

CAGS AND ACS EVIDENCE BASED REVIEWS IN SURGERY. 33

The association between colonoscopy and deaths from colorectal cancer

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The term “evidence-based medicine” was first coined by Sackett and colleagues as “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.”¹ The key to practising evidence-based medicine is applying the best current knowledge to decisions in individual patients. Medical knowledge is continually and rapidly expanding. For clinicians to practise evidence-based medicine, they must have the skills to read and interpret the medical literature so that they can determine the validity, reliability, credibility and utility of individual articles. These skills are known as critical appraisal skills, and they require some knowledge of biostatistics, clinical epidemiology, decision analysis and economics, and clinical knowledge.

Evidence Based Reviews in Surgery (EBRS) is a program jointly sponsored by the Canadian Association of General Surgeons (CAGS) and the American College of Surgeons (ACS) and is supported by an educational grant from ETHICON and ETHICON ENDO-SURGERY, both units of Johnson & Johnson Medical Products, a division of Johnson & Johnson and ETHICON Inc. and ETHICON ENDO-SURGERY Inc., divisions of Johnson & Johnson Inc. The primary objective of EBRS is to help practising surgeons improve their critical appraisal skills. During the academic year, 8 clinical articles are chosen for review and discussion. They are selected for their clinical relevance to general surgeons and because they cover a spectrum of issues important to surgeons, including causation or risk factors for disease, natural history or prognosis of disease, how to quantify disease, diagnostic tests, early diagnosis and the effectiveness of treatment. A methodological article guides the reader in critical appraisal of the clinical article. Methodological and clinical reviews of the article are performed by experts in the relevant areas and posted on the EBRS website, where they are archived indefinitely. In addition, a listserv allows participants to discuss the monthly article. Surgeons who participate in the monthly packages can obtain Royal College of Physicians and Surgeons of Canada Maintenance of Certification credits and/or continuing medical education credits for the current article only by reading the monthly articles, participating in the listserv discussion, reading the methodological and clinical reviews and completing the monthly online evaluation and multiple choice questions.

We hope readers will find EBRS useful in improving their critical appraisal skills and in keeping abreast of new developments in general surgery. Four reviews are published in condensed versions in the *Canadian Journal of Surgery* and 4 are published in the *Journal of the American College of Surgeons*. For further information about EBRS, please refer to the CAGS or ACS websites. Questions and comments can be directed to the program administrator, Marg McKenzie, at mmckenzie@mtsinai.on.ca.

Reference

1. Evidence-Based Medicine Working Group. Evidence-based medicine. *JAMA* 1992;268:2420-5.

SELECTED ARTICLE

Baxter NN, Goldwasser MA, Paszat LF, et al. Association of colonoscopy and death from colorectal cancer. *Ann Intern Med* 2009;150:1–8.

ABSTRACT

Objective: To evaluate the association between colonoscopy and colorectal cancer (CRC) deaths. **Design:** Observational case-control study. **Data source:** Four databases: the Ontario Cancer Registry, Mortality File, Ontario Health Insurance Plan and the Canadian Institute for Health Information hospital discharge abstract databases. **Cases:** Patients aged 52–90 years who received a diagnosis of CRC between June 1996 and December 2001 and who died of CRC between January 1996 and December 2003. Patients were identified by use of International Classification of Diseases (ICD-9) codes. **Controls:** Each case was matched with 5 controls based on factors felt to influence colonoscopy rates and risk of CRC death, including sex, socioeconomic status, age and geographic location. Once a list of all matches for each case was identified, 5 controls were randomly selected for each one. **Main outcome:** Exposure to colonoscopy. **Results:** In total, 10 292 cases and 51 460 controls were identified; 719 cases (7.0%) and 5031 controls (9.8%) had undergone colonoscopy. Compared with controls, cases were less likely to have undergone any attempted colonoscopy (adjusted conditional odds ratio [OR] 0.69, 95% confidence interval [CI] 0.63–0.74, $p < 0.001$) or complete colonoscopy (adjusted conditional OR 0.63, 95% CI 0.57–0.69, $p < 0.001$). Complete colonoscopy was strongly associated with fewer deaths from left-sided CRC (adjusted conditional OR 0.33, 95% CI 0.28–0.39) but not from right-sided CRC (adjusted conditional OR 0.99, 95% CI 0.86–1.14). **Conclusion:** In usual practice, colonoscopy is associated with fewer deaths from CRC. This association is primarily limited to deaths from cancer in the left side of the colon.

COMMENTARY

The objective of the article by Baxter and colleagues¹ was to evaluate the association between colonoscopy and colorectal cancer (CRC) deaths. The authors used administrative claims data from Ontario and performed a case-control study. The authors hypothesized that the use of screening colonoscopy would be associated with fewer CRC deaths, although they hypothesized that the rates of use would be lower than estimates in the literature. The authors found that the use of colonoscopy was associated with fewer CRC-related deaths. Interestingly, this protective effect was realized largely through a reduction in deaths related to left-sided colorectal cancer.

It is worth reviewing some of the background informa-

tion surrounding screening for CRC and specifically the use of colonoscopy as a screening tool. Colorectal cancer is the second most common cause of cancer-related deaths in North America.² In North America, numerous groups recommend the use of colonoscopy as a means of both prevention and early treatment for both colorectal polyps and cancers.³ Consequently, the use of screening colonoscopy has increased in North America and is generally viewed as the preferred method. There are no data from randomized clinical trials (RCT) demonstrating its efficacy. The evidence for its use is indirect and extrapolated and has been inferred from RCTs of fecal occult blood test screening that have resulted in reductions in CRC-related deaths.⁴

The ideal method to assess the efficacy of a screening tool is an RCT comparing screened and unscreened populations. This, however, requires a large sample size to give the study sufficient power to detect clinically significant differences. These studies are usually expensive and time-consuming. In addition, screening colonoscopy is already widely entrenched in North America as the preferred method of screening for colorectal polyps and cancer. Thus, Baxter and colleagues¹ chose to assess the efficacy of screening colonoscopy by performing a case-control study. Case-control studies are usually less expensive and time-consuming than RCTs. They do, however, require careful planning and consideration with regards to the methods used to minimize both bias and confounding. Case-control studies do not involve the random allocation of patients and, therefore, confounding cannot be controlled by randomization. In case-control studies, the outcome of interest is present at the outset. Both the cases and controls are selected. Matching of cases and controls based on certain characteristics is used to minimize confounding. In this study, the use of colonoscopy was evaluated in 2 groups: those who died from CRC and members of the population from which the cases originated (CRC diagnosis) who had a screening history reflective of the population in question. The authors used robust methods to determine the efficacy of screening colonoscopy in a “real-world” population (as opposed to the results from a single centre of excellence).

Although case-control studies can only show an association with the outcome of interest, this study seems to confirm that colonoscopy reduces the risk of CRC-related deaths. The study also demonstrates that this protective effect is because of reductions in CRC-related deaths from left-sided cancers and that colonoscopy does not appear to confer any benefit in preventing right-sided CRC. This finding is somewhat surprising and unexpected. There are a number of possible explanations that may partially explain this finding, some of which are linked to the potential limitations of this study.

A significant potential limitation was the use of self-reported physician billing data, along with a lack of confirmatory data to demonstrate completeness of colonoscopy. Incomplete colonoscopy without adequate examination of

the cecum could bias the results of the study if they were misclassified as “complete.”

Second, the training and specialty of the physicians performing the colonoscopies could potentially bias the results. Nearly 70% of the examinations were performed by nongastroenterologists. It is possible that there may be differences in the rates of “complete” colonoscopy depending on who performs the colonoscopy, their training and the volume of procedures they perform. Third, differences in the quality and type of bowel preparation used could have had significant effects on the ability of the endoscopist to view lesions on the right versus the left side of the colon. Fourth, there may be differences in the biology and growth characteristics of lesions found on the right versus the left side of the colon. There is some early evidence that some lesions on the right side may grow faster and more often be flatter sessile serrated adenomas.⁵

As a result of these findings, which highlight the possible difficulty in removing lesions/polyps in the right colon in a real-world screened population, there are a number of important points to be considered by clinicians performing these screening examinations:

1. Incomplete examinations should be followed up by further examination of the colon by someone with more experience or by some other modality.
2. Preparatory bowel cleansing regimes should be optimized, including rescheduling if visualization is inadequate.
3. Endoscopists should be educated about vigilance for serrated and flat adenomas, especially in the right colon.

This study used a case-control design to successfully evaluate the effectiveness of screening colonoscopy in a real-world at-risk population. The authors showed that screening colonoscopy provides protection against CRC-related deaths. However, it highlights that colonoscopy may fail to detect right-sided lesions. It raises some interesting questions in relation to this finding and provides a strong motivation for clinicians to implement changes focused on improving the detection of right-sided lesions.

Competing interests: None declared.

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