# Pan-Canadian colorectal cancer surgery data: an opportunity for reflection and improvement

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**Summary**

Variation in data provides an opportunity for health care providers to assess how patient care can be improved. Pan-Canadian colorectal cancer data show that, although long-term survival is similar among provinces, differences exist in other important aspects of care: length of stay, minimally invasive approach, readmission, and short-term mortality. Examining variation among stakeholders involved with colorectal cancer allows the opportunity to reflect on and optimize care.

Canada has achieved substantial reductions in the burden of colorectal adenocarcinoma. However considerable efforts will be needed to continue to improve outcomes. Recognizing the central role of surgical care in improving survival for colorectal cancer, the Canadian Partnership Against Cancer released pan-Canadian and jurisdictional surgical data. The objective was to present data related to various surgical indicators to encourage quality-improvement discussions. This article discusses the variation in care that patients with colorectal cancer receive in Canada and emphasizes that Pan-Canadian benchmarking yields important information for all who care for these patients — this should be an ongoing data source we are able to reflect on to target areas for improvement.

The data in this paper come from the following sources: the Canadian Institute for Health Information's Discharge Abstract Database and National Ambulatory Care Reporting System (up to fiscal year 2018/19); International Cancer Benchmarking Partnership publications (survival data); and the Canadian Cancer Registry linked with various other data holdings through Statistics Canada's Social Data Linkage Environment (selected indicators from 2014 or earlier). It should be noted, there are no data from the province of Quebec.

## Key points

First, according to the American College of Gastroenterology, because of improved screening, there has been a decrease in the incidence of colorectal cancer, which correlated with a 9% decrease in the volume of colorectal cancer surgery in Canada between 2013 and 2018. After surgery is performed, 5-year survival is arguably the most important metric to a person with cancer, and there is minimal variation in 5-year survival across the country. In addition, the survival rate in Canada is comparable to that in the United States and European countries.

The mortality rate is low, and while there is variation, it is comparable with international standards (Figure 1). The rate is 25.1 deaths per 1000 cases nationally, with the mortality rate in both Ontario and Nova Scotia exceeding this. The percentage of patients dying within 90 days of their surgery was lowest in Manitoba at 3%; the percentage was 5% or higher in British Columbia,

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Nova Scotia, Ontario and Saskatchewan. Based on the literature, early mortality is related to perioperative adverse events, comorbidities and possibly to surgical volume.[1,2] Reducing morbidity is important with respect to mortality but also to length of stay (LOS) and readmission, which in turn decrease the burden of colorectal cancer on health care systems, patients and their families.

Hospital costs are typically related to LOS, and the latest data available show significant variation among provinces. The pan-Canadian median is 6 days, with provincial averages ranging from 5 (British Columbian, Ontario) to 8 days (Manitoba) (Figure 2). This is inversely correlated with the use of minimally invasive surgery (MIS), which was greatest in British Columbia and Ontario (Figure 3). While many factors contribute to LOS, the most accessible, modifiable factors are the creation and adoption of Enhanced Recovery After Surgery (ERAS) protocols and MIS.[3,4]

One paradigm shift in colorectal surgery has been the use of ERAS, which is associated with decreased LOS, complications and mortality.[5] There are resources available to help

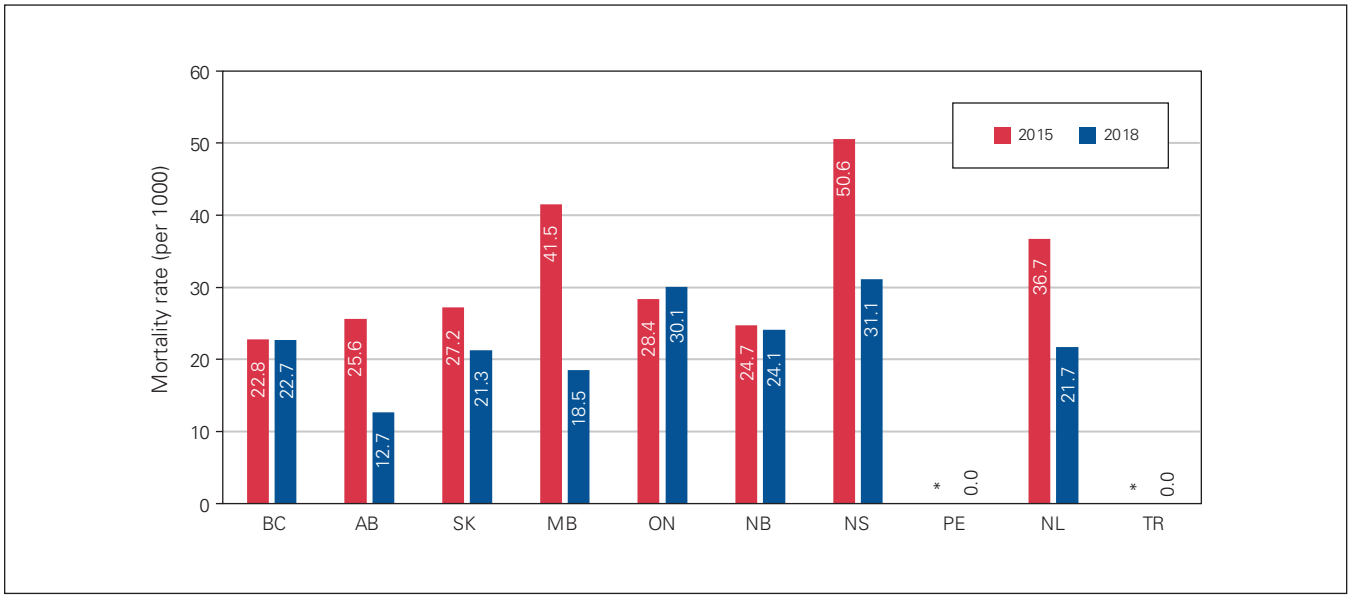


**Fig. 1.** Mortality rate (per 1000) in acute care hospitals for patients undergoing colorectal cancer surgeries across Canada (fiscal years 2015 and 2018).*Data from Prince Edward Island and the territories (TR) were suppressed due to small numbers.

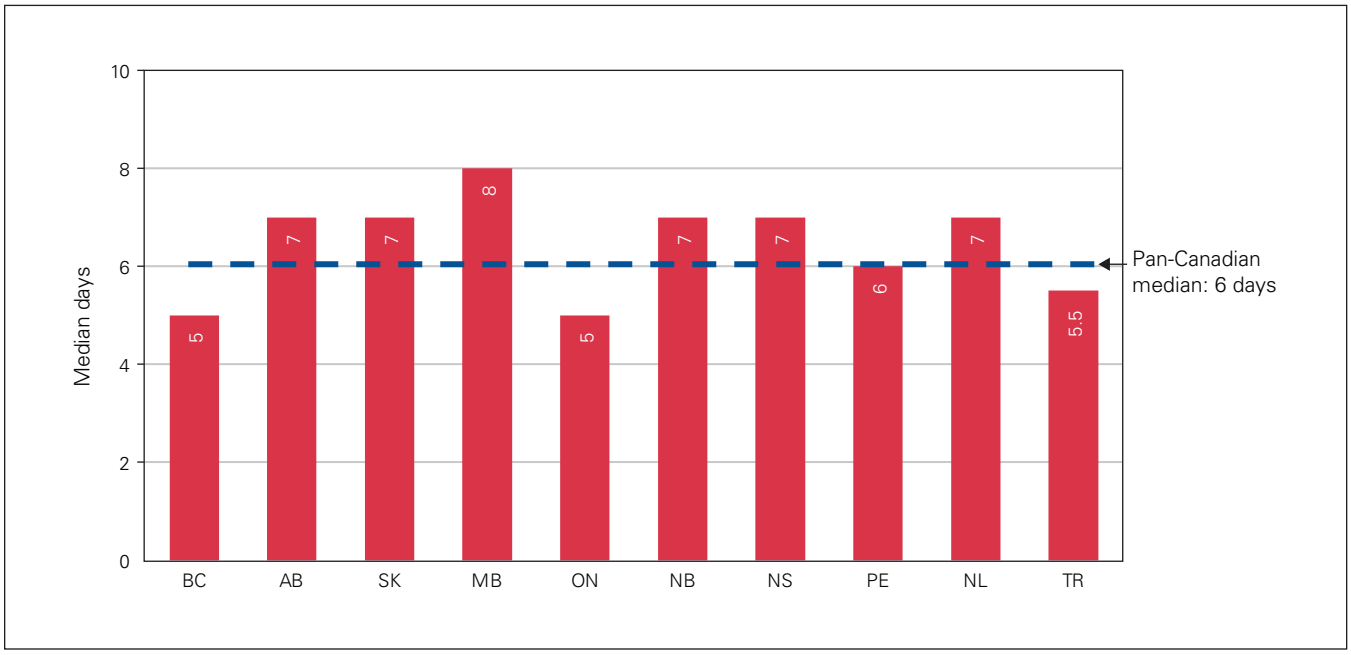


**Fig. 2.** Median length of stay in acute care hospitals among patients with colorectal cancer who were alive at discharge (fiscal year 2018). TR = territories.

hospitals implement this cost-effective, multidisciplinary program.[6] Every province, institution and surgeon should aim to not only implement an ERAS protocol, but also to ensure that the requisite components are being followed.

Minimally invasive surgery has been shown to decrease LOS, pain and complications such as surgical site infection (SSI).[4] It was used in 44% of cases across the country, with British Columbia, Ontario and the territories exceeding that rate (Figure 3). Previous studies have shown that the surgeons' preferred way to acquire these skills is through mentoring. Fortunately, this occurs increasingly in our training programs. Further, the Canadian Association of General Surgeons has started the LapCo program, which is designed to mentor surgeons who would like to offer an MIS approach to their colorectal patients. Advocating adjustments in billing codes to ensure recognition of the importance of an MIS approach should be considered. Indeed, MIS procedures can increase operative time, which was also seen as a potential barrier by Canadian surgeons.[7]

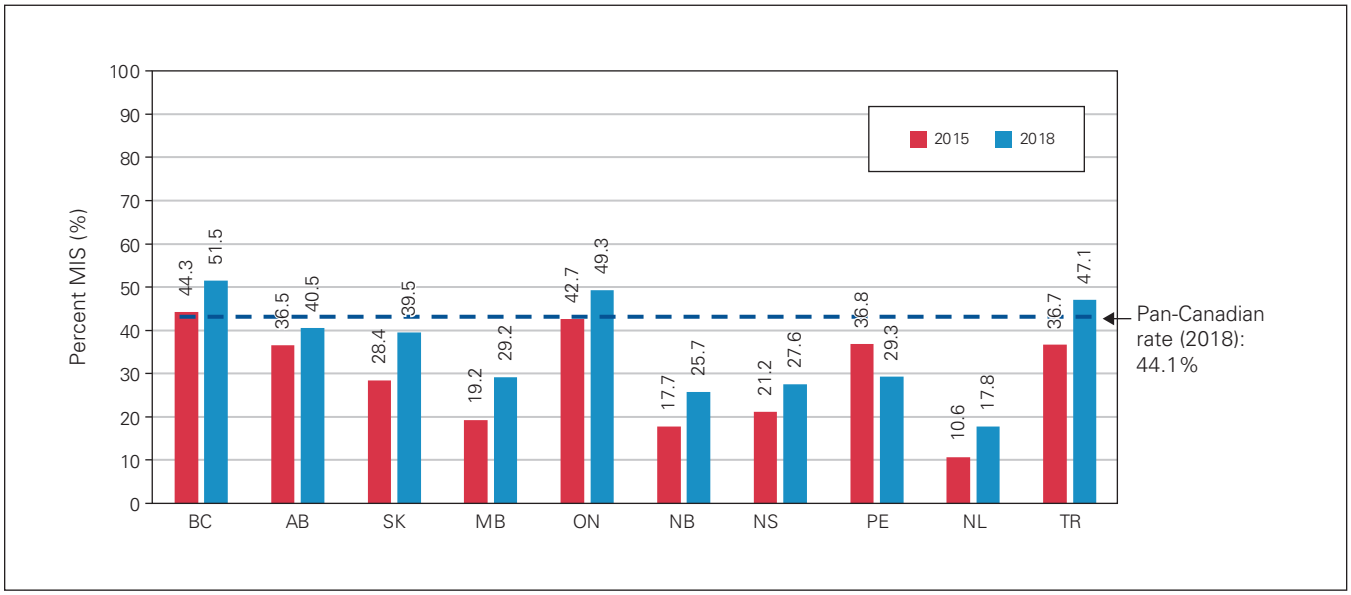


**Fig. 3.** Percentage of minimally invasive surgeries performed for colorectal cancer across Canada (fiscal years 2015 and 2018). TR = territories.

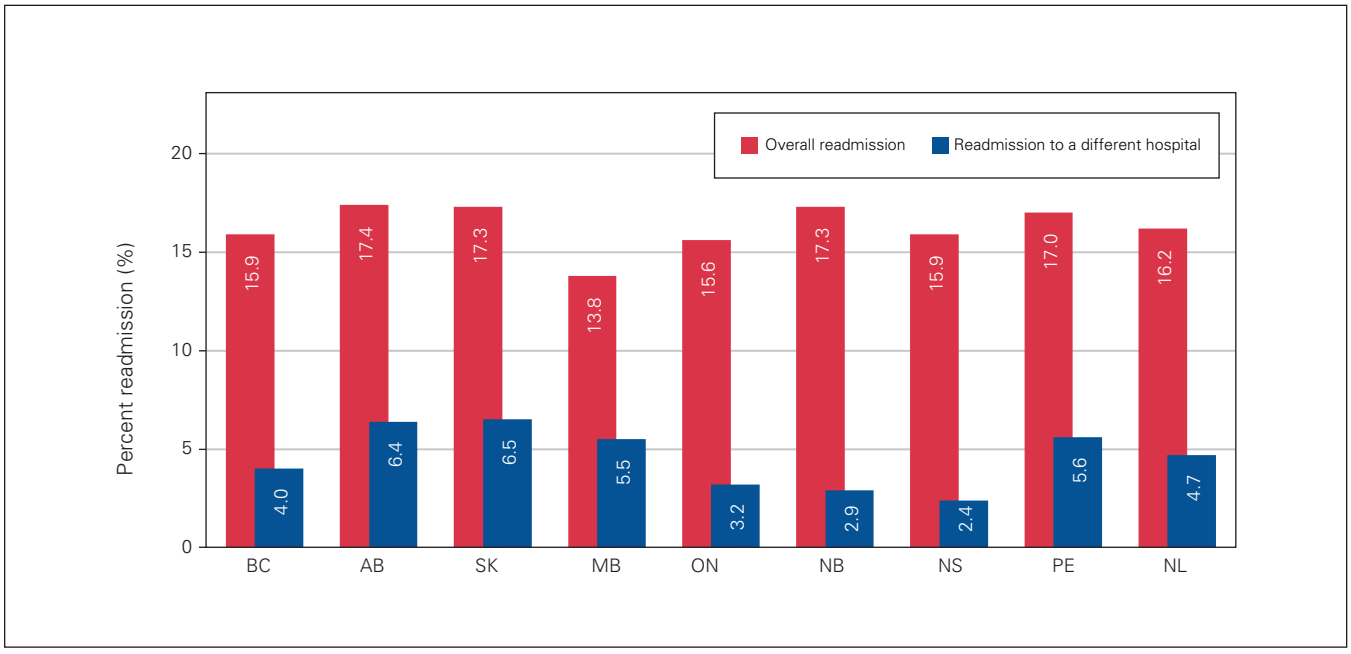


**Fig. 4.** Unplanned readmissions and deaths. Percentage of hospitalizations with readmission (overall and to a different hospital) within 90 days of colorectal cancer surgery (diagnosis year 2014).

In alignment with the Action Plan to Optimize Cancer Surgery in Canada, surgeons need to understand that the preoperative period is a window of opportunity and ensure they take advantage of it. The unplanned readmission rate across the country is between 13.8% and 17.4%, with Manitoba having the lowest rate, while Nova Scotia, New Brunswick and Saskatchewan have the highest rates (Figure 4). Important causes of readmission after colorectal surgery include SSI and bowel complications (anastomotic leak and obstruction). It is well known that MIS approaches reduce SSI and that preoperative characteristics, such as smoking, increase the risk of anastomotic complications.[4] It has also been shown that poor functional status was associated with longer LOS and higher readmission rate.[8] Preoperatively, surgeons should focus on modifiable factors, such as smoking cessation, anemia treatment, glycemic control, and prehabilitation. Those actions, combined with the implementation of ERAS and MIS, could have an impact on the readmission rate.

## Discussion

The data presented in this manuscript are broad but provide important insight into the variation of colorectal cancer surgery outcomes across Canada. We have proposed some explanations for the variation among provinces, although granular data are lacking and therefore the explanations are speculation. Benchmarking of more specific data would be useful to target efforts to improve the quality of care. For example, more specific data on not only patient characteristics, but also process measures such as the use of ERAS protocols, multidisciplinary cancer rounds, and hospital/surgeon volumes, could be explored.

Many of the improvements mentioned in this article relate to better integration of surgical and medical care. These data also support the notion that there should be funding for ongoing research into outcomes, innovative solutions, and knowledge translation strategies. There are provinces that outperform the national average in specific areas. The Canadian Association of Thoracic Surgeons has used the concept of positive deviants at their annual national meeting to advance the quality of care by inviting high-performing centres to share their best practices. This type of initiative is something other national organizations may want to adopt.

Finally, there should be an effort to identify opportunities to improve delivery of optimal care in vulnerable or underserviced areas. Whether this is achieved through initiatives such as comprehensive benchmarking, concentration of the surgical treatment, standards or accreditation of care, mentorship programs, or using virtual multidisciplinary rounds, a critical piece will be the ongoing use of data to not only identify areas of opportunity, but also to create dialogue to identify best practice.[1]

Canadian surgical care continues to improve year over year, leading many countries in the care we deliver. The challenge is that despite our universal care model, we do not deliver best practice care universally. The hope is that by knowing and reflecting on our own data, we can move closer toward that goal.

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**Competing interests:** A. MacLean declares receiving an honorarium from Johnson & Johnson for teaching at the Canadian Colorectal Surgery Fellows Bootcamp, and he has been the Chair of the Royal College of Physicians and Surgeons of Canada's examination committee for general surgery. H. Moloo declares honoraria from SAEGIS for quality-improvement work, Johnson & Johnson for teaching at the Colorectal Surgery Fellows Bootcamp, and Cancer Care Manitoba for a lecture on quality improvement. He is also president of the Canadian Society of Colon and Rectal Surgeons and a board member of the Ontario Association of General Surgeons. No other competing interests were declared.

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## References

1. Iversen LH, Green A, Ingeholm P, et al. Improved survival of colorectal cancer in Denmark during 2001-2012 — The efforts of several national initiatives. *Acta Oncol* 2016;55:10-23.
2. Degett TH, Dalton SO, Christensen J, et al. Mortality after emergency treatment of colorectal cancer and associated risk factors — a nationwide cohort study. *Int J Colorectal Dis* 2019;34 :85-95.
3. Balvardi S, Pecorelli N, Castelino T, et al. Measuring in-hospital recovery after colorectal surgery within a well-established enhanced recovery pathway: a comparison between hospital length of stay and time to readiness for discharge. *Dis Colon Rectum* 2018;61:854-60.
4. Schwenk W, Haase O, Neudecker J, et al. Short term benefits for laparoscopic colorectal resection. *Cochrane Database Syst Rev* 2005;2005:CD003145.
5. Zhuang CL, Ye XZ, Zhang XD, et al. Enhanced recovery after surgery programs versus traditional care for colorectal surgery: a meta-analysis of randomized controlled trials. *Dis Colon Rectum* 2013;56:667-78.
6. Gustafsson UO, Scott MJ, Hubner M, et al. Guidelines for perioperative care in elective colorectal surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations: 2018. *World J Surg* 2019;43:659-95.
7. Moloo H, Haggar F, Martel G, et al. The adoption of laparoscopic colorectal surgery: a national survey of general surgeons. *Can J Surg* 2009;52:455-62.
8. Fagard K, Leonard S, Deschodt M, et al. The impact of frailty on postoperative outcomes in individuals aged 65 and over undergoing elective surgery for colorectal cancer: a systematic review. *J Geriatr Oncol* 2016;7:479-91.