

Article details: 2018-0002	
Title	The uptake of elective laparoscopic colectomy for colon cancer in Canada from 2004 to 2014: a descriptive analysis
Authors	C. Hoogerboord MBChB MSc, A.R. Levy PhD, M. Hu MA, G. Flowerdew DSc, G. Porter MD MSc
Reviewer 1	David Pace
Institution	Discipline of Surgery, Memorial University, St. John's, NL
General comments (author response in bold)	<p>This time series analysis of the use of laparoscopic colon surgery in Canada is interesting and timely. Using administrative data, the authors found that the use of laparoscopic was steadily increasing in Canada from 2004 to 2014. This data set showed that there are several variables associated with its use including younger age, female gender, province, urban address, low comorbidity index, high volume hospital, and type of resection. Unfortunately, many important variables that may have influenced the choice of laparoscopic colon surgery could not be included and were discussed in the paper.</p> <p>In terms of interprovincial variation, a number of variables including physician remuneration (some provinces give a premium for doing a colon resection laparoscopically), the prevalence of obesity, and the population density of fellowship trained colorectal/MIS surgeons who can perform laparoscopic colon surgery were not considered but could be discussed further. A discussion of the barriers to incorporation of laparoscopic colon surgery could be further expanded upon in the discussion as well.</p> <p><b>Thank you very much for the constructive feedback and suggestions, which we have included to the best of our ability:</b></p> <p><b>We referred to barriers to incorporation of laparoscopic colectomy in the interpretation: "Our data suggest that such training programs aimed at practicing surgeons in secondary level hospitals may be most effective at increasing pan Canadian use and reducing interprovincial variation. However, limited time to attend training courses, pressure on operating room resources and time and resource constraints for experienced mentors may pose significant barriers (1)."</b></p> <p><b>Unfortunately, our CIHI data do not allow for differentiation of fellowship trained surgeons nor does it reliably capture overweight /obesity. We addressed this in limitations: "Several clinical variables were not available in the DAD maintained by CIHI (e.g. body mass index, tumour stage, local recurrence vs. primary tumour, prior abdominal operation) and thus we are unable to examine their association with laparoscopic colectomy use. We were also not able to distinguish fellowship trained subspecialist surgeons and how their distribution affected interprovincial variation."</b></p> <p><b>Reference: Reviewer 1</b>  <b>(1) Birch DW, Misra M, Farrokhyar F. The feasibility of introducing advanced minimally invasive surgery into surgical practice. Can J Surg 2007 Aug;50(4):256-260.</b></p>
Reviewer 2	Julie Hallet
Institution	Sunnybrook Health Sciences Centre — Odette CancerCentre, Division of General Surgery, Toronto, Ont.
General comments (author response in bold)	<p><b>Thank you very much for the constructive feedback and suggestions, which we have addressed to the best of our ability:</b></p> <p>Hoogerboord and al report a descriptive analysis of the use of laparoscopic colectomy in Canada over a 10-year period. This is interesting information contributing to efforts to further increase the uptake of minimally invasive surgery and improve patient outcomes. I have a few comments that if addressed I believe would improve the impact of the paper. It would provide additional insight on whether practice changes are needed and how to operate them.</p> <p><b>METHODS</b></p> <p>- The authors provided the checklist for the STROBE statement. The study should also be reported according to the RECORD statement for observational routinely collected data.  <b>As per CMAJ editors, the RECORD statement is sufficient</b></p> <p>- The authors used the Elixhauser comorbidity index to assess comorbidity burden. Could they provide a definition and reference for this index, and explain why it was picked over other comorbidity measures using administrative data (such as the ADG system or adapted Charlson index)?  <b>Methods: "A medical comorbidity was defined according to the Elixhauser index, which was specifically developed to be applied to administrative data and that has been shown to outperform other measures of comorbidity, including the Charlson index (1-3)".</b></p> <p>- High volume for surgeon and institutions was defined using the 75th percentile. This results in surprisingly low cut-off for high volumes (7/year for surgeon).  a) Did the authors consider using cut-offs from previously published work on volume-outcomes? How could their decision have impacted outcomes?  b) To appreciate this, it could be interesting to provide details of volume distribution for surgeons and institutions (also by provinces), and consider a sensitivity analysis using higher cut-offs to test the robustness of results.  c) was sub-group analysis based on volumes considered?  - There were significant variations in use of laparoscopy between provinces. I suspect the same was true for institutions (although not reported). How did the author account for clustering effects? This would significantly impact results and should be addressed using appropriate statistical methods.  <b>a, b, c) Several methods to describe surgeon and hospital volume are used in the literature, including tertiles, quartiles, percentiles that allow for similar numbers of patients in each group and arbitrary cut-off volumes (4-7). We therefore feel that our use of quartiles is acceptable and a more accurate representation of the Canadian experience than what a generic number would be. We were however also surprised by the low annual surgeon volumes in our data. We decided to dichotomize volume quartiles into high and low as the small differences between lower quartiles (Surgeon volume quartiles; 1: 1-2, 2: 2.1-3.88, 3: 3.9-7.0, hospital volume quartiles; 1: 1-3.89, 2: 3.90-16.18, 3: 16.27-36.63) maybe difficult to interpret and are likely of little clinical significance.</b></p> <p><b>Although a more detailed analysis of the impact of provider and hospital volumes on laparoscopic colectomy would have been interesting we feel that it is beyond the scope of this paper; the primary objective of our study was to describe the pan Canadian use and uptake of laparoscopic colectomy, similar to what has been done in</b></p>

other countries /jurisdictions (8-13), rather than testing statistical hypotheses regarding drivers of uptake.

To account for clustering we compared the mean proportion of provincial laparoscopic colectomies per patient to that of surgeons and of surgeons to that of institutions by paired t-test:

**Analysis:** "To assess the effects of clustering we compared the mean proportion of provincial laparoscopic colectomies per patient to that of surgeons and of surgeons to that of institutions by one tailed paired t-test."

**Results:** "The mean proportion of laparoscopic surgeries per surgeon was lower than per patient (0.26 vs. 0.31,  $p=0.02$ ), and lower per institution than per surgeon (0.23 vs. 0.26,  $p=0.02$ ), reflecting a clustering of the procedure within physicians and additional clustering within institutions, with more procedures being performed by high volume surgeons and in high volume hospitals."

#### RESULTS

- Could the authors provide information re the diagnosis for which patients were operated on? The CIHI-DAD should include ICD-10 diagnosis codes to classify in benign vs malignant at a minimum.

**The study only included patients who underwent elective colectomy for colon cancer, the diagnostic and intervention codes were included in the Methods:** "Patients with an International Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA) (14) primary diagnosis of colon cancer (C18.0-18.9 or C19) and a Canadian Classification of Health Intervention (CCI) (15) procedure code for colectomy (1.NM.87, 89, 91 or 1.NQ.87) were identified."

- Could length of stay be obtained from CIHI-DAD?

**We included a description of postoperative length of stay and in hospital mortality;**

**Methods:**"Baseline characteristics, in hospital mortality and postoperative length of stay, defined as number of days from day of surgery up to and including day of discharge, of laparoscopic and open colectomy groups were compared by use of Student's t test for continuous and chisquare test for categorical variables."

**Interpretation:** "Compared to open colectomy, patients who underwent laparoscopic colectomy had lower in hospital mortality (0.82% vs. 2%) and 2.9 days shorter postoperative length of stay."

- There were significant variations by provinces. Could the authors elaborate on this? Including information on baseline and clinical characteristics comparison between provinces, to better appreciate the sources of this variation. This would be helpful information in addressing how to act on the reported results - what factors underlie the variation? how can we improve the uptake of laparoscopic surgery where it is less used?

**Included in Interpretation:** "Factors that increased the likelihood of laparoscopic colectomy included later year of study, younger age, lower level of medical comorbidities, urban residence, right hemicolectomy and high surgeon and hospital volume. It is therefore not surprising that provinces with older populations and higher rural / urban ratios had lower uptake of laparoscopic colectomy".

- The multivariate analysis is interesting but limited. The most interesting thing about this data would be to gain insight about the reasons why laparoscopy may not be used. This may help design interventions to further increase its uptake.

#### DISCUSSION

- Please reference the comments on mentorship programs for MIS (lines 48-54 page 6).

**Included in Interpretation:** "To ensure the safety and effectiveness of laparoscopic colectomy, established surgeons in particular need to engage in comprehensive training programs that include all members of the perioperative team as well as ongoing post course mentorship (16). Our data suggest that such training programs aimed at practicing surgeons in secondary level hospitals may be most effective at increasing pan Canadian use and reducing interprovincial variation. However, limited time to attend training courses, pressure on operating room resources and time and resource constraints for experienced mentors may pose significant barriers (17)".

- The implications of the results are not discussed much. How should these results be used? How can they inform changes in practice, training, or policy? Is the current use of laparoscopic colectomy appropriate or is there room for improvement? This is important to bring this paper passed its descriptive nature.

**To clarify the implications of our results we edited our Interpretation and Conclusion as follows:** "The introduction of technically advanced procedures can be associated with harm (18). The traditional model of a short course followed by a "learning curve" during which a surgeon gains experience and proficiency is fraught with legal and ethical dilemmas and often fails to establish change in practice over the long term (19). To ensure the safety and effectiveness of laparoscopic colectomy, established surgeons in particular need to engage in comprehensive training programs that include all members of the perioperative team as well as ongoing post course mentorship (16). Our data suggest that such training programs aimed at practicing surgeons in secondary level hospitals may be most effective at increasing pan Canadian use and reducing interprovincial variation. However, limited time to attend training courses, pressure on operating room resources and time and resource constraints for experienced mentors may pose significant barriers (17)."

#### Conclusion

"Although the use of elective laparoscopic colectomy for cancer increased significantly in the decade following the publication of seminal randomized trials there is still room for improvement. Significant interprovincial variation in use of laparoscopic colectomy exists, with lowest use in provinces with smaller, older and more rural populations. Further knowledge translation strategies are needed to ensure equal access to the benefits of laparoscopic colectomy for all Canadians."

#### References: Reviewer 2

(1) Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. Med Care 1998 Jan;36(1):8-27.

(2) Southern DA, Quan H, Ghali WA. Comparison of the Elixhauser and Charlson/Deyo methods of comorbidity measurement in administrative data. Med Care 2004 Apr;42(4):355-360.

(3) Sharabiani MT, Aylin P, Bottle A. Systematic review of comorbidity indices for administrative data. Med Care 2012 Dec;50(12):1109-1118.

(4) Damle RN, Macomber CW, Flahive JM, Davids JS, Sweeney WB, Sturrock PR, et al. Surgeon volume and elective

	<p>resection for colon cancer: an analysis of outcomes and use of laparoscopy. J Am Coll Surg 2014 Jun;218(6):1223-1230.</p> <p>(5) Karanicolas PJ, Dubois L, Colquhoun PH, Swallow CJ, Walter SD, Guyatt GH. The more the better?: the impact of surgeon and hospital volume on in-hospital mortality following colorectal resection. Ann Surg 2009 Jun;249(6):954-959.</p> <p>(6) Buurma M, Kroon HM, Reimers MS, Neijenhuis PA. Influence of Individual Surgeon Volume on Oncological Outcome of Colorectal Cancer Surgery. Int J Surg Oncol 2015;2015:464570.</p> <p>(7) Drolet S, MacLean AR, Myers RP, Shaheen AA, Dixon E, Buie WD. Elective resection of colon cancer by high-volume surgeons is associated with decreased morbidity and mortality. J Gastrointest Surg 2011 Apr;15(4):541-550.</p> <p>(8) Kemp JA, Finlayson SR. Nationwide trends in laparoscopic colectomy from 2000 to 2004. Surg Endosc 2008 May;22(5):1181-1187.</p> <p>(9) Rea JD, Cone MM, Diggs BS, Deveney KE, Lu KC, Herzig DO. Utilization of laparoscopic colectomy in the United States before and after the clinical outcomes of surgical therapy study group trial. Ann Surg 2011 Aug;254(2):281-288.</p> <p>(10) Moghadamyeghaneh Z, Carmichael JC, Mills S, Pigazzi A, Nguyen NT, Stamos MJ. Variations in Laparoscopic Colectomy Utilization in the United States. Dis Colon Rectum 2015 Oct;58(10):950-956.</p> <p>(11) Dobbins TA, Young JM, Solomon MJ. Uptake and outcomes of laparoscopically assisted resection for colon and rectal cancer in Australia: a population-based study. Dis Colon Rectum 2014 Apr;57(4):415-422.</p> <p>(12) Park SJ, Lee KY, Lee S. Laparoscopic Surgery for Colorectal Cancer in Korea: Nationwide Data from 2008-2013. J Minim Invasive Surg 2015;18(2):39-43.</p> <p>(13) Chan BP, Gomes T, Musselman RP, Auer RC, Moloo H, Mamdani M, et al. Trends in colon cancer surgery in Ontario: 2002-2009. Colorectal Dis 2012 Oct;14(10):e708-12.</p> <p>(14) Canadian Institute for Health Information. International Statistical Classification of Diseases and Related Health Problems, 10th Revision. 2009; Available at: <a href="https://www.cihi.ca/en/icd_10_ca_vol1_2009_en.pdf">https://www.cihi.ca/en/icd_10_ca_vol1_2009_en.pdf</a>. Accessed 12/03, 2017.</p> <p>(15) Canadian Institute for Health Information. Canadian Classification of Health Interventions, Volume Three. 2012; Available at: <a href="https://www.cihi.ca/en/cci_volume_three_2012_en.pdf">https://www.cihi.ca/en/cci_volume_three_2012_en.pdf</a>. Accessed 12/03, 2017.</p> <p>(16) Birch DW, Bonjer HJ, Crossley C, Burnett G, de Gara C, Gomes A, et al. Canadian consensus conference on the development of training and practice standards in advanced minimally invasive surgery: Edmonton, Alta, Jun. 1, 2007. Can J Surg 2009 Aug;52(4):321-327.</p> <p>(17) Birch DW, Misra M, Farrokhyar F. The feasibility of introducing advanced minimally invasive surgery into surgical practice. Can J Surg 2007 Aug;50(4):256-260.</p> <p>(18) Moore MJ, Bennett CL. The learning curve for laparoscopic cholecystectomy. The Southern Surgeons Club. Am J Surg 1995 Jul;170(1):55-59.</p> <p>(19) Healey P, Samanta J. When does the 'learning curve' of innovative interventions become questionable practice? Eur J Vasc Endovasc Surg 2008 Sep;36(3):253-257.</p>
Reviewer 3	Carl Brown
Institution	Division of General Surgery, St. Paul's Hospital, Vancouver, BC
General comments (author response in bold)	<p><b>Thank you very much for the constructive feedback and suggestions, which we have addressed to the best of our ability.</b></p> <p>The authors present data demonstrating differential increase (but, uniformly increased utilization) in laparoscopic surgery across 9 provinces in Canada over the study period of 2004-2014. As the authors outline, this is an important study that evaluates the relative enthusiasm for adoption of new technology by general surgeons involved in colorectal cancer care.</p> <p>The authors use ICD 10 and CCI codes to identify patients with colorectal cancer and colectomy surgical intervention, respectively. They provide no evidence of validation of these administrative codes for either diagnosis or procedure. If they are not aware of validation work and have not conducted this diligence themselves, they should include this as a serious limitation of their work/assumptions. Furthermore, they should cite studies that have investigated other diagnostic and procedure codes to give the reader a sense of the range of the accuracies of using simple codes (rather than a validated multi-step process to confirm diagnostic code - see Rezaie, Quan, fedorak Rn, Panaccione R, hilsden RJ. Development and validation of an administrative case definition for inflammatory bowel diseases. Can J Gastroenterol. 2012;26:711-717). Similar research on procedural codes should be cited.</p> <p><b>Included in Methods: "As part of its quality assurance processes, CIHI conducts regular reabstraction studies to validate the accuracy of diagnostic and procedure coding in the DAD (1). Furthermore, our selection of diagnostic and procedure codes are consistent with codes validated by the Institute for Clinical Evaluative Sciences (ICES) (2)."</b></p> <p><b>"Also, as of 2004 therapeutic data in the DAD from all provinces were classified in a common manner according to the Canadian Classification of Health Intervention (CCI), which includes specific codes for laparoscopic colectomy (3). Prior to 2004, the Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures (CCP) used procedure modifier codes to indicate laparoscopic colectomy, which is known to significantly underestimate its use (4,5)."</b></p> <p>In the discussion, the authors mention surgeons trained in fellowship (residency training in the laparoscopic era should be considered as well). A surrogate for this could be surgeons who are new to the data set (i.e. new surgeon codes year by year) compared to established surgeons (surgeon whose unique identifier was in the data in 2004).</p> <p><b>We did consider using a surrogate as described above. However, to calculate average surgeon volumes for example, we only included years in which at least 1 colectomy was performed. It could have therefore been possible, especially in smaller provinces, that a practicing surgeon did not perform any colectomy in 2004, which would have erroneously included them in the "laparoscopic era" group. Also, we have no baseline data on years of experience /practice preferences of surgeons prior to 2004.</b></p> <p>While the authors analyse the uptake of the procedure, they don't discuss incentives in much detail. It would be important to correlate financial incentives for laparoscopic colon surgery in the individual provinces (certainly, these were introduced in Ontario and BC during the study period) which may influence surgeon behaviour. A delicate issue related to this incentive is the possibility surgeons would start but not complete the procedure laparoscopically to reap this financial reward, thereby undermining the authors' assumptions that the CCI code mostly reflects completion of the procedure laparoscopically.</p> <p><b>Included in Interpretation: "Financial incentives for laparoscopic colectomy may also influence surgeon behaviour. The introduction of a 25% fee premium for laparoscopic colectomy in Ontario may have been a factor in the</b></p>

increased uptake observed in 2005 (6). However, similar laparoscopic fee codes introduced in British Columbia and Nova Scotia in 2011 did not have the same effect (7)."

**We stated in limitations: "In addition, we were not able to distinguish between the various types of laparoscopic colectomy (e.g. completed laparoscopic, laparoscopic assisted, laparoscopic converted to open); therefore, laparoscopic colectomy in this study should be interpreted as a procedure that was at least initiated laparoscopically."**

There is no safety data presented (perioperative mortality, cancer survival), so the possibility of increased rates of laparoscopy (or, at least hospital coding rates increasing) compromising cancer care in practice is an issue. There is data that suggests it has been safely introduced in a Canadian jurisdiction:

Aslani, N., Lobo Prabhu, K., Heidary, B., Phang, T., Raval, M. J., & Brown, C. J. (2012). Outcomes of laparoscopic colon cancer surgery in a population-based cohort in British Columbia: are they as good as the clinical trials? *American Journal of Surgery*, 204(4), 411-415 .

However, there is some evidence that suggests new procedures can be associated with harm

Atallah, S. B., DuBose, A. C., Burke, J. P., Nassif, G., deBeche-Adams, T., Frering, T., et al. (2017). Uptake of Transanal Total Mesorectal Excision in North America, 60(10), 1023-1031. Healey, P., & Samanta, J. (2008). When Does the "Learning Curve" of Innovative Interventions Become Questionable Practice? *European Journal of Vascular and Endovascular Surgery*, 36(3), 253-257. <http://doi.org/10.1016/j.ejvs.2008.05.006>

This issue should be explored.

**In the interpretation we included our data on postoperative length of stay and in hospital mortality and related it to that of other population base studies: "Compared to open colectomy, patients who underwent laparoscopic colectomy had lower in hospital mortality (0.82% vs. 2%) and 2.9 days shorter postoperative length of stay."**

**"Randomized controlled trials demonstrated similar in hospital mortality rate, enhanced postoperative recovery with shorter postoperative length of stay and equivalent oncologic outcomes of elective laparoscopic colectomy, compared to open colectomy (8-11). These were subsequently confirmed by population based studies, although some reported a lower in hospital mortality for laparoscopic colectomy (6,12-15). Our pan Canadian data substantiate shorter length of hospital stay and decreased in hospital mortality for laparoscopic colectomy."**

In Table 1, statistically significant differences between lap and open surgery in gender, comorbidity despite minimal differences in absolute values - I would encourage the authors to comment specifically on these features as examples of limitations of large administrative database research with the caveat that statistical significance in these data should be interpreted with caution. Related to the previous suggestion, it is likely that the variance related to uncertainty in the diagnosis/procedure codes would overwhelm the uncertainty in these features.

**Included in Limitations: "Observed differences in mortality and length of stay outcomes, even after controlling for modest differences in baseline characteristics of open and laparoscopic groups, may be at least partially explained by unmeasured factors contributing to a selection bias."**

A small suggested change - in Table 1, surgical volumes (surgeon, hospital) should be expressed in whole numbers (see "high volume") to be clinically meaningful.

**The numbers for surgeon and hospital volumes were adjusted to the nearest whole.**

#### References: Reviewer 3

- (1) Canadian Institute for Health Information. Discharge Abstract Database Metadata (DAD). 2017; Available at: <https://www.cihi.ca/en/discharge-abstract-database-metadata>. Accessed 12/03, 2017.
- (2) Juurlink D, Preyra C, Croxford R, Chong A, Austin P, Tu J, et al. Canadian Institute for Health Information Discharge Abstract Database: A Validation Study. Toronto: Institute for Clinical Evaluative Sciences. 2006; Available at: <https://www.ices.on.ca/flip-publication/canadian-institute-for-health-information-discharge/files/assets/basic-html/index.html#3>. Accessed 03/27, 2018.
- (3) Senagore AJ. Adoption of Laparoscopic Colorectal Surgery: It Was Quite a Journey. *Clin Colon Rectal Surg* 2015 Sep;28(3):131-134.
- (4) Langenfeld SJ, Thompson JS, Oleynikov D. Laparoscopic colon resection: is it being utilized? *Adv Surg* 2013;47:29-43.
- (5) Sticca RP, Alberts SR, Mahoney MR, Sargent DJ, Finstuen LM, Nelson GD, et al. Current use and surgical efficacy of laparoscopic colectomy in colon cancer. *J Am Coll Surg* 2013 Jul;217(1):56-62; discussion 62-3.
- (6) Simunovic M, Baxter NN, Sutradhar R, Liu N, Cadeddu M, Urbach D. Uptake and patient outcomes of laparoscopic colon and rectal cancer surgery in a publicly funded system and following financial incentives. *Ann Surg Oncol* 2013 Nov;20(12):3740-3746.
- (7) Nova Scotia Medical Services Insurance. Physician's bulletin, Volume XLVIII - #1. March 26, 2012; Available at: <http://msi.medavie.bluecross.ca/wp-content/uploads/sites/3/2015/07/634-995-MSI-Physicians-Bulletin-March-2012.pdf>. Accessed 04/02, 2018.
- (8) Laparoscopically assisted colectomy is as safe and effective as open colectomy in people with colon cancer Abstracted from: Nelson H, Sargent D, Wieand HS, et al; for the Clinical Outcomes of Surgical Therapy Study Group. A comparison of laparoscopically assisted and open colectomy for colon cancer. *N Engl J Med* 2004; 350: 2050-2059. *Cancer Treat Rev* 2004 Dec;30(8):707-709.
- (9) Veldkamp R, Kuhry E, Hop WC, Jeekel J, Kazemier G, Bonjer HJ, et al. Laparoscopic surgery versus open surgery for colon cancer: short-term outcomes of a randomised trial. *Lancet Oncol* 2005 Jul;6(7):477-484.
- (10) Guillou PJ, Quirke P, Thorpe H, Walker J, Jayne DG, Smith AM, et al. Short-term endpoints of conventional versus laparoscopic-assisted surgery in patients with colorectal cancer (MRC CLASICC trial): multicentre, randomised controlled trial. *Lancet* 2005 May 14-20;365(9472):1718-1726.
- (11) Lacy AM, Garcia-Valdecasas JC, Delgado S, Castells A, Taura P, Pique JM, et al. Laparoscopy-assisted colectomy versus open colectomy for treatment of non-metastatic colon cancer: a randomised trial. *Lancet* 2002 Jun 29;359(9325):2224-2229.
- (12) Aslani N, Lobo-Prabhu K, Heidary B, Phang T, Raval MJ, Brown CJ. Outcomes of laparoscopic colon cancer surgery in a population-based cohort in British Columbia: are they as good as the clinical trials? *Am J Surg* 2012 Oct;204(4):411-415.
- (13) Cone MM, Herzig DO, Diggs BS, Dolan JP, Rea JD, Deveney KE, et al. Dramatic decreases in mortality from laparoscopic colon resections based on data from the Nationwide Inpatient Sample. *Arch Surg* 2011 May;146(5):594-599.

- |  |  |
|--|--|
|  | <p>(14) Babaei M, Balavarca Y, Jansen L, Gondos A, Lemmens V, Sjovald A, et al. Minimally Invasive Colorectal Cancer Surgery in Europe: Implementation and Outcomes. <i>Medicine (Baltimore)</i> 2016 May;95(22):e3812.</p> <p>(15) Dobbins TA, Young JM, Solomon MJ. Uptake and outcomes of laparoscopically assisted resection for colon and rectal cancer in Australia: a population-based study. <i>Dis Colon Rectum</i> 2014 Apr;57(4):415-422.</p> |
|--|--|