greater than III for 90.8% of patients and 91.4% had no unusual findings at the time of surgery. Preoperative oral antibiotics were administered in 20.5% of procedures, primarily at 2 hospitals (Table 1). Preoperative parenteral antibiotics were omitted in 21% of patients but when given were given before the incision 97% of the time. Metronidazole, cefazolin and gentamycin were the most common antibiotics. Postoperative antibiotics were administered 25.2% of the time, primarily at 2 hospitals and, of these, 83% received postoperative antibiotics for more than 24 hours. Hair removal was not documented at 5 hospitals (70%). Temperature was not documented in the perioperative record 18.9% of the time, and only 30.2% of patients' minimum temperatures were greater than 36°C. The FiO<sub>2</sub> was not documented in 57.9% of cases and only 7.2% had a FiO<sub>2</sub> > 80%.

**Table 1, abstract 14. Infection prevention measures recorded at 7 teaching hospitals in the charts of patients undergoing elective surgery for colorectal cancer**

Intervention	Overall, %	Range, %
Antibiotics		
Preoperative, oral	20.5	0–86.7
Preoperative, IV	79	35.4–96
Postoperative, IV	25.2	7.2–51
Perioperative temperature not recorded	19.4	2–49.3
Proportion of patients with min. temperature > 36°C	30.2	15–38.5
Hair removal documented	37.1	0–94
Razor use documented	0.9	0–3.6
FiO <sub>2</sub> documented?	42.1	0–87.8
FiO <sub>2</sub> > 80%	7.2	0–32.7
IV = intravenous.		

Level-1 evidence for preventing surgical site infections in elective colorectal procedures is not uniformly employed in practice. In addition, important information regarding these practices is often not documented in the charts. Work is underway to improve both documentation and compliance with the evidence, and a second chart audit has been planned following implementation.

### 15

**IMPACT OF A SPECIALIZED MULTIDISCIPLINARY TRACHEOSTOMY TEAM ON TRACHEOSTOMY CARE OF CRITICALLY ILL PATIENTS.** *C. de Mestral, S. Iqbal, N. Fong, J. Leblanc, P. Fata, T. Razek, K. Khwaja.* Department of Surgery, McGill University Health Centre, Montréal, Que.

A tracheostomy team (“Trach Team”) was created in 2005

to follow critically ill patients who had undergone a tracheostomy, until their discharge from hospital. Composed of a trauma surgeon, respiratory therapist, speech pathologist and clinical nurse specialist, this team meets twice a week to round on these patients as they transition from the intensive care unit (ICU) to the medical and surgical wards. A retrospective study was performed to assess the impact of this multidisciplinary team. Outcomes analyzed were time to first tube change, time to decannulation, incidence of speech valve placement and the incidence of tracheostomy-related complications on the ward. The outcomes of 89 patients who required tracheostomies in a 12-month period after the team was created were compared with 48 patients from a similar time frame before the establishment of the Trach Team. Under the new service, there was a significant decrease in tube blockage (5.5% v. 25%,  $p = 0.016$ ) and calls for respiratory distress (16.7% v. 37.5%,  $p = 0.04$ ) on the wards. A significantly larger proportion of patients also received speech valves (67.4% v. 19.4%,  $p < 0.0001$ ) after creation of this team. Furthermore, there appears to be a decreased time to first tube change (9.3 v. 26.0 d) and decreased time to decannulation (28.4 v. 50.4 d), but this was statistically insignificant due to small sample size. While further data analysis is required to demonstrate significant differences in time to decannulation and readmission to the ICU, the closer follow-up and more standardized care provided by a specialized multidisciplinary Trach Team results in fewer tracheostomy-related complications and an increase in speech valve installations.

### 16

**PERIOPERATIVE SUPPLEMENTAL OXYGEN IN COLORECTAL PATIENTS: A META-ANALYSIS.** *M.S. Brar, S.S. Brar, E. Dixon.* Department of Surgery, University of Calgary, Calgary, Alta.

Perioperative supplemental oxygen has been proposed to decrease the incidence of surgical site infection in colorectal surgery. A number of randomized controlled trials have been reported with inconsistent results. Important clinical outcomes other than surgical site infections have been collected in these studies and have yet to be included in previous reviews. A meta-analysis of randomized controlled trials was performed to elucidate the effects of perioperative supplemental oxygen in colorectal surgery on surgical site infection incidence, mortality, rate of intensive care unit (ICU) admission and length of stay.

Two independent reviewers performed a literature search of MEDLINE, PubMed, EMBASE, the Cochrane Library and the Cochrane Clinical Trials Registry. In addition, bibliographic searches were performed, and experts were contacted for unpublished data. Randomized trials involving colorectal patients that included perioperative supplemental oxygen as a treatment arm and defined surgical site infection as an outcome measure were included. Non-English language publications were excluded.

Five studies met inclusion criteria, however, 1 trial reported only surgical site infection as an outcome. Using a fixed-effects model, perioperative supplemental oxygen significantly reduced surgical site infection (odds ratio [OR] = 0.66, 95% confidence interval [CI] 0.47–0.92,  $p = 0.01$ ) and mortality (OR = 0.17, 95% CI 0.04–0.67,  $p = 0.01$ ). There was no significant difference in the rate of ICU admission or length of stay. However,

with a random-effects model, there was no significant difference in surgical site infection, but the mortality benefit with perioperative supplemental oxygen was maintained. Tests of heterogeneity were performed, and significant heterogeneity was only present among the studies with respect to length of stay.

This meta-analysis of randomized control trials confirms that perioperative supplemental oxygen in colorectal surgery reduces the incidence of surgical site infection. Moreover, supplemental oxygen appears to confer a mortality benefit. Further randomized controlled trials are required to confirm and strengthen these conclusions.

#### 17 (CAGS CLINICAL RESEARCH AWARD)

**TIMELY ACCESS AND QUALITY OF CARE IN COLORECTAL CANCER: ARE THEY RELATED?** *Y. McConnell, K. Inglis, G. Porter.* Division of General Surgery, Dalhousie University, Halifax, NS.

Colorectal cancer (CRC) patients want both timely access and high-quality care, but no published data examine the relationship between these 2 aspects of their care. This study aimed to explore the relationship between CRC-specific quality indicators (QI) and access time intervals (ATI) in CRC patients.

Between February 15, 2002, and February 15, 2004, all patients undergoing nonemergent surgery for primary CRC within a single health district were enrolled in a prospective consecutive cohort study. A standardized method was used to collect clinicodemographic and diagnostic/treatment event data. Associations between accepted CRC QI and benchmarked ATI for diagnosis, surgery and adjuvant therapy were examined using multivariate logistic regression, controlling for other clinicodemographic factors.

**Table 1, abstract 17. Achievement of quality indicators (QI) and benchmarked access time intervals (ATI) among colorectal cancer patients (n = 392)**

Measure	%
Quality indicators	
Diagnosis by screening	9.9
Preoperative liver imaging	53.1
Preoperative colonic endoscopy/imaging	74.7
Pathology report: margin status	98.5
Pathology report: number of lymph nodes	96.7
≥ 12 lymph nodes examined	45.4
In-hospital/30-day mortality	3.8
Access time intervals	
Presentation to definitive diagnosis (4-week benchmark)	36.0
Definitive diagnosis to surgery (4-week benchmark)	51.3
Surgery to start chemotherapy (8-week benchmark)	47.4

Table 1 summarizes the QI and ATI for the study cohort, which consisted of 392 patients. On multivariate logistic regression, asymptomatic patients presenting via screening were more likely to move from presentation to diagnosis within the 4-week benchmark for this ATI, compared with symptomatic patients (RR 8.1,  $p < 0.001$ ). The absence of preoperative liver imaging (RR 2.9,  $p < 0.001$ ) and the presence of complete preoperative colonic evaluation (RR 2.2,

$p = 0.006$ ) were associated with achievement of the 4-week benchmark for the ATI from diagnosis to surgery. Conversely, the absence of complete preoperative colonic evaluation was associated with achievement of the 8-week benchmark for the ATI from surgery to adjuvant therapy (RR 9.1,  $p = 0.001$ ). Detailed results of the multivariate analysis are presented.

Although several associations between QI and benchmarked ATI for CRC patients were identified, the relationship between quality and access appears complex and far from universal. This suggests that timely access cannot be used as a surrogate measure for quality of CRC care.

#### 18

**GETTING STARTED WITH ROBOTICS IN GENERAL SURGERY: IS ROBOTIC CHOLECYSTECTOMY THE WAY TO SHARPEN YOUR TEETH?** *S. Jayaraman, W. Davies, C.M. Schlachta.* Canadian Surgical Technologies & Advanced Robotics (CSTAR), Division of General Surgery, Schulich School of Medicine and Dentistry, University of Western Ontario, London, Ont.

The value of robotics in general surgery may be for advanced minimally invasive procedures. Unlike other specialties, formal fellowship training opportunities for robotic general surgery are few. As a result, most surgeons develop robotic skills in practice. Our goal was to determine if robotic-assisted cholecystectomy is a safe and effective bridge to advanced robotics in general surgery.

Before performing advanced robotic procedures, 2 surgeons completed the Intuitive Surgical robotic training course and agreed to work together on all cases. Clinical surgery began with da Vinci cholecystectomy with a plan to begin advanced procedures after at least 10 cholecystectomies. We performed a retrospective review of our pilot series of robotic-assisted cholecystectomies and compared them with contemporaneous laparoscopic controls. The primary outcome was safety. The secondary outcome was learning curve.

There were 16 cases in the robotics arm and 20 cases in the laparoscopic arm. Two complications occurred in the robotic arm, while only 1 laparoscopic patient experienced a complication. None were significant. The mean time required to perform robotic-assisted cholecystectomy was significantly longer than laparoscopic (91 v. 41 min,  $p < 0.001$ ). The mean time to clear the operating room was significantly longer for robotic cases (14 v. 11 min,  $p = 0.01$ ). A trend showing longer mean anesthetic time for robotic cases was observed (23 v. 15 min). Regarding learning curve, the mean operative time needed for the first 3 robotic cases was longer than the last 3 cases (101 v. 80 min); however, this was not statistically significant. Since this experience, the team has confidently gone on to robotic biliary, pancreatic, gastrophageal and colorectal operations.

Robotic cholecystectomy can be performed reliably; however, due to the significant increase in operating room resources, it cannot be justified for routine use. Our experience, however, demonstrates that robotic cholecystectomy is safe and can be used to gain confidence in advanced robotics.

#### 19

**DOES ROBOTIC ASSISTANCE IMPROVE EFFICIENCY IN PERFORMING COMPLEX MINIMALLY INVASIVE SURGICAL PROCEDURES?**



*S. Jayaraman, I. Al-Ghamdi, F.Z. El-Deen, D. Quan, C.M. Schlachta.* Canadian Surgical Technologies & Advanced Robotics (CSTAR), Division of General Surgery, Schulich School of Medicine and Dentistry, University of Western Ontario, London, Ont.

We developed a model of biliary-enteric anastomosis to test whether assistance with the da Vinci surgical system, as compared with laparoscopy alone, improves performance on a complex minimally invasive surgical (MIS) procedure.

An ex vivo model for choledochojejunostomy was created using specimens of porcine liver with an intact extrahepatic biliary system and a contiguous loop of proximal intestine. Choledochojejunostomies were performed in 2 experimental arms: Group 1 (laparoscopic) 25 cases; Group 2 (da Vinci-assisted) 24 cases. All procedures were performed by 3 surgeons with graduated expertise in MIS: Surgeon A (MIS and robotic focus); Surgeon B (experienced MIS); Surgeon C (basic MIS). Each surgeon performed equal numbers of procedures in each group. The primary objective was comparison of time to complete anastomosis using da Vinci and laparoscopic approaches. Secondary objectives included anastomosis quality and integrity and impact of experience on performance.

Da Vinci assistance led to significantly faster times than laparoscopy for: anastomosis completion (28.6 v. 38 min,  $p < 0.002$ ), knot tying (1.8 v. 3.4 s,  $p < 0.001$ ) and a lower leak rate with methylene blue challenge ( $p < 0.004$ ). One stenosis occurred (Surgeon C, laparoscopy). Surgeon A completed the da Vinci-assisted anastomosis more rapidly than surgeon B (22.3 v. 33.6 min,  $p < 0.001$ ) and Surgeon C (33 min,  $p < 0.000001$ ). Surgeon A was significantly faster at completing the laparoscopic anastomosis than either Surgeon B (23.7 v. 39.4 min,  $p < 0.006$ ) or Surgeon C (43.8 min  $p < 0.002$ ). Unlike Surgeon A, Surgeons B and C both significantly benefited from da Vinci assistance over laparoscopy. There was no significant difference between surgeons or techniques regarding the number of suture bites required to complete the anastomosis.

Da Vinci assistance improves time to completion and quality of choledochojejunostomy over laparoscopy alone in an ex vivo model. This advantage is more pronounced in the hands of surgeons with less experience in complex laparoscopy.

## 20

**GENERAL SURGERY WAIT TIMES IN A UNIVERSAL HEALTH CARE SYSTEM.** *Y. Dang, W.M. Hopman, D. Mercer, J.S. Lott, J. Kawakami.* Queen's University, Kingston General Hospital, Kingston, Ont.

The purpose of this study was to assess a real-time surgical software program to examine general surgery wait times, as decreasing wait times for cancer surgery is a governmental priority initiative.

The wait list management system, Axxess.Rx™ (AdapCS.Canada) has been used exclusively by the department of general surgery to book nonemergency surgery for 5 years. We reviewed the surgery wait times for patients in a general surgery practice. Variables thought to be potentially important in predicting wait time were also collected, including cancer diagnosis, surgeon's assessment of urgency, age, sex, inpatient/outpatient status and year of surgery.

There were 2834 operations for cancer and 6750 for benign conditions performed. The mean waiting time for cancer surgery reached a nadir in 2003 at 23.0 days; it subsequently increased every year and is now 32 days for 2007. In comparison, benign surgery was at a nadir waiting time of 82.4 days in 2002 and is currently 127.6 days at our institution. Multivariate analysis revealed that the cancer diagnosis, age, year of surgery, urgency score and inpatient status were predictive of waiting time.

Waiting time for cancer surgery has increased slightly, but it appears the delay is increasing significantly for patients with benign disease. Our surgery wait time tool has been vital in assessing resource allocation on wait times.

## 21

Withdrawn

## 22

**THE DEVELOPMENT OF A VIRTUAL REFERENCE MANUAL FOR PERIOPERATIVE NURSES WORKING IN A MINIMALLY INVASIVE SURGICAL SUITE.** *S. Yeung, J. Harnish, D.R. Urbach.* Department of Minimally Invasive and General Surgery, University Health Network, University of Toronto, Toronto, Ont.

Continuing education is necessary for perioperative nurses to maintain their skills within the dynamic environment of minimally invasive surgery (MIS). It is becoming more common for hospitals to provide training and orientation for nurses online. In December 2005, the Toronto Western Hospital asked the MIS nurse specialist to create a reference manual for laparoscopic procedures that could be made available 24/7 via the hospital's Intranet site.

A virtual reference manual was created using web-based publishing software. The manual contains information on 4 laparoscopic procedures: cholecystectomy, appendectomy, adrenalectomy and ventral herniorrhaphy.

For each of the above surgical procedures there are 8 sections encompassing anatomy/physiology, anesthesia, patient positioning and preparation, draping, procedure description, medication, surgeon preferences and postoperative care. Prior to publication, all sections were reviewed by experts in the field. The manual also contains synoptic videos of the procedure for nurses to review, along with images of equipment, room set-up and draping procedures. Special attention is paid to the set-up of instruments and the step-by-step use of laparoscopic equipment.

The creation of a virtual reference manual was a collaborative effort of operating room (OR) personnel, surgeons and administration. Having an online resource should reduce the uncertainty and "fear" nurses experience when working in an MIS suite with unfamiliar equipment. This will be particularly helpful for the novice OR nurse, or the nurse from another service who is asked to fill in. The virtual reference manual will be available online in fall 2006. Once the manual is formally launched, further research is planned to assess the impact online resources have on nursing.

## 23

**COLO-URACHAL FISTULA AS A COMPLICATION OF DIVERICULAR DISEASE — CASE REPORT.** *F. Tuma, S. Najfi, S.E. Tilley.*

**James Paton Memorial Hospital, Gander, Memorial University of Newfoundland, St. John's, NL.**

A case report of a 73-year-old, otherwise healthy, male patient who initially presented with moderate abdominal pain and constipation. Abdominal series and computed tomography (CT) confirmed the diagnosis of diverticulitis with phlegmon of small bowel, resulting in partial small bowel obstruction. There was no diverticular abscess. Conservative treatment was initiated, and both the small bowel obstruction and the diverticulitis resolved after few days. He was then discharged home asymptomatic.

An elective outpatient barium enema was done a few weeks after discharge and confirmed left-sided diverticular disease. Colonoscopy confirmed the same, with presence of small inflammatory sigmoid polyp.

Nine weeks after the diverticulitis episode, the patient presented with feculent umbilical discharge. He was well otherwise with no gastrointestinal or sepsis signs or symptoms. Sinogram was done from the umbilicus end and showed contrast flowing to the sigmoid colon with no intraperitoneal spillage. CT scan confirmed the diagnosis of colo-urachal fistula. Conservative treatment was started and continued for a few weeks, as the discharge from the fistula was decreasing gradually until it stopped completely.

Two months later, the patient had a recurrence of the same fistula. Again, conservative treatment was tried for a few weeks but with no signs of improvement. Operative treatment with explorative laparotomy was then undertaken and showed 1) patent urachus from the umbilicus end but blind from the bladder end; 2) large inflammatory mass of sigmoid colon, small bowel loops and the patent urachus; and 3) fistulous communication between the urachus and the sigmoid colon. Resection of the mass including the patent urachus was done with primary anastomosis of both the small bowel and the sigmoid colon. The patient had an uneventful postoperative recovery and was discharged home on postoperative day 8. The pathology report showed urachal, sigmoid and small bowel tissue with inflammatory tissue but no malignancy.

## 24

**CONSERVATIVE MANAGEMENT VERSUS LAPAROTOMY FOR FREE AIR FOLLOWING BLUNT ABDOMINAL TRAUMA: A CASE REPORT.** *M. Bawazeer, M. Aljiffrey, R. Saadia.* Department of Surgery, Trauma Service, Health Sciences Centre, University of Manitoba, Winnipeg, Man.

Hollow viscus injuries following blunt abdominal traumas are uncommon. Because of that, there is no widely accepted pre-operative method for diagnosis. Computed tomography (CT) is the most commonly used modality, but it has high false positive and false negative rates. The presence of free air on CT scan is highly suggestive but not diagnostic for hollow viscus injuries, and its reported sensitivity is only 50%–75%. We report a patient with pneumoperitoneum found on CT scan after blunt abdominal trauma who underwent a negative laparotomy. To the best of our knowledge, this is the second report suggesting that laparotomy is not always indicated for isolated free air found on abdominal CT scans.

## 25

**HAND-ASSISTED SPLENECTOMY IS THE SUPERIOR APPROACH FOR SPLEENS OVER 20 CM IN LENGTH.** *T.W. Swanson, S. Sampath, A.T. Meneghetti, J. Connors, O.N.M. Panton.* Department of Surgery, Vancouver General Hospital, University of British Columbia, Vancouver, BC.

The objective was to evaluate the complication rates, hospital stays and operative times in hand-assisted laparoscopic splenectomies (HALS) compared with standard open splenectomies (OS) and laparoscopic splenectomies (LS) in a variety of spleens sizes.

A retrospective chart review of 217 splenectomies, between 1988 and 2007, at 5 Vancouver hospitals was conducted.

Over the time period, 156 splenectomies were performed laparoscopically: 22 spleens > 20 cm were removed laparoscopically (20 HALS) and 18 spleens between 17 and 20 cm (7 HALS). Conversion rates using the HALS technique in spleens > 20 cm was no different than in LS < 17 cm (6% v. 5%,  $p = 0.917$ ). Estimated blood loss (375 v. 935 cc,  $p = 0.08$ ) and hospital stay (4.2 v. 8.9 d,  $p = 0.001$ ) in spleens > 20 cm was less in HALS than in OS. Operative time for HALS > 20 cm was longer than for OS (162 v. 114 min,  $p = 0.003$ ) and slightly greater than a 27-minute difference seen between LS and OS in < 17 cm spleens. Complication rates with spleens > 20 cm were equal between techniques (6/20 HALS v. 6/18 OS). In spleens 17–20 cm, HALS had more minor complications, compared with LS (4/7 v. 2/10 patients,  $p = 0.035$ ), but had no significant difference in terms of major complications, length of operation, hospital stay or blood loss.

This study represents the highest volume of HALS in spleens > 17 cm described to date. HALS has equal complication rates and shorter hospital stay than OS in spleens > 20 cm. HALS can be performed with low open conversion rates and should be offered to suitable patients with spleens > 20 cm when available surgical expertise allows.

## 26

**THE WEIGHT (WAIT) MUST END: WAIT TIMES FOR BARIATRIC SURGERY IN CANADA ARE UNACCEPTABLE.** *N.V. Christou, S. Al-Sabah, E. Efthimiou.* Section of Bariatric Surgery, Division of General Surgery, McGill University, Montréal, Que.

Severe obesity is reaching epidemic proportions throughout the world, including Canada. The only permanent treatment of severe or morbid obesity (MO) is bariatric surgery (BS). Access to BS is very limited in Canada.

This study sought to collect accurate data on wait times for BS in Canada.

We carried out a survey of members of the Canadian Association of Bariatric Physicians and Surgeons and performed a more detailed analysis at one Canadian bariatric surgery centre (#7 below), where a prospectively collected BS registry has been maintained since 1983. The survey response rate was 82%. The data are summarized in Table 1.

The wait time from office contact to surgery varied from 3 to 9 years at the 9 centres. At centre #7 there were 670 patients who had contacted the office for consultation, 607 patients waiting to see the surgeon and 217 patients on the actual operating list. This centre performed 138 BS cases in

2007. The wait time from office contact to surgery calculates as 1639/138, ~11 years, assuming all patients wait their turn at this centre. By comparison, the Fraser Institute and the Wait Times Alliance benchmarks for reasonable surgical wait times vary from 8 weeks for cancer surgery to 1.5 years for cosmetic surgery. There were 7 documented deaths on the wait list of centre #7 over the past 10 years.

**Table 1, abstract 26. Wait lists for bariatric surgery at 9 bariatric surgery centres across Canada**

Centre	Wait list; no. patients			Total	No. surgeries in 2007
	Office contact	Office app't	Surgery-ready		
1	90	12	78	180	65
2	0	21	55	76	24
3	0	90	160	250	120
4	130	6	15	151	11
5	455	38	385	878	99
6	836	93	710	1639	329
7	670	607	217	1494	138
8	100	100	100	300	200
9	0	240	80	320	82
Total	2281	1207	1800	5288	1068

app't = appointment.

This study clearly demonstrates that wait times for BS are the longest of any surgically treated condition. Given the significant reduction in the relative risk of death with BS (40%–89%, depending on the study), the current wait times for BS in Canada are unacceptable.

27

**A RETROSPECTIVE REVIEW OF GENERAL SURGERY TRAINING OUTCOMES AT THE UNIVERSITY OF TORONTO.** *J. Tyrwhitt, L. Rotstein, Y. Shargall, C. Compeau.* St. Joseph's Health Centre, University Health Network, Toronto, Ont.

In Ontario, the adoption of the Professional Association of Interns and Residents of Ontario guidelines for resident work hour thresholds has effectively reduced the work week of general surgery residents. Furthermore, in 1997, the Royal College of Physicians and Surgeons of Canada changed the pre-existing fall certification examination to a spring exam, reducing the final several months of residency training to a period of exam preparation. We questioned what impact these reductions in clinical experience have had on general surgery graduates at the University of Toronto.

Final year In-Training Evaluation Reports (ITERs) of University of Toronto general surgery trainees from 1995 to 2006 were evaluated. Residents were subdivided into 4 groups according to year of graduation ('95–'97, '98–'00, '01–'03 and '04–'06). We evaluated postgraduate 'performance' by categorizing residents into 1 of 4 groups: residents who 1) entered directly into general surgery practice after graduation, 2) entered into a Royal College certification subspecialty program, 3) entered a noncertification Royal College program or 4) entered into a nonregulated "clinical fellowships."

One-hundred and eighteen surgical trainees were evaluated. The average scores for each of the 5 ITER parameters (technical

skills, professional attitudes, application of knowledge, teaching performance and overall performance) were not statistically different for each of the 4 graduating groups. At completion of residency there were statistically fewer general surgery graduates from 2004–2006 ( $p < 0.05$ ) who entered directly into general surgery practice compared with the other years. The graduates from 2004–2006 who did not enter into general surgery practice appeared to choose nonregulated "clinical fellowships."

These observations may indicate that recent surgical graduates possess an acceptable skill set but may lack the clinical confidence to enter directly into general surgery practice. Evidence seems to indicate that nonregulated "clinical fellowship" has become an unregulated surrogate extension of the training program whereby surgeons can gain additional clinical experience and surgical expertise.

28

**ENDOSCOPIC TREATMENT OF ZENKER'S DIVERTICULUM: RESULTS OF A 7-YEAR EXPERIENCE.** *A. Maghrabi, A. Alkadi, D. Thomson, S. Dhalla.* Department of Surgery, Brandon Regional Health Centre, Brandon, University of Manitoba, Winnipeg, Man.

We are reporting our experience for treating Zenker's diverticulum (ZD) using the endoscopic needle knife papillotome.

A total of 18 patients with a mean age of 80 (68–91) years were included in our prospective cohort study, where they underwent endoscopic Zenker's diverticulectomy using a needle knife papillotome at Brandon Regional Health Centre over a 7-year period. The mean follow-up was 27.5 months. A dysphagia scoring system from 0 (no dysphagia) to 4 (total dysphagia) was used. All patients' baseline characteristics, pre- and postoperative symptoms, operative time, time to oral intake, length of hospital stay, recurrence of symptoms and complications were analyzed.

Dysphagia score improved significantly after the treatment ( $p < 0.0001$ ), there was also significant improvement in the regurgitation symptoms in our patients ( $p < 0.0027$ ) and no difference in weight loss before or after the procedure ( $p < 0.058$ ). The mean operating room time was 28.4 minutes. Oral intake was resumed within 48 hours except for 1 patient. Hospital stay was 24–48 hours except for 2 patients. Only 1 patient had a microperforation treated conservatively, and 2 patients had re-do procedures due to persistent of symptoms.

Endoscopic Zenker's diverticulectomy using a needle knife papillotome is a safe and effective alternative approach to manage ZD for highly morbid patients. It is minimally invasive, provides decreased anesthetic time, decreased hospital stay and an acceptably low complication rate.

29

**ABDOMINAL COMPARTMENT SYNDROME DUE TO CONSTIPATION: CASE REPORT.** *F. Tuma, A. Felix, H. Mir.* St. Clare Mercy Hospital, Memorial University of Newfoundland, St. John's, NL.

A case report of a 69-year-old gentleman who presented with mild abdominal pain and constipation of 3 weeks duration. He was well otherwise. His history was positive for a complicated

right hip arthroplasty done 2 months earlier; this was followed by revision, which was again complicated by methicillin-resistant *Staphylococcus aureus* (MRSA) infection necessitating intravenous vancomycin and a prolonged period of narcotic pain medications with the side effect of significant constipation.

On initial assessment of his abdominal pain, he was found to have severe constipation with no signs and symptoms of acute abdomen; therefore, he was admitted for observation and further investigations. Tap water enema was tried to relieve his constipation; this was associated with unexplained sudden episode of unresponsiveness, vomiting and aspiration. He was promptly and successfully resuscitated, intubated and ventilated.

Urgent pulmonary and abdominal computed tomography (CT) scanning showed not pulmonary embolism, but a significantly dilated entire colon and rectum. Observation in the intensive care unit (ICU) revealed worsening abdominal distension with bladder pressure of 20 mm Hg, but no ventilatory or urinary consequences. Rectal disimpaction followed by rectal tube insertion failed to improve his abdominal distention and constipation over the following 8 hours. His bladder pressure increased to 41 mm Hg, associated with oliguria, tachycardia and hypotension. This constellation of findings confirmed the diagnosis of intra-abdominal compartment syndrome. An emergent exploratory laparotomy was then done.

Operatively, the entire colon, starting from the ileocecal valve to include the intraperitoneal rectum, was hugely distended and gangrenous but not perforated. The small bowel and the stomach were completely normal looking. Therefore, total colectomy with terminal ileostomy was done with easy and tension-free closure of the abdominal wall. The patient was returned back to the ICU for continuous monitoring. He then developed anuria requiring hemodialysis and hypotension requiring continuous vasopressors; he continued to be unresponsive for 4 days. An electroencephalograph and head CT scan were performed showing no cerebral cortical activity and a large cerebral infarct, respectively. After discussion with the patient's family, the treatment and care were discontinued, and he died shortly after, on postoperative day 4. Autopsy was offered but declined by the family.

### 30

**SURGICAL SITE INFECTION (SSI) PREVENTION: THE GAP BETWEEN EVIDENCE AND PRACTICE IN ACADEMIC MEDICAL CENTRES.** *C. Eskicioglu, J. Chung, D.S. Fenech, A.B. Nathens, A.R. Gagliardi, S.S. Forbes, M. McKenzie, R.S. McLeod.* University of Toronto, Toronto, Ont.

A significant gap exists between the best evidence and the actual practice of surgery. Awareness of evidence is the first step in knowledge translation. Our primary objective was to identify gaps in the knowledge and understanding of SSI prophylaxis strategies in general surgery residents and faculty at 7 teaching hospitals. A survey was distributed to 55 surgeons and 68 residents. Our questionnaire focused on identifying whether surgeons had knowledge of evidence supporting manoeuvres to prevent SSI. The question addressing this particular issue asked, "Do you believe that research evidence supports the following best practices in preventing SSI?" We received 76 survey responses for a response rate of 62% (65%

from residents and 59% from attending surgeons). Awareness of research evidence supporting antibiotic prophylaxis, peri-operative normothermia and strict glycemic control was reported by 89.5%, 68.4% and 65.8% of respondents, respectively. There was less awareness of the evidence supporting no hair removal, the omission of bowel preparation and hyperoxia as practices to prevent SSIs. Responses were similar for attending surgeons and residents. These data suggest that despite level I evidence supporting the value of these SSI prevention measures, between 11% and 53% of surgeons and residents are unaware that this evidence exists. Broad-reaching initiatives that increase awareness of best evidence may encourage attending surgeons to change their practice. As the residents appear to adopt the beliefs of their mentors, it is critical that they also be engaged through appropriate educational initiatives. The next step for translating this evidence into practice is the identification of multifaceted implementation strategies that will engage both residents and attending surgeons.

### 31

**ATTRITION IN MEDICAL AND SURGICAL OBESITY CLINICS: A RETROSPECTIVE REVIEW.** *G. Hadi, D.W. Birch, X. Shi, C. Stoklossa, K. Chalifoux.* Centre for the Advancement of Minimally Invasive Surgery, Edmonton, Alta.

Surgery for morbid obesity is the only proven treatment that achieves long-term (sustainable) weight loss and a statistically significant reduction in mortality. Our clinical experience, coupled with preliminary evidence from the literature, suggests that patient compliance (lifestyle change) may predict long-term success. Moreover, compliance can only be determined through long-term clinical follow-up.

Obesity is a chronic disease, and all patients should be managed in a multidisciplinary clinic regardless of the approach to treatment. In this study we examine the attrition rates of a medical and surgical clinic for obesity and investigate factors that predict failure to maintain long-term follow-up. Our hypothesis is that high rates of attrition are associated with certain demographic characteristics and certain comorbidities.

Retrospective review of a multidisciplinary clinic's records (Weight Wise, Capital Health) is being assessed. A total of 1208 morbidly obese patients, with records from October 2002 to April 2008, are being reviewed. Demography (age, sex, weight and height) and comorbidities (psychiatric, cardiac, pulmonary, renal, hypertension, diabetes) are being analyzed.

Attrition is defined as self-discharge, not interested, unable to commit time, loss of follow-up and discharge due to poor compliance. A multidisciplinary team makes decisions for discharging noncompliant patients. The team consists of surgeons, internists, dieticians, social workers, psychologists, psychiatrists, physiotherapists, registered nurses and coordinators.

The patients are divided in 2 groups. The first group includes patients who had surgery (laparoscopic gastric band insertion or gastric bypass) and the second group includes patients who are being treated medically.

The records of 318 patients who had surgery for obesity and the other 890 patients under medical intervention are being reviewed. Initial results revealed an attrition of 37 patients (9%) from the surgical group.

Further analysis of the demographic characteristics and

comorbidities of the groups are being done to determine factors that impact long-term follow-up.

Data from this study will be used to determine strategies for improving long-term follow-up for obesity.

32

**LAPAROSCOPIC ACCESSORY SPLENECTOMY: THE IMPORTANCE OF PERIOPERATIVE LOCALIZATION STUDIES.** *A. Altaf, M. Sawatzky, J. Ellsmere, H.J. Bonjer, D. Klassen.* Division of General Surgery, Dalhousie University, Halifax, NS.

We report our experience with laparoscopic accessory splenectomy (LAS) in patients with recurrent immune thrombocytopenic purpura (ITP) after previous splenectomy, and the use of perioperative localization methods to help with the intraoperative identification of accessory spleen in these patients.

Five consecutive patients who underwent LAS after initial splenectomy for ITP at a tertiary care centre were reviewed. Demographics, preoperative diagnostic and localization studies, technical success and the effect on thrombocytopenia were examined. The location of accessory spleen was also recorded.

Five patients with recurrent ITP underwent LAS during the study period. All had successful removal of the accessory spleen based on final pathological exam. One patient required a second exploration with perioperative localization after a failed attempt without. A novel method of localization of accessory spleen was used in 3 operations. This consisted of preoperative computed tomography-guided injection of methylene blue at the accessory spleen's site and/or preoperative intravenous injection of Technetium-99m-labelled damaged red blood cells. Intraoperatively, the dye is used for visual identification, and the gamma probe is used to aid in localization or to confirm the presence of the accessory spleen within the excised specimen. We found these methods helpful in the intraoperative identification of accessory spleen. The accessory spleens missed at initial splenectomy were found in unusual locations. Four of the 5 patients had sustained improvement in platelet counts after LAS. One patient had postoperative ileus that resolved on conservative management. No other complication or mortality was observed.

We conclude that LAS after previous splenectomy is feasible and safe. Perioperative localization methods aid in the intraoperative identification of accessory spleen. Accessory spleens missed at initial splenectomy are generally found in unusual locations. Treatment of recurrent or unresolved ITP with LAS can be effective in some patients.

33

**THE ROLE OF INTERVAL APPENDECTOMY IN THE MANAGEMENT OF APPENDICEAL ABSCESS OR PHLEGMON: IS IT INDICATED?** *T. Swidinsky, D. Hochman.* Department of General Surgery, University of Manitoba, Winnipeg, Man.

A retrospective chart review of 26 patients shows that an interval appendectomy after appendiceal abscess or phlegmon is not indicated after conservative management. Data were gathered from a retrospective chart review of patients admitted to St. Boniface General Hospital in Winnipeg from April 2004 until September 2007. Patients who had an admission diagnosis of appendiceal abscess or phlegmon were selected for the

study. Comparisons were made between patients managed conservatively and those who failed conservative management. Using a Student's *t* test, the groups were compared by demographics, white blood cell count (WBC) at admission, and type and duration of antibiotics. Pathology of the failed group was examined. Twenty-nine patients were identified as being admitted for appendiceal abscess/phlegmon. Three were excluded owing to other diagnosis, 2 underwent an immediate operation, and 2 had scheduled interval appendectomies. Twenty-two patients were managed conservatively for a mean follow-up time of 611.8 days. Seven (31.8%) failed conservative management. Average time to recurrence was 107.57 days. There was no statistical difference between the groups in terms of age ( $p = 0.146$ ), sex ( $p = 0.624$ ) and WBC on admission ( $p = 0.704$ ). There was a significant difference in duration of antibiotics: 10.71 days versus 16.73 days ( $p = 0.034$ ), with those who failed receiving a shorter duration. One patient had adenocarcinoma on pathological review. Routine interval appendectomy after conservative management of an appendiceal abscess/phlegmon is not indicated based on the low rate of recurrence. Recurrence of appendicitis may be dependent on the duration of antibiotics given during treatment. A colonoscopy may be considered in patients who are managed conservatively.

34

**TELESONOGRAPHY FOR TRAUMA: USERS' PERCEPTIONS 6 MONTHS AFTER INITIATION OF A PILOT TERRESTRIAL EVALUATION OF A SPACE-INITIATED TECHNOLOGY.** *L. Kmetz, D. Dyer, C. Turner, R. Hall, D. Lautner, S. Lan, C. Gautier, J. Cusden, A. Bigras, G. Bigras, J. Boyd, D.R. Hamilton, P.B. McBeth, A.W. Kirkpatrick.* Regional Trauma Services, Calgary, Banff Mineral Springs Hospital, Banff, Alta., Telesat, Ottawa, Ont., and Wyles Life Sciences, Houston, Tex.

We recently introduced a trial teleultrasound system (TUS) between a tertiary care trauma centre (FMC) and a rural referring hospital (BMSH), that featured bidirectional video and unidirectional ultrasound (US) communication to facilitate real-time telementoring or observation of US during acute trauma resuscitations. The clinical protocol used both the focused assessment with sonography for trauma (FAST) and the extended (EFAST) for pneumothoraces. We thus sought to explore users' perceptions of the system after the initial experience. All TUS users, both sending and receiving, were contacted by phone or email and asked 7 structured questions regarding their overall satisfaction and perceptions of the usefulness of the TUS. Out of 18 potential respondents, 13 completed the survey: 12 MDs (1 surgeon, 9 emergency MDs, 2 residents) and 1 nurse, for a 72% response rate. In terms of prior reported US experience, for the FAST 54% reported great, 38% limited and 8% no experience; for EFAST, 38% reported limited, 54% none and 8% great experience. In terms of overall satisfaction, 46% were strongly satisfied and 46% satisfied, with 1 abstention, generating the perception by 92% that this would benefit the Canadian North. Collegiality was strongly felt to be improved by 69% and improved by 23%. Forty-six percent strongly felt this technology improved their personal US skills and 23% agreed while 15% disagreed, all of whom reported great prior FAST experience. The majority

(62%) were neutral regarding whether TUS was a better teaching or clinical tool, while 31% strongly or simply disagreed, feeling it was more important clinically. Overall, the majority of providers were satisfied with and perceived there were both local and further potential benefits for remotely injured patients to benefit from a TUS. Further evaluation of this approach and technology is warranted in more remote settings with less experienced personnel.

### 35

**DO PERFORMANCE MEASURES ON THE LAPMENTOR VR SIMULATOR PREDICT FLS PERFORMANCE?** *E. Greco, J. Escallon, T. Grantcharov, A. Okrainec.* University Health Network, Department of Surgery, University of Toronto, Toronto, Ont.

The Fundamentals of Laparoscopic Surgery (FLS) simulator has been extensively studied, and its assessment of technical skill has been found to be reliable and valid. One of the disadvantages of this simulator is that it requires a trained proctor for scoring. The LapMentor (LM) is a high fidelity virtual reality simulator with haptic feedback. It allows a trainee to practice 9 basic laparoscopic tasks including laparoscopic suturing. The purpose of this study was to determine the predictive validity of performance on the LapMentor with FLS score.

Sixteen participants (9 novice, 3 intermediate and 4 experienced surgeons) were tested on 8 LapMentor basic laparoscopic tasks and the 5 FLS tasks. Total time (TT), number of instrument movements (NIM) and total path length (TPL) were measured for each task on the LapMentor, with lower values indicating a higher skill level. Pearson correlation was used to assess the association between TT, NIM and TPL on each LapMentor task and the overall FLS score (see Table 1).

**Table 1, abstract 35. Pearson correlation between 8 LapMentor (LM) tasks and total FLS score**

LapMentor task	Total time	No. of instrument movements	Total path length
Ball touching task	-0.575*	-0.592*	-0.715†
Duct clipping	-0.071	-0.143	-0.029
Duct retraction & clipping	-0.741†	-0.649†	-0.585†
Ball transfer	-0.553*	-0.796†	-0.564†
Circle cutting	-0.833†	-0.789†	-0.745†
Cautery of bands	-0.233	-0.789†	-0.745†
3D object manipulation	-0.643†	-0.711†	-0.751†
Intracorporeal suturing	-0.780†		

FLS = Fundamentals of Laparoscopic Surgery.  
\*Significant at the 0.05 level (2-tailed)  
†Significant at the 0.01 level (2-tailed)

There was an excellent correlation between performance on almost all LapMentor tasks and FLS score. LapMentor number of instrument movements and total path length were slightly more robust predictors of FLS score compared with total time.

### 36

**AN UNTAPPED RESOURCE: USING THE ICU ENVIRONMENT FOR THE TEACHING OF END-OF-LIFE SKILLS.** *S. Minor, D. Heyland, C. Schroder.* Department of Surgery, Dalhousie

University, Halifax, NS, Critical Care Medicine and Palliative Care Medicine, Queen's University, Kingston, Ont.

Proficiency and confidence in palliative end-of-life (P/EOL) care is essential to the practising surgeon. However, most surgical training programs lack any formal P/EOL care training, and adding yet another competency to an already full curriculum presents difficulties for most programs. The approach our centre took to confronting this challenge was to utilize the intensive care unit (ICU) rotation as the venue for delivering a P/EOL curriculum. Although at face value the ICU would seem to be an ideal environment to teach P/EOL care skills and to develop the specialized communication skills required in P/EOL care discussions, this assumption has not been fully validated. The purpose of this study was to evaluate the effectiveness and perceived value of a formal P/EOL care curriculum for junior residents during an ICU rotation by measuring self-assessed changes in P/EOL care attitudes and competencies.

Residents rotating through the ICU over a 6-month period completed pre- and postcurriculum surveys evaluating their self-assessed efficacy in providing P/EOL care and attitudes toward P/EOL care. Scores were analyzed using a paired Student's *t* test.

Seventeen of 19 (90%) residents completed both the pre- and postcurriculum evaluations. The P/EOL curriculum increased self-assessed efficacy ratings in the domains of pain management ( $p = 0.04$ ), psychosocial knowledge ( $p = 0.001$ ), communicator knowledge ( $p = 0.001$ ), professional knowledge ( $p = 0.002$ ) and manager knowledge ( $p < 0.001$ ). The rotation was rated as being valuable in preparing residents to care for patients near the end of life ( $p < 0.05$ ), with surgery residents indicating it to be the most valuable rotation in their palliative care training.

An ICU P/EOL curriculum improves self-rated efficacy scores across multiple domains in P/EOL care and is seen as a valuable educational experience.

### 37

**EVIDENCE-BASED GUIDELINES FOR THE PREVENTION OF UNPLANNED PERIOPERATIVE HYPOTHERMIA (PH) IN PATIENTS UNDERGOING ABDOMINAL SURGERY.** *S.S. Forbes, C. Eskicioglu, A.B. Nathens, A.R. Gagliardi, D.S. Fenech, R.S. McLeod.* For the Best Practice in General Surgery Working Group, Department of Surgery, University of Toronto, Toronto, Ont.

The objective of this study was to appraise the available evidence for patient monitoring, perioperative active warming methods, outcomes supporting the prevention of perioperative hypothermia and implementation strategies for the prevention of PH.

Outcomes assessed included the precision and accuracy of thermometers, efficacy of warming devices readily available in Canadian operating rooms, including intravenous (IV) fluid warmers and forced-air devices, and surgical site infections and morbid cardiac events associated with PH.

MEDLINE, EMBASE and the Cochrane Database were searched to identify randomized controlled trials of efficacy and prospective studies of diagnostic accuracy. The methods of the Canadian Task Force on Preventive Health Care were employed to grade study quality, level of evidence and formulate the final recommendations.

All patients undergoing abdominal surgery must have their temperature monitored with an esophageal probe while under general anesthesia; awake patients and patients in recovery must have temperatures monitored using oral probes (2 studies, level II-2 evidence, grade B recommendation). Active warming with IV fluid warmers and forced-air devices must be employed for all patients whose procedure is expected to last longer than 30 minutes (8 studies, level I evidence, grade B recommendation) with a target temperature of  $> 36^{\circ}\text{C}$ . The prevention of PH with systemic warming measures is necessary to prevent surgical site infections in patients undergoing clean surgery (14% v. 6%, risk ratio [RR] 2.39, 95% confidence interval [CI] 1.08–5.28,  $p = 0.03$  in a study of preoperative warming) and clean-contaminated surgery (19% v. 6%, RR 3.25, 95%CI 1.35–7.85,  $p = 0.005$  in a study of intraoperative warming), (2 studies, level I evidence, grade A recommendations) and morbid cardiac events in the high-risk population (6% v. 1%, RR 4.49, 95%CI 1.00–20.2,  $p = 0.02$ ), (1 study, level I evidence, grade A recommendation).

The data are current up to January 31, 2008.

### 38

**MINIMALLY INVASIVE SURGERY IN THE PROVINCE OF QUÉBEC. A GLOBAL PORTRAIT.** *M. Chhiv, Y. Lévesque, O. Mailloux, R.C. Grégoire, J.P. Gagné.* Québec Centre for Minimally Invasive Surgery, Centre hospitalier universitaire de Québec, Québec, Que.

The objective of this study was to assess the state of minimally invasive surgery (MIS) practice in the province of Quebec.

A questionnaire concerning the practice and learning of MIS was mailed to all 489 Quebec general surgeons in October 2006; a second mailing was done in May 2007. The survey addressed the surgeon's demographics, site and type of practice, performance of basic and advanced MIS procedures, abdominal access technique and the perception of the respondent toward skill acquisition.

Two-hundred and fifty (51.0%) surgeons responded. Twelve of them were retired and thus excluded from the analysis. Mean age of respondents (71% male) was 45.2 years. Ninety percent perform at least 1 basic MIS procedure and 82.4% perform endoappendectomies. Eighty-five percent perform at least 1 advanced procedure, whereas 58.0% perform 3 or more. Laparoscopic resections for benign and malignant colorectal conditions are performed by 66.0% and 43.7% of respondents, respectively. Seventy percent use an open technique for creation of pneumoperitoneum. Factors positively influencing the use of advanced MIS procedures are: a younger age ( $p < 0.0001$ ), fewer years of experience ( $p < 0.05$ ) and the performance of basic MIS procedures ( $p < 0.0001$ ). Using the Likert scale, we found that surgeons acquired their MIS skills by residency training (median of 4), by themselves (median of 4) and from colleagues (median of 4). The main factor limiting the practice of MIS is the lack of operative time (median of 4). Respondents feel that academic surgical departments (median of 4), the Quebec Surgical Association (median of 4) and the Canadian Association of General Surgeons (median of 4) are responsible for providing continuing medical education in MIS.

Many factors influence the practice of MIS by surgeons in the province of Quebec.

### 39

**SURGERY IN THE HOMELESS POPULATION: PATIENT CHARACTERISTICS AND IMPACT ON LENGTH OF STAY.** *M. Goodwin, C.J. Brown.* Department of Surgery, St. Paul's Hospital, Division of General Surgery, Department of Surgery, University of British Columbia, Vancouver, BC.

In this study we analyze the demographic characteristics and length of stay among homeless persons undergoing surgery at an urban hospital in Vancouver and compare these with other lower-income and higher-income domiciled persons.

From 2002 to 2006, all patients admitted to a surgeon at St. Paul's Hospital (SPH) were identified in the SPH electronic medical record. Three groups were identified: homeless adults, adults living in the Downtown Eastside and patients living in Vancouver city centre. In this early analysis, basic descriptive statistics were used to analyze demographic characteristics, principal diagnoses, comorbidities and length of stay.

Of the admissions for homeless surgical patients ( $n = 134$ ), 63% were for the treatment of trauma as compared with 24% of the housed population ( $p < 0.001$ ). Of the homeless population, 56% were identified as substance abusers, as opposed to 11% in the domiciled population ( $p < 0.001$ ). Homeless surgical patients were more than twice as likely to be HIV positive (13% v. 6%;  $p < 0.0001$ ) than the domiciled. Homeless patients stayed 3.4 days, or 36% longer per admission on average than housed patients ( $p = 0.01$ ).

In summary, patients admitted for surgery who are homeless tend to be victims of trauma or deep tissue infection. Furthermore, they remain in hospital longer than housed patients. Policy and program planners should consider the potential of supported housing to offset the cost of excess hospitalization in the homeless population recovering from illness. Further analysis of these data using a multivariate model for hospital length of stay is planned.

### 40

**RELIABILITY AND VALIDITY OF THE GENERAL SURGERY RESIDENT EVALUATION REPORT FORM: AN ASSESSMENT OF THE 7 CANMEDS ROLES.** *H. Redwan, T. Donnon, L. Mudrick-Donnon.* Departments of Surgery and Community Health Sciences, Postgraduate Medical Education, University of Calgary, Calgary Alta.

Each of the residency specialty programs at the University of Calgary have developed various Rotation-Resident Evaluation Report (R-RER) forms designed to assess the 7 CanMEDs core competencies identified by the Royal College of Physicians and Surgeons of Canada. The aim of this study was to report the reliability and validity of the General Surgery (15-item), online R-RER forms.

The General Surgery R-RER forms completed during the 2006–2008 academic years (July 1, 2006, to March 30, 2008) were reviewed for all PGY 1–5 residents. Three of the 15 items were found to be inconsistently completed and were removed from subsequent analyses. Internal consistency and exploratory factor analyses were used to investigate the reliability and construct validity of the forms in connection to the measurement of residents' 7 CanMEDs competencies.

Although the General Surgery forms were found to have

good internal reliability (Cronbach's  $\alpha = 0.95$ ), inadequate construct validity was derived from the resulting 2-factor solution. Factor analysis shows that the General Surgery form accounts for 74% of the variance and that item loadings depict a model emphasizing the role and responsibilities of residents as defined by the 1) medical expert and 2) professional roles only.

The General Surgery R-RER form appears to have excellent reliability without the corresponding construct validity derived through exploratory factor analyses. Although an oblique-rotated factor analysis provides the best representation of the 2-factor model, the resulting 12-item R-RER form falls short of measuring all 7 of the CanMEDs roles. Further research into the design and development of in-training evaluation reports that look at measures that encompass all of the roles will be explored.

#### 41

**PREOPERATIVE STAGING IN CANCER OF THE PANCREATIC HEAD: IS THERE ROOM FOR IMPROVEMENT?** *K. Croome, S. Jayaraman, C.M. Schlachta. Division of General Surgery, Schulich School of Medicine and Dentistry, University of Western Ontario, London, Ont.*

Despite advances in preoperative staging, cancer of the pancreatic head is frequently unresectable at laparotomy. We performed an institutional retrospective review of patients referred for resection of cancer of the pancreatic head over a 2-year period. Our objective was to identify potential areas of improvement in preoperative staging. The primary outcome was the rate of metastasis or unresectability found at laparotomy in patients who were booked for potentially curative resection. One-hundred and thirty-three patients were referred with suspected pancreatic cancer. All had preoperative computed tomography (CT) scanning. Twenty-four also had preoperative endoscopic ultrasound (EUS) and 23 had magnetic resonance imaging (MRI). Seventy-eight patients were deemed not to be candidates for surgery, leaving 55 potentially resectable patients who were scheduled for attempted pancreaticoduodenectomy. Thirty-two patients (58%) underwent resection with curative intent. Twenty-three patients (42%) were found to be unresectable at the time of surgery. Reasons for unresectability were: metastases, 9 (16%), or locally-advanced disease, 14 (26%), not appreciated by preoperative staging. Reasons for unresectability due to locally advanced disease were: involvement of vasculature, 12 (22%), or mesentery, 2 (4%). One patient had a diagnostic laparoscopy immediately before planned open exploration and was found to have peritoneal seeding precluding curative resection. Of patients having EUS, 14 were not surgical candidates due to locally-advanced tumour. Ten patients were offered surgery with curative intent, whereas 5 (50%) were found to be unresectable (4 metastatic, 1 locally advanced). Of the patients having MRI, 11 were offered surgery, whereas 5 (45%) were not resectable (2 metastatic, 3 locally advanced).

In our institution, preoperative staging for cancer of the pancreatic head misses a substantial amount of metastatic and unresectable disease. There is clearly room for improvement, and newer technologies should be evaluated to enhance detection of metastatic and locally advanced disease to prevent unnecessary laparotomy.

#### 42

**MEASUREMENT OF QUALITY INDICATORS FOR SENTINEL LYMPH NODE BIOPSY (SLNB) AT AN ACADEMIC INSTITUTION: A FEASIBILITY STUDY.** *B.J. Wells, A.R. Gagliardi, F.C. Wright, N. Fraser, D. McCreedy, C.M.B. Holloway, M.L. Quan. Departments of Surgery, Sunnybrook Health Sciences Centre and Princess Margaret Hospital, Toronto, Ont.*

SLNB is becoming the preferred method for axillary staging in early breast cancer. Previously, there were no performance measures or "quality indicators" (QIs) from which SLNB could be evaluated. We recently developed 11 QIs using a Delphi consensus method (see table). The aim of this study was to determine the feasibility of measuring these QIs and to

**Table 1, abstract 42. Quality indicators for sentinel node biopsy in breast cancer**

No.	Quality indicator	Proportion of patients...	Feasible to measure?
1.	Axillary node positivity rate	...undergoing SLNB in whom was identified and found to be positive.	Yes: Chart-level
2.	Proper identification of SLN	...in whom sentinel lymph node(s) (SLNs) were identified as "hot" and/or "blue" and/or "clinically suspicious" in the chart or dictated OR note.	Yes: Chart-level
3.	SLNB performance in eligible patients	...undergoing SLNB in the setting of breast conserving surgery for T1 tumours.	No
4.	No. of nodes removed (> 1)	...who underwent SLNB in whom the number of nodes removed is greater than 1.	Yes: Chart-level
5.	Pathologic evaluation protocol	...in whom the SLNs were examined using a recognized protocol involving serial-sectioning.	Yes: Institution-level
6.	Pathologic reporting using AJCC	...whose SLNB final pathology reports identify the category of metastases and present the patterns of tumour according to AJCC/UICC criteria.	Yes: Chart-level
7.	Concurrent SLNB with lumpectomy	...who underwent SLNB and lumpectomy concurrently.	Yes: Chart-level
8.	Axillary recurrence rate	...with a negative SLNB who develop an axillary recurrence.	No
9.	Completion ALND for positive SLNB	...with a positive SLNB (as defined by the presence of, at a minimum, micrometastases greater than 0.2 mm) who received a completion axillary lymph node dissection (ALND).	Yes: Chart-level
10.	SLNB performance in ineligible patients	...who undergo SLNB as a stand-alone axillary procedure who are "ineligible" based on preoperative disease characteristics (i.e., inflammatory breast cancer, etc.)	Yes: Chart-level
11.	Standard protocol for injection of radiocolloid	...having radiocolloid injected at an institution that has defined nuclear medicine protocol for SLNB for breast cancer.	Yes: Institution-level

AJCC = American Joint Committee on Cancer; ALND = axillary lymph node dissection; OR = operating room; SLN = sentinel lymph node; SLNB = sentinel lymph node biopsy; UICC = International Union Against Cancer.



use them to describe baseline performance measures of SLNB performed at a single institution.

All patients with breast cancer undergoing SLNB at a single tertiary institution were identified through a database of SLNB cases performed from January 1 to December 31, 2006. Patient charts were reviewed and the QIs abstracted.

Nine of the 11 QIs were measurable: 7 required chart-level abstraction whereas 2 were confirmed at the institutional level. Two QIs were not measurable (see Table 1). There were 119 patients identified having SLNB during the study period: 5 patients had no SLNs identified, resulting in 114 cases of completed SLNBs. The axillary positivity rate was 14% (16/114). Method of sentinel lymph node (SLN) identification was documented in 99% of cases, and for 91 (80%) patients, greater than 1 SLN was removed. All SLNs were examined according to protocol, however only 43 (38%) pathology reports specified stage by American Joint Committee on Cancer (AJCC) guidelines. SLNB was performed concurrently with lumpectomy in 67 (59%) cases, and with mastectomy in 42 (37%) cases. Five (4%) SLNB cases occurred at a second operation. Of the 16 patients with a positive SLNB, 14 (87.5%) underwent completion ALND; 1 refused further treatment. Of the 5 patients with no SLNs identified, 4 (80%) underwent immediate ALND. No "ineligible" patients underwent a SLNB.

Nine of 11 previously developed QIs for SLNB were feasible to abstract from patient charts. Use of these QIs can serve to provide baseline measures and ongoing assessment of quality for SLNB.

#### 43

**A 5-YEAR RETROSPECTIVE COHORT STUDY OF BLUNT AORTIC INJURY IN THE BRITISH COLUMBIA TRAUMA SYSTEM.** *N. Robbins, N. Bell, P. Brasher, A. Williams, J. Cooper, D.C. Evans.* Department of Surgery, Vancouver General Hospital, University of British Columbia, Vancouver, BC.

Blunt aortic injury (BAI) is considered a time-critical injury mandating rapid transfer to definitive quaternary-level care. In British Columbia (BC), the Vancouver General Hospital (VGH) is the principal referral centre for BAI within a provincial trauma system serving 4.4 million people. We sought confirmation that BAI patients transported rapidly to definitive care would have improved survival.

This was a retrospective, observational cohort of all patients with a BAI diagnosis captured by the VGH Trauma Registry from January 1, 2001, to December 31, 2006. Data retrieved included patient demographics, transfer details, injury severity scores, treatment and outcomes (hospital mortality and length of stay). Prehospital data provided time and location of injury. Transfer times and distances to initial and definitive care were calculated and mapped using geographic information system (GIS) analysis.

Fifty-two BAI patients were treated between 2001 and 2006. Seventy-three percent were male with a mean age of 42 years. Fifty-two percent were direct transfers from the scene and 48% were treated first at another hospital. Overall mortality was 44%, and mortality for direct and indirect transfers was 72% and 18%, respectively. The mean transfer time and distance from scene to VGH was 9.8 hours/227.5 km for

survivors and 2.0 hours/42.8 km for nonsurvivors. Among nonsurvivors, 77% had no attempt at repair, 18% underwent endovascular aortic replacement (EVAR) and 4% had open repair. Of survivors, 52% were treated with EVAR, 31% had open repair and 7% were managed expectantly.

Although patients diagnosed with BAI but not transferred to VGH were not studied, we believe these to be few. Survival following BAI was not shown to correlate with distance or time to definitive care in a large provincial trauma system. BAI presenting directly to a quaternary centre offering definitive care still resulted in death in more than two-thirds of cases.

#### 44

**A SINGLE-CENTRE EXPERIENCE OF DIAGNOSTIC LAPAROSCOPY FOR INTRA-ABDOMINAL LYMPHADENOPATHY.** *S. Wiebe, D. Klassen.* Queen Elizabeth II Health Sciences Centre, Halifax, NS.

Laparoscopic biopsy represents an alternative to open laparotomy in patients with significant neoplastic or infectious diseases presenting with intra-abdominal lymphadenopathy in the absence of peripheral lymphadenopathy. The goal of this study was to evaluate the safety and diagnostic effectiveness of laparoscopic lymph node biopsy.

A retrospective review of 15 consecutive laparoscopies between February 2004 and March 2008 for computed tomography (CT)-detected intra-abdominal lymphadenopathy was conducted.

There were no procedure-related mortalities and no major morbidities. Conversion to laparotomy was required in a single case for intolerance of pneumoperitoneum. A diagnosis was established in all cases: 1 Hodgkin lymphoma, 9 non-Hodgkin lymphomas, 2 adenocarcinomas, 1 benign lymphadenopathy, 1 case of *Bartonella* infection and 1 case of previously undiagnosed cirrhosis with regenerative liver nodules. The average operative time was 75 (range 30–180) minutes. Four cases were performed in patients with previous intra-abdominal surgeries with an average operative time of 61 minutes. The majority of cases were performed in an outpatient setting.

Laparoscopic lymph node biopsy is a safe and effective diagnostic procedure for investigation of intra-abdominal lymphadenopathy. In our series, there was no increase in morbidity or operative time in patients with prior abdominal surgeries.

#### 45

**THE GENERAL SURGERY ROTATION FOR FAMILY MEDICINE RESIDENTS IN ONTARIO — THE IMPACT, BARRIERS AND LESSONS LEARNED.** *T.K. Asano, C.J. MacDonald, F. Balaa, R.P. Boushey, E.C. Poulin, J. Mamazza.* Department of Surgery, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

The purpose of this study was to examine the status, perceived value and potential for improvement of the general surgery curriculum for family medicine residents in Ontario.

Both qualitative and quantitative methodologies were used to examine individual, interpersonal and organizational barriers and facilitators at 4 academic centres during the 2007–2008 academic year. Self-administered questionnaires

were distributed to current family medicine (FM) residents ( $n = 396$ ) and recent FM graduates ( $n = 167$ ). Semistructured interviews of general surgery and FM educators and residents were conducted ( $n = 25$ ). Qualitative data were analyzed using a modification of the grounded theory. Quantitative data were reported as summary statistics and univariate analyses.

Sixty-one percent of the current FM residents believed that a general surgery rotation should be mandatory during their residency training. However, for those that had completed a general surgery rotation, only 24% agreed that the tasks undertaken during the rotation enabled them to meet their educational needs. The interviews revealed broad consensus that gaining general surgical knowledge and skills were important for family medicine residents. However, there was less agreement about the setting and structure for implementing an effective surgical training experience. This study explored the challenges that have arisen from competing priorities, cultural differences between the 2 clinical disciplines, lack of proactive educational planning and the belief in the merits of expert versus nonexpert preceptorship for the acquisition of surgical knowledge and skills.

Recommendations are made with a view to overcoming the current challenges and move toward implementing an effective general surgery curriculum for family medicine residents in Ontario.

#### 46

**ASSESSING THE IMPACT OF A 2-DAY LAPAROSCOPIC INTESTINAL WORKSHOP.** *T.K. Asano, C. Soto, E.C. Poulin, J. Mamazza, R.P. Boushey.* Department of Surgery, The Ottawa Hospital, University of Ottawa, Ottawa, Ont.

The purpose of this study was to determine the impact of a comprehensive laparoscopic intestinal workshop for the adoption of laparoscopic colonic surgery.

A 2-day laparoscopic intestinal surgery workshop included interactive discussions during a live laparoscopic colon resection, didactic teaching, video clips and supervised hands-on practice of numerous laparoscopic colon resections on a cadaveric model. Participants ( $n = 45$ ) completed a pre-, post- and 6-months-postcourse questionnaire.

The participants had been in practice for a mean of 11.0 (standard deviation [SD] 9.0) years. Fifty percent had learned laparoscopy during residency and 56% were already performing laparoscopic colectomies as part of their practice. In contrast, 32% of the participants felt unprepared to attempt a laparoscopic colectomy, however, immediately after the workshop only 7% continued to feel unprepared. Six months after the intestinal workshop, 53% of the surgeons that were not performing laparoscopic colectomies before the workshop had subsequently performed at least 1. Of these surgeons, 62% had a surgical preceptor for their case(s). Reasons cited for not performing a laparoscopic colectomy since the workshop included the lack of a surgical preceptor, inadequate local instrumentation and a perceived inadequate surgical skill set.

A comprehensive laparoscopic intestinal workshop contributed to the perceived acquisition of advanced laparoscopic surgical skills. Local laparoscopic preceptorship was an important adjunct to the workshop for the incorporation of laparoscopic colorectal surgery into practice.

#### 47

**AN ECONOMIC EVALUATION OF ABDOMINAL COMPUTED TOMOGRAPHY IN THE ASSESSMENT OF PATIENTS WITH SUSPECTED APPENDICITIS.** *S.S. Brar, S.J. Heitman, E. Dixon, B.J. Manns.* Departments of Surgery, Medicine and Community Health Sciences, University of Calgary, Calgary, Alta.

A decision analytic model was created to model the effectiveness and cost-effectiveness of computed tomography (CT) scanning in the assessment of suspected appendicitis. Three strategies were assessed in this evaluation: 1) "clinical assessment alone" without use of CT scans; 2) "selective CT" where scans were done for patients with equivocal clinical presentations; and 3) "mandatory CT strategy" where all patients with suspected appendicitis underwent a CT scan. Effect was defined in our analysis as the accuracy of diagnosis. The cost and rate of negative appendectomy were secondary outcomes. The perspective of this analysis was the publicly funded health care system.

Probability estimates for our model were derived from a systematic review of the literature. Costs were calculated from local administrative data when available. Given our perspective, only direct costs were included in our analysis. Model validity was assessed by comparison with a patient cohort from the Calgary Health Region using administrative data. Sensitivity analysis and scenario analysis were performed to test the robustness of our model.

In the base case analysis, clinical assessment alone was the least effective (accuracy 87.5%) and the most costly strategy. The mandatory and selective CT strategies had identical effectiveness (92.8% and 93%, respectively). Negative appendectomy rates showed a similar ranking, with a 13.4% rate for clinical assessment alone, a 5.6% rate for selective CT and a 3.8% rate for the mandatory CT strategy. The mean cost of managing patients with suspected appendicitis was \$3381.30, \$3114.30 and \$3368.50 for patients with clinical examination only, selective CT and mandatory CT strategies, respectively. Therefore, in the base-case analysis, the selective CT strategy appeared optimal. In sensitivity and scenario analysis, the model was sensitive to the prevalence of appendicitis and the proportion of patients with atypical presentations of appendicitis. The model was not sensitive to cost variables.

#### 48

**THE YIELD OF ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY AFTER CHOLECYSTECTOMY FOR GALLSTONE PANCREATITIS: A POPULATION BASED STUDY.** *P.M. Johnson, M.J. Walsh.* Division of General Surgery, Dalhousie University, Halifax, NS.

Endoscopic retrograde cholangiography (ERCP) may be used in patients after cholecystectomy for gallstone pancreatitis based on intraoperative cholangiogram findings or recurrent symptoms. Previous data have suggested that many common bile duct stones pass spontaneously in this patient population. The purpose of this study was to determine the yield of ERCP after cholecystectomy for gallstone pancreatitis

All patients who were admitted to hospital from 1997 to 2001 in Nova Scotia with pancreatitis who underwent cholecystectomy during the same admission were identified from the physician billings and hospital discharge databases. Patients who

underwent postoperative ERCP were identified and the type of procedure (therapeutic v. nontherapeutic) was determined. Patients who had preoperative ERCP or common bile duct exploration at the time of surgery were excluded. All patients were followed for at least 1 year after cholecystectomy.

Three-hundred and sixteen patients underwent cholecystectomy for gallstone pancreatitis. During follow-up, 32 of 316 (10%) patients developed recurrent biliary complications including pancreatitis (97%) and cholangitis (3%). Thirty-nine patients (12.3%) underwent ERCP which involved sphincterotomy in 41%, basket extraction in 13%, stent placement in 8% and no therapeutic intervention in 38%.

More than one-third of patients who have ERCP after cholecystectomy for gallstone pancreatitis do not undergo therapeutic intervention. Given the risks associated with ERCP, further research is needed to accurately identify patients who will benefit most from this procedure.

#### 49

**PREDICTION OF LAPAROSCOPIC PERFORMANCE BASED ON SIMULATOR ASSESSMENT.** *G. Sroka, L.S. Feldman, J. Cao, P. Kaneva, G.M. Fried.* Steinberg-Bernstein Centre for Minimally Invasive Surgery, McGill University Health Centre, Montréal, Que.

Laparoscopic simulators can be used for assessment with the goal of predicting performance in the operating room. We have previously shown that Fundamentals of Laparoscopic Surgery (FLS) simulator metrics are predictive of intraoperative performance, as measured by GOALS (a validated global rating scale). We investigated whether motion analysis metrics add to FLS simulator score in the prediction of GOALS scores. Seventeen surgeons (12 novice [PGY 1–3] and 5 experienced [PGY 4+]) performed the 5 FLS tasks plus a cannulation task in the Pro-MIS simulator. The FLS tasks were scored for time and precision, and ProMIS generated motion analysis metrics (instrument smoothness and path length). Each subject was also assessed intraoperatively using GOALS during dissection of the gallbladder from the liver bed as part of elective laparoscopic cholecystectomy. Multivariate regression analysis was used to assess the independent contributions of surgical experience, FLS scores and motion analysis metrics to the prediction of intraoperative GOALS score. Statistically significance was set at  $p < 0.05$ . Both FLS score ( $p < 0.0001$ ) and surgical experience ( $p < 0.0001$ ) were independent predictors of the GOALS score. When experience level is known, instrument path length ( $p = 0.28$ ) and instrument smoothness ( $p = 0.08$ ) are not independent predictors of the GOALS score. This study confirms that FLS simulator score and surgical experience independently predict performance of dissection of the gallbladder from the liver bed. Measurement of motion analysis is expensive and cumbersome and does not add further information to the prediction of intraoperative technical skill.

#### 50

**IMPACT OF HIGH DEFINITION IMAGING ON PERFORMANCE OF SIMULATED LAPAROSCOPIC TASKS.** *G. Sroka, L.S. Feldman, R. Fayez, P. Kaneva, J. Cao, D. Stanbridge, G.M. Fried.* Steinberg-Bernstein Centre for Minimally Invasive

Surgery, McGill University Health Centre, Montréal, Que.

The availability of a high definition (HD) laparoscopic camera improves image quality, however, whether this translates into improved performance compared with a standard camera (SD) is not known. The aim of this study was to assess whether an HD system impacts performance in a laparoscopic simulator.

Part 1: Twenty-four medical students were randomly assigned to perform simulated laparoscopic tasks with either a standard camera (Karl Storz, 720 × 480 pixels, 4:3 screen) or an HD camera (Karl Storz, Image 1 full HD 1920 × 1080 pixels, 16:9 screen). Tasks included peg transfer, cannulation and needle positioning, and were scored for time and errors. Each task was repeated 10–13 times (mean 10.6) until no further improvement was recorded. The slope (for the first 5 trials) and plateau (potential) of the learning curves were estimated using linear regression. These values were compared between the HD and SD groups using unpaired  $t$  test. Part 2: Six experienced and 6 inexperienced surgeons performed 5 FLS tasks using HD and SD cameras in random order. Tasks were scored for time and precision. Results were compared by using paired  $t$  tests. Statistical significance was set at  $p < 0.05$ . Part 1: The learning curves were virtually identical with HD or SD imaging for all tasks. Part 2: Total FLS score was significantly higher with the HD versus the SD camera systems (79.6, standard deviation 14 v. 75.3, standard deviation 15;  $p = 0.02$ ). Extracorporeal suturing (95, standard deviation 16 v. 86, standard deviation 20;  $p = 0.005$ ) and cutting (68, standard deviation 13 v. 63, standard deviation 13;  $p = 0.02$ ) were better using the HD camera. This study shows that imaging quality plays no significant role in the learning curve of naïve surgeons. In contrast, HD imaging results in small but significant improvements in performance for more experienced surgeons. Further study is justified to define the specific benefits of the system in different experience levels and in different complexities of laparoscopic tasks.

#### 51

**STAGED SURGICAL RECONSTRUCTION FOR ACUTE GASTRIC NECROSIS WITH PERFORATION — A CASE REPORT AND REVIEW.** *H. Cheah, A. Kwan, C. Mann.* Department of Surgery, Memorial University of Newfoundland, St. John's, NL.

Acute gastric necrosis is a rare event with a reported mortality rate of 80% despite treatment. We present the case of a 43-year-old woman of normal weight with acute gastric distension following an episode of binge eating. Computed tomographic (CT) examination demonstrated a massively dilated stomach with gastric wall pneumatosis and free intra-abdominal air in keeping with the diagnosis of acute gastric necrosis and perforation.

A successful outcome was attained following a staged surgical procedure. Initial management was an emergent total gastrectomy without reconstruction due to extensive contamination and a tenuous blood supply. A pharyngostomy tube and J tube allowed her to be maintained on enteral tube feeds until a complex staged reconstruction could be performed following a 6-month interval. At that time a Roux-en-Y esophagojejunostomy through a thoracoabdominal approach was performed. The patient returned home following surgery with a return to her baseline function.

## 52

**EARLY OXIDANT-INDUCED AKT PHOSPHORYLATION AND SRC KINASE ACTIVATION IN MACROPHAGES IS MEDIATED BY ACID SPHINGOMYELINASE.** *P.S. Tawadros, M. Ailenberg, M. Cantos, K. Szaszi, A. Kapus, J.C. Marshall, O.D. Rotstein.* St. Michael's Hospital, University of Toronto, Toronto, Ont.

We have previously reported that oxidative stress contributes to priming of macrophages for increased lipopolysaccharide (LPS) responsiveness through Src-dependent activation of the PI3 kinase/Akt pathway (*J Biol Chem* 2003;278:47834-41). Recent studies have implicated the lipid ceramide, generated from sphingomyelin via acid sphingomyelinase (ASM), as an important upstream regulator of signaling in inflammation. Other recent reports have suggested that lipid mediators such as ceramide can activate Src kinases. Taken together, we hypothesized that lipid metabolites generated through the ASM pathway may play an important role in oxidant-induced activation of Akt and Src kinase in macrophages.

RAW 264.7 macrophages were transfected in vitro with an ASM siRNA from Santa Cruz using Lipofectamine. A scrambled negative siRNA from Ambion was used as control. After 24 hours of transfection, cells were treated with 300  $\mu$ M hydrogen peroxide ( $H_2O_2$ ) for 0–15 minutes. Western blot analysis was performed with a phospho-Akt antibody (Ser 473) and a phospho-Src family antibody (Tyr 416). Changes were assessed by densitometry.

Molecular inhibition of ASM by siRNA was verified by polymerase chain reaction (PCR) analysis of ASM mRNA levels compared with control housekeeping gene mRNA levels. Optimal knockdown conditions were found to be 40 pmol of ASM siRNA for 24 hours. In the ASM knockdown group,  $H_2O_2$ -induced phosphorylation of Akt was reduced by over 95% at 5 minutes and 75% at 15 minutes, compared with control. As well,  $H_2O_2$ -induced activation of Src kinase was reduced by over 95% at 5 minutes compared with control. These results support a role for ASM in generating early lipid mediators of oxidant priming in macrophages.

Oxidant-induced activation of Akt and Src kinase is mediated in part by the ASM pathway. ASM and its lipid products may therefore represent upstream targets for modulating oxidant-induced cellular priming.

## 53

**THE FEASIBILITY AND IMPACT OF A 3-DAY SURGICAL SIMULATION COURSE IN AFRICA.** *A. Okrainec, L. Smith, G. Azzie.* Department of Surgery, University Health Network, University of Toronto, Toronto, Ont.

Although simulation is now considered important for learning technical skills, there is very little literature assessing the use of simulation in resource restricted countries. The purpose of this study was to determine the feasibility and impact of a 3-day Fundamentals of Laparoscopic Surgery (FLS) course in Botswana, Africa.

A total of 20 surgeons and trainees participated in a 3-day FLS course. A pretest FLS score was obtained for each subject, followed by 2 days of practice with feedback. A final FLS post-test score was then obtained. Participants also watched the FLS instructional CD-ROM and took the written test on day 3.

Mean post-test scores were significantly higher than pretest scores for each task (Table 1) and for the total FLS simulator score (26, standard deviation [SD] 19 v. 57, SD 19;  $p < 0.001$ ). The mean score on the written test was 242 (SD 116). In total, only 2 surgeons had a combined simulator and written test score required to obtain FLS certification.

**Table 1, abstract 53. Test scores before and after a 3-day FLS course in Botswana, Africa**

Performance	Test: mean score (and SD)		<i>p</i> value
	Pre-test	Post-test	
Peg transfer	34 (29)	65 (25)	< 0.001
Pattern cutting	14 (17)	49 (20)	< 0.001
Endoloop	26 (22)	49 (32)	< 0.001
Extraorporeal	30 (33)	68 (26)	< 0.005
Intracorporeal	27 (29)	55 (28)	< 0.005

FLS = Fundamentals of Laparoscopic Surgery; SD = standard deviation.

To our knowledge, this is the first time the FLS program has been taught in Africa. We have shown that giving the FLS course in a resource restricted country is feasible and resulted in a dramatic improvement in FLS-simulator performance after 3 days. However, most surgeons still did not reach FLS passing scores, indicating that more than 3 days will be required in future courses to help surgeons obtain FLS certification.

## 54

**TELESIMULATION: A NOVEL METHOD OF TEACHING SURGICAL SKILLS IN RESOURCE RESTRICTED COUNTRIES.** *A. Okrainec, O. Henao, G. Azzie.* Department of Surgery, University of Toronto, Toronto, Ont.

Telesimulation (TS) is a novel concept that uses the internet to link simulators between instructors and trainees in different locations. The objective of this study was to determine if telesimulation could be used to teach the Fundamentals of Laparoscopic Surgery (FLS) course from Canada to Botswana, Africa.

Pretest FLS scores were obtained for each surgeon during a first visit to Botswana. For the TS, 1 FLS box was located in Toronto, Canada, and 1 in Gaborone, Botswana. The set-up was identical at each site: the FLS camera was connected to a television with an S-video cable and to a laptop with a USB cable, allowing the FLS camera to be used as a webcam. A second webcam was used to display an external image of each person on the FLS. Skype software was used to establish a video connection between both FLS cameras and the exterior webcams. The instructor and the trainee could speak to each other and see themselves and each other's FLS boxes in real time.

A total of 10 TS sessions were held between 9 surgeons in Botswana and 2 FLS instructors in Toronto. Instructors could teach, demonstrate and provide feedback on all 5 FLS tasks performed by surgeons in Botswana. Preliminary data suggest that all FLS tasks could be scored accurately from Canada and that trainees improved over the course of the study.

Telesimulation is a novel, practical and inexpensive method for teaching FLS in Africa which can be applied anywhere in the world with internet access. Final data with post-test FLS scores will be obtained on a future trip to Africa to determine

if telesimulation is an effective method for teaching and certification of FLS.

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**DOUBLE BALLOON ENTEROSCOPY FOR SMALL INTESTINAL DISEASES: A SYSTEMATIC REVIEW OF EVIDENCE PUBLISHED IN EARLY 2007.** *F. Moustarah.* Edmonton, Alta.

Double balloon enteroscopy (DBE) is a novel technology for endoscopically assessing and treating suspected or confirmed small bowel pathology. Since its early introduction in Asia in 2001, DBE has been disseminated to Europe, but its adoption in North America has only been recent. Strong evidence for the efficacy of DBE in treating small bowel conditions is lacking.

A systematic review of the evidence published in the first quarter of 2007 was carried out to evaluate the role of DBE in diagnosing and treating small bowel abnormalities and to review its safety profile. A systematic search for evidence was conducted using a broad search strategy to survey the major electronic databases as well as the grey literature.

Studies meeting predetermined inclusion criteria were reviewed. Data were extracted and analyzed by the author. Studies were graded according to the Oxford criteria for medical evidence. There were no systematic reviews, randomized controlled trials or controlled observational studies identified for inclusion. Out of 392 unique titles resulting from the search, 34 were published in 2007, of which 22 (11 case series and 11 case reports) were included for the review. This represents a total sample of 1211 patients undergoing DBE with only 5% being in North America.

The indications for DBE varied, with the most common being obscure gastrointestinal bleeding (OGIB); patient age ranged from 12 to 89 years. The diagnostic yield ranged from 41% to 100%, with the calculated yield being 77.9% in patients with OGIB. The therapeutic impact of DBE ranged from 65% to 84% in reported series. Interventional endoscopic therapy was possible in up to 78% of patients. DBE associated severe adverse events were rare. There appears to be a role for DBE in managing patients with small bowel pathology and better selecting those who are candidates for laparotomy with intra-operative enteroscopy.

56

**TOWARD OBJECTIVE EVALUATION OF COSMETIC OUTCOMES OF BREAST-CONSERVING SURGERY — VALIDATION OF A NEW SOFTWARE PROGRAM IN COMPARISON TO A PANEL SCORE.** *F. Ali, S. Latosinsky, M. Cheang.* Department of Surgery, Health Sciences Centre, University of Manitoba, Winnipeg, Man.

Until recently, there has been no completely objective way to evaluate cosmesis post-breast-conserving surgery (BCS). This study aims to compare and validate a new software program that evaluates cosmesis based on calculation of breast asymmetry, scar visibility and colour difference versus a panel of 3 evaluators. A 3-panel score has recently been shown to be the most reliable method of cosmetic evaluation of BCS.

Using a cohort of 99 women > 2 years post-BCS with radiotherapy, photographs were taken under standard conditions in the anteroposterior view. Both the panel and software

employed the previously validated 4 point Danoff cosmetic scale for each patient, thus allowing for direct comparison. A weighted kappa statistic and Kendall coefficient was used to compare Danoff scores between the software and 3 randomly chosen evaluators (1 nurse and 2 surgeons) from the previous trial.

Ninety-five women were evaluated; 4 were rejected as they were incompatible with the software. The software had a weighted kappa of 0.47 (95% confidence interval 0.34–0.59) as compared with the randomly chosen panel of 3. This represents moderate correlation. The Kendall coefficient was 0.54 (0 = no agreement, 1 = complete agreement).

As per the kappa and Kendall values, the software correlated moderately to the panel score. This correlates well to a previous validation study of this software versus an international expert panel. The moderate correlation also compares favourably to interrater reliability from studies measuring subjective evaluations only; these studies have shown only fair to moderate reproducibility between evaluators. They also depend on experience of evaluators. The software shows promise in allowing surgeons to evaluate their cosmetic outcomes rapidly, reliably and objectively, and may perhaps render subjective methods unnecessary.

57

**A NEW URGENT SURGERY SERVICE AT A TEACHING HOSPITAL — IMPACT ON WAITING TIMES AND PATIENT CARE.** *M. Segedi, M. Hameed, A. Buczkowski, C.J. Brown, D.C. Evans, O.N.M. Panton.* Department of Surgery, University of British Columbia, Vancouver General Hospital, Health Sciences Centre, Vancouver, BC.

We studied the impact of a new Urgent Surgery Care (USC) service at a tertiary hospital on surgical waiting times and patient outcomes.

Adult patients admitted from the emergency department at Vancouver General Hospital under the care of one of the general surgeons from July 1, 2006, to December 31, 2007, were identified from the Quality Utilization Information Support Team (QUIST) database. A retrospective cohort study using univariate and multivariate analyses was performed to compare patient outcomes over 3 consecutive 6-month periods: Traditional (pre-USC), Interim (surgeon-centred model) and USC (team-based model). Exclusion criteria included a delay to surgery of greater than 48 hours and surgery related to trauma or genitourinary pathology.

Overall, 796 patients met study criteria. The groups were equivalent in size (Traditional  $n = 262$ ; Interim  $n = 275$ ; USC  $n = 259$ ), sex distribution and age distribution (Traditional 53.6, standard deviation [SD] 20 y; Interim 52.9, SD 20 y; USC 53.6, SD 20 y). Length of stay was significantly lower in the USC group compared with the Traditional group (4.4, SD 5.5 d v. 6.5, SD 10.2 d;  $p = 0.0075$ ). Regardless of the group, a small proportion of patients underwent surgery within the requested operating priority time (Traditional 19%; Interim 23%; USC 13%). Significantly fewer patients underwent surgery within the operating priority time in the USC cohort compared with other groups ( $\chi^2 = 0.02$ ). Actual time to surgery did not differ between the groups (Traditional 16.8, SD 10.1 h; Interim 16.2, SD 10.2 h; USC 18.3, SD 10.8 h).

Patients cared for under the new USC model had similar

wait times for surgery but significantly shorter lengths of hospital stay. Timeliness of surgical intervention after surgical booking was low, with less than a quarter of patients undergoing surgery within the specified time priority.

This study describes our preliminary experience with an Urgent Surgery Care delivery model and potential impact on patient outcomes. Weaknesses identified will aid in creating a continuous surgical outcomes improvement system.

## 58

**OPEN VERSUS STAPLED HEMORRHOIDECTOMY: A CASE CONTROL STUDY.** *S.R. Cader, C. de Gara.* Department of Surgery, University of Alberta, Edmonton, Alta.

To compare outcomes of conventional open Milligan–Morgan hemorrhoidectomy with stapled hemorrhoidectomy for symptomatic hemorrhoids in 1 surgeon's practice, and to see if these outcomes agree with the literature, thus guiding future practice.

A list of all hemorrhoid surgical cases that Dr. de Gara performed between 1997 and 2006 was obtained. One-hundred and twelve cases were listed. Charts were excluded if the surgery was other than a hemorrhoidectomy, if the patient was on anticoagulation or if concomitant inflammatory bowel disease was present. Eighty-one charts met inclusion criteria and were analyzed for severity of hemorrhoids, preoperative symptoms, surgery performed and postoperative outcomes. As postoperative follow-up was generally not long enough to assess for long-term symptoms or recurrence, a random sample of patients in each of the conventional and stapled hemorrhoidectomy groups will be telephoned and interviewed to assess for long-term outcomes.

## 59

**ESTIMATING THE INVASIVE PLACEBO EFFECT SIZE: THE ELEPHANT IN THE ROOM.** *J. Boutros, M. Boutros, S.M. Hameed, A. Levy.* Division of General Surgery, Department of Surgery, Department of Healthcare and Epidemiology, University of British Columbia, Vancouver, BC, McGill University, Montréal, Que.

The choice of a control group in surgical trials is not simple, and the placebo control presents multiple issues. We aim to determine the circumstances in which a placebo control is methodologically appropriate in the assessment of surgical interventions and to estimate the placebo effect in this context.

The literature was surveyed, and studies fulfilling predetermined criteria were included. A pooled weighted average estimate of the placebo effect size was calculated, and a sensitivity analysis was performed.

Seven trials with an invasive placebo control were identified. The placebo effect size was extracted from each study, and the pooled weighted-average estimate of the placebo effect size of all the trials was 0.507. One trial, involving the invasive administration of medication, was overwhelmingly larger than the others, and the weighted-average estimate of the placebo effect size without this trial was 0.388. Advantages of including a placebo control included the ability to blind the patient and outcome assessors to treatment group allocation, and to estimate the placebo effect size, however, this in turn negatively affects generalizability. The placebo effect was

found to be most measurable when the primary outcome was a patient-reported continuous outcome.

Hence, the authors conclude that the use of an invasive placebo is most justifiable methodologically when the primary outcome is a patient-reported continuous outcome and when the expected treatment effect size is less than 40%.

## 60

**THE DEVELOPMENT OF A TEMPLATE FOR HEALTH TECHNOLOGY ASSESSMENT OF SURGICAL PROCEDURES USING MIXED METHODS.** *E. Dixon, I. You, G. Maddern, W. Ghali.* University of Calgary, Calgary, Alta.

To develop a template for health technology assessment (HTA) of surgical procedures.

Using a combination of investigative methods, we performed an HTA of hepatic resection for metastatic colorectal cancer (HRMCC). We used health services research methods and spatial epidemiology to describe 1) current rates of HRMCC and their change over the time period of interest, and 2) the outcomes following the application of the technology during the study period. We also used a consensus- and evidence-based methodology (Delphi process) to identify quality indicators of care for patients undergoing HRMCC. And finally we identified other gaps in knowledge regarding the optimal use of HRMCC and attempted to address them. Specifically, we wanted to know what effect surgeon training has on outcomes following HRMCC. The final component of this mixed method assessment is a health economics assessment of the technology (this has previously been studied and reported).

Using HRMCC as a case study of an existing surgical technology/technique, we used 4 linked studies to develop a template for HTA of surgical procedures. In the first 2 studies, we used administrative data from the Canadian Institute for Health Information (CIHI) to describe the rates, changes in these rates and regional variation over the past 10 years of HRMCC across Canada (Study A); in Study B, we looked at the outcomes (mortality) following HRMCC across the country over the same 10-year period while accounting for potential confounders and studying the effect of hospital volume. In study C, we used a Delphi process of international experts in different aspects of the care of patients with metastatic colorectal cancer to derive a list of 19 quality indicators for patients undergoing HRMCC. In Study D, we examined what effect surgeon training had on perioperative and long-term outcomes following HRMCC.

Using mixed methods, we have developed a template for the HTA of both new and existing surgical technologies.

## 61

**BREAST CANCER SURGERY AND SAME-DAY DISCHARGE: A PROSPECTIVE QUALITY OF LIFE STUDY.** *L. Bohacek, D. Pace.* Department of General Surgery, Memorial University, St. John's, NL.

Same-day discharge following breast cancer surgery has become a common practice. The goal of our study was to assess patients' qualitative experience and satisfaction with same-day discharge in St. John's, NL.

Fifty patients answered a quality of life questionnaire following breast surgery. This 2-part questionnaire was completed via telephone interview conducted at 2 and 6 weeks after discharge.

Of the 50 patients, 40 were discharged home the same day. Among the same-day discharge patients, the perceived Activities of Daily Living level (on a scale of 1–10) fell from 9.7 to 4.4 immediately following surgery, rising again to 7.6 after 2 weeks. The majority (80%) of these patients found their postoperative pain to be slightly bothersome at most, and 75.9% found their pain medications to be very effective. Seventy percent found the postoperative nausea was not bothersome, and 54.5% found the provided antiemetic medications were very effective. The majority of patients were able to think clearly and feel self-sufficient within the first 2 days of surgery. The average time to “full recovery” was 18.6 days, and the average time to return to work was 26 days. Twenty-five percent of same-day discharge patients did require a return visit to the emergency department following discharge (not significantly different from the patients who stayed overnight). Seventy-five percent of patients felt the same-day discharge either reduced or had no negative effect on their stress level. Seventy-two percent stated that if they were to have surgery again, they would prefer to be discharged home, and 68% stated that they were extremely satisfied with the surgery.

The majority of patients contacted provided positive feedback with respect to pain and nausea control, ability to return to normal function and overall satisfaction with the same-day discharge process.

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THE STATUS OF MULTIDISCIPLINARY CANCER CONFERENCES IN ONTARIO. *F.C. Wright, R.S. McLeod, D. Urbach, D. Davis, N. Lookhong, A.R. Gagliardi.* Department of Surgery, University of Toronto, Toronto, Ont.

Cancer care is complex, and multimodal therapy is now considered standard of care. Multidisciplinary cancer conferences (MCC) offer a venue to regularly prospectively discuss patients with cancer, and there are strong indications that such discussion improves patient outcomes. In Ontario, before 2006, no guidelines or recommendations existed regarding MCCs, and little was known about their prevalence, form or function. This study represents the first description of MCCs in Ontario, Canada.

A survey was sent to 728 general surgeons in Ontario with 2 repeat mailings to explore the status of MCCs. In particular, surgeons were asked if their hospital had MCCs, how long they had been in existence, how often they were held, type of cases presented, regular participants, extent of organizational support and their perceived benefits. Significant differences among subgroups were examined statistically.

The response rate was 44.2% (170/385 eligible surgeons). Sixty-nine percent of respondents said their institution had MCCs (91% academic, 56% community). Seventy-eight percent of community hospitals had “general MCCs” where all types of cancer cases were discussed. MCCs at community hospitals occurred biweekly or monthly, but surgeons indicated they were most likely to attend monthly. MCCs at academic centres were most likely to be held weekly, and surgeons were most likely to attend weekly. Few MCCs had a designated coordinator. Surgeons perceived that MCCs helped them incorporate multidisciplinary opinions into their patient care plans, improved communication with colleagues and improved patient outcomes.

We have demonstrated that the majority of academic centres in Ontario have MCCs, that minimal administrative support exists and that they are perceived to improve communication between colleagues and patient outcomes. Further research is required to understand barriers and enablers to establishing and maintaining MCCs, especially in community practice.