

Measuring the quality of care provided to patients with colorectal cancer

The potential of quality indicators

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Colorectal cancer (CRC) is the second most prevalent cancer in Canadian men and women, reflecting both high incidence and a 62% five-year relative survival ratio (observed survival relative to expected survival in a population).¹ The care of CRC patients includes diagnostic and staging investigations, treatment and followup. This involves clinicians across numerous healthcare sectors: primary care, radiology, gastroenterology, surgery, pathology, radiotherapy and chemotherapy. The primary treatment for CRC is complex and multidisciplinary — it involves surgical resection^{2,3} with adjuvant chemotherapy (for colon and rectal cancer) and radiation therapy (for rectal cancer), provided according to clinical and/or pathologic stage of disease.^{4,6} The burden of illness can be reduced by improving the quality of CRC care provided.⁷ This paper discusses the measurement of quality of CRC care, quality indicator (QI) initiatives, the feasibility of QI measurement in Canada and considerations when using quality performance data.

QUALITY OF CARE AND QUALITY INDICATORS

Quality of care is often defined as the extent to which health-care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.⁸ QIs are one of the tools that can be used to measure quality of care. QIs are measurable elements of provider or health system performance that provide a quantitative basis for clinicians, organizations and managers aiming to improve patient care and the processes by which care is provided.⁹ Such measures can act as “flags”, allowing us to recognize potential problems and suboptimal practices, and thereby identify opportunities for improvement. Importantly, QIs are not direct measures of quality,⁹ but rather of those processes of care for which there is evidence that the process is associated with improved patient outcomes.¹⁰ The usefulness of a QI ultimately depends on its evidence base and its relationship to desirable outcomes. When scientific evidence is lacking, QIs are based upon a high degree of expert consensus that the process or care event is likely beneficial. Any given QI must be valid (i.e. measure what it is supposed to measure), consistently defined, and reliably and efficiently measurable if it is to be used effectively as a quality monitoring tool.⁹

Traditionally, QIs are related to structures, processes or outcomes of healthcare.⁹ Structural measures relate to health system characteristics (e.g. material or human resources), process measures assess the activities in episodes of care (i.e. what is actually done), and outcome measures reflect the effect of care delivery on the health status of patients and populations.^{9,11} Process-based indicators tend to be most useful in terms of quality improvement, particularly when related to better patient outcomes. For example, a process QI can measure whether a patient diagnosed with CRC receives appropriate preoperative investigations, but 30-day or in-hospital mortality rates following CRC surgery (an outcome QI) are more difficult to interpret.

While some QIs may appear analogous to clinical practice guidelines (CPG) — and indeed, both were developed to improve quality of care — QIs and CPGs have different conceptual and clinical purposes.¹² CPGs focus on providing “ideal” care at the patient level by presenting syntheses of the best available evidence so that clinicians may judge whether specific recommendations are appropriate for each patient. They guide clinicians in the delivery of optimal care and are open to clinical judgment. Conversely, QIs focus on



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populations of patients, setting a standard (or benchmark) that, if not met, identifies poor quality for that population or jurisdiction.¹³ Accordingly, these measures are used for quality assurance, comparison and improvement.

In its report *Ensuring Quality Cancer Care*, the Institute of Medicine (IOM, one of the US National Academies) recommended a quality monitoring system capable of measuring and reporting on the quality of care for patients with cancer.⁷ Such a system can enhance accountability within the cancer care system and inform quality improvement by identifying instances where the organization of services, patterns of care, and/or outcomes are inconsistent with evidence-based or consensus-driven standards.¹⁴ Preliminary findings from two US quality measurement initiatives (the American Society of Clinical Oncology's Quality Oncology Practice Initiative and the American College of Surgeons' Electronic Quality Improvement Packet program) show that feedback on individual and hospital performance can lead to improvements in the quality of care provided to patients with cancer, such as reduced variation and improved concordance with QIs.^{15,16}

QUALITY INDICATOR INITIATIVES IN CRC CARE

In the years following the IOM's 1999 report, numerous organizations expended considerable effort to identify and develop QIs and to initiate quality-monitoring systems. From 2001 to 2005, the American Society of Clinical Oncology (ASCO), along with the RAND Corporation and Harvard University, led the National Initiative for Cancer Care Quality (NICCQ), a project that identified and measured 61 QIs for CRC and breast cancer in five US metropolitan areas.¹⁷ This was an extensive undertaking involving patient surveys and detailed reviews of medical records. At the same time, the National Quality Forum (NQF), a multi-stakeholder organization including healthcare payers, providers, consumers and researchers, initiated the Quality of Cancer Care Performance Measures project¹⁸ to identify valid QIs for CRC, breast cancer and palliative care. Many of the NQF measures were proposed by the American College of Surgeons' Commission on Cancer (CoC). In Europe, similar efforts have identified QIs that could be used to monitor the quality of cancer care.^{19,20}

The result of these and other initiatives^{13,14,16,21,22} is a wide array of QIs that measure the quality of CRC diagnosis, management and surveillance. For example, the NICCQ project¹⁷ assessed 25 CRC measures spanning the areas of diagnostic evaluation, surgery, adjuvant therapy, management of treatment toxicity and surveillance, and components of care representing testing, pathology, documentation of key clinical factors, referral, timing, receipt of treatment, technical quality of treatment and respect for patient preferences. In surgery alone, McGory et al¹³ reported on 92 process-based QIs deemed valid by expert panels; those QIs covered the preoperative, intraoperative and postoperative periods, and included measures related to credentialing for laparoscopic CRC surgery, comorbidity assessment, staging, patient-provider discussions, medication use and postoperative management. While the measurement of these QIs represents potentially meaningful steps toward providing high-quality

Key points

- Quality indicators (QIs) are a tool for measuring quality of care and identifying opportunities for improvement.
- A number of consensus-based QIs that are potentially measurable from linked administrative databases have been developed in North America for colorectal cancer (CRC). Capturing these QIs would not add to care professionals' workload but would require analysts capable of linking large databases.
- Important challenges to implementation of these CRC QIs throughout Canada include provision of CRC stage data in provincial cancer registries, provincial CRC screening data and linkage of radiology databases.

CRC care, quality monitoring programs must determine which measures are feasible for their organizations and jurisdictions as regards issues like measurement capacity and stakeholder acceptability.

In 2006, ASCO teamed up with the National Comprehensive Cancer Network (NCCN) to identify a smaller number of evidence-based, rigorously developed and scientifically sound QIs with the potential to produce improvements in care at the population level.²³ At the conclusion of this initiative, ASCO/NCCN and the NQF realized they were proposing similar QIs and harmonized them in 2007, allowing the organizations to present a single set of approved measures to the public (see **Table 1**). These QIs focus on staging and treatment processes.

In Canada, Cancer Care Ontario (CCO) has taken the lead on quality monitoring and reporting. Through the Cancer Quality Council of Ontario, CCO developed a quality index that measures and annually reports on 28 evidence-based QIs covering areas of care from cancer prevention to end-of-life care.²⁴ CRC-specific measures included screening rates, wait times for colonoscopy, surgery and systemic treatment and concordance with guideline-recommended therapy for colon cancer. The index was initiated to demonstrate to the public that the cancer system is monitored and accountable, and to aid in targeted quality improvement efforts.²⁵

FEASIBILITY OF QI MEASUREMENT IN CANADA

As the purpose of QIs is to assess care for populations, it is imperative that organizations and jurisdictions have appropriate and adequate data sources to capture the relevant metrics. Certainly, given the demands placed on healthcare resources, efficiency of measurement is critical to developing and maintaining a viable quality monitoring system. The

TABLE 1a. Quality indicators that are potentially measurable from linked administrative health databases

Quality indicator	Potential data sources
ASCO/NCCN and CoC QIs for overall management of CRC	
At least 12 regional lymph nodes (LN) are removed and pathologically examined for resected colon cancer. ^{*,†}	- cancer registry with stage data [§] - physicians' billings - discharge abstracts
Adjuvant chemotherapy is considered or administered within 4 months of diagnosis for patients under the age of 80 with AJCC Stage III colon cancer. ^{*,‡}	- cancer registry with stage data - cancer centre administrative database [¶] - physicians' billings
Radiation therapy is considered or administered within 6 months of diagnosis for patients under the age of 80 with clinical or pathologic AJCC T4N0M0 or Stage III disease receiving surgical resection for rectal cancer.	- cancer registry with stage data - cancer centre administrative database [¶]
Postoperative adjuvant chemotherapy is considered or administered within 9 months of diagnosis for patients under the age of 80 years with AJCC Stage II or Stage III rectal cancer. ^{*,‡}	- cancer registry with stage data - cancer centre administrative database [¶] - physicians' billings
Diagnosis, staging and preoperative evaluation	
Proportion of colon and rectal carcinomas detected by screening. [†]	- cancer registry - provincial screening program database ^{**}
Proportion of patients undergoing surgery for CRC having preoperative complete large bowel imaging (colonoscopy or barium enema + sigmoidoscopy) 3 months prior to surgery or within 6 months following surgery. ^{*,§,¶}	- cancer registry - physicians' billings - hospital discharge abstracts - institutional radiology database
Proportion of patients undergoing surgery for rectal cancer having preoperative imaging of the pelvis with CT, MRI and/or transrectal ultrasonography. ^{*,¶}	- cancer registry - physicians' billings - hospital discharge abstracts - institutional radiology database
Proportion of patients undergoing CRC surgery having preoperative imaging of the liver with ultrasound, CT or MRI. [†]	- cancer registry - physicians' billings - hospital discharge abstracts - institutional radiology database
Proportion of patients having undergone colon or rectal surgery whose pathology report indicates number of LN examined and number of positive LN. [‡]	- cancer registry with stage data [§] - physicians' billings - hospital discharge abstracts

movement toward quality monitoring should not burden frontline providers with increased documentation requirements.¹³ One potential source of data, therefore, is the linkage of administrative health databases,²⁶⁻²⁸ which include cancer data from registries, physicians' billings and hospital discharge abstracts. Many process measures (e.g. performance of colonoscopy and surgery) can be obtained in Canada via provincial billings and hospital discharge abstracts. In addition to efficiency and cost-effectiveness, the use of these large administrative databases permits QI measurement for the entire population. **Table 1** presents QIs for the preoperative, intraoperative and postoperative management of CRC that are potentially measurable from linked administrative data. These QIs were derived from systematic literature reviews and considered valid by expert panels via the modified Delphi methodology.^{13,14}

In Canada, all provinces and territories have a cancer registry, physician billing data, and vital statistics data, and most can access hospital discharge abstract data from the Canadian Institute for Health Information (except Quebec, which does not report to this database). These databases can be linked to measure particular QIs at the level of the entire provincial or territorial population. Some provinces and

jurisdictions have the capacity to measure a larger number of QIs²⁷ by using additional databases (e.g. screening databases associated with provincial screening programs) and/or by linking regional databases (e.g. laboratory and radiology systems) to registry, billings and discharge abstracts data. In addition to the data, however, QI measurement requires analysts experienced with linking large administrative databases. At present, all provinces and territories report incidence, mortality, and survival data through the Canadian Cancer Statistics,¹ yet only Ontario, through its Cancer Quality Council,²⁴ publicly reports evidence-based QIs of CRC care. Otherwise, QI measurement and monitoring for CRC care is usually carried out via research initiatives or for internal reporting and/or quality assurance purposes in particular institutions or jurisdictions. For example, Cancer Surgery Alberta monitors several QIs for processes of CRC surgical care, which it captures through its web-based operative synoptic reporting tool. The reports are provided internally to surgeons with the goal of improving surgical practice.

Despite the utility of administrative health data to assess processes of cancer care, measurement is hindered by the lack of data in population-based administrative databases.^{12,29} In Canada, one of the major challenges in CRC quality

monitoring is the lack of staging data available in the cancer registries. Without cancer stage data, many of the QIs are inappropriate, including all of the treatment measures (since treatment for CRC is recommended according to disease stage). Although national initiatives have been working to support the collection of stage data for more than a decade,³⁰ registry data remain incomplete. Ontario reports its stage capture rate for new cancer diagnoses. The population-based stage capture rate for new CRC diagnoses in January 2008 was just over 75%,³¹ which represents substantial improvement since 2005 but is still inadequate to assess treatment measures for the entire province. Research initiatives throughout Canada have staged cohorts of all new CRC diagnoses over a particular time period. The CIHR/CCNS Team in Access to Colorectal Cancer Care in Nova Scotia has staged all CRC cases diagnosed over a 5-year period in the entire province.³² This stage data

will allow the research team to evaluate the quality of CRC care — including many of the QIs presented in **Table 1** (page 8-9) — provided to patients in that province. The Canadian Partnership Against Cancer (CPAC) is now leading a nation-wide initiative to capture population-based stage data for the four most common cancers (CRC, breast, prostate and lung).³³

Other deficiencies in administrative data include the lack of CRC screening data (e.g. FOBT data, inability to distinguish between screening vs investigative colonoscopies) and limitations with chemotherapy capture (for example, although chemotherapy codes exist in billings data and cancer centre administrative systems, such as the Oncology Patient Information System, chemotherapy can be administered in out-patient hospital settings without an associated physician billing). Nonetheless, it is possible to measure QIs related to screening and chemotherapy use, but there will be limitations,

TABLE 1b. Quality indicators that are potentially measurable from linked administrative health databases

Quality indicator	Potential data sources
Intraoperative care	
If a patient undergoes CRC surgery and < 12 lymph nodes are obtained, then the patient should be referred to a medical oncologist. [†]	- cancer registry with stage data [§] - cancer centre administrative database [¶] - physicians' billings - hospital discharge abstracts
Postoperative management	
Proportion of patients with known or suspected rectal cancer who see a radiation oncologist preoperatively, or who are Stage II or III and see a radiation oncologist within 8 weeks of surgery. [†]	- cancer registry with stage data - cancer centre administrative database [¶] - physicians' billings - hospital discharge abstracts
Proportion of patients with rectal cancer who see a medical oncologist preoperatively, or who are Stage II or III and see a medical oncologist within 8 weeks of surgery. [†]	- cancer registry with stage data - cancer centre administrative database [¶] - physicians' billings - hospital discharge abstracts
Surveillance	
Proportion of patients with colon cancer undergoing surveillance colonoscopy within one year following surgery. [†]	- cancer registry - physicians' billings - hospital discharge abstracts
Outcomes	
5-year and adjusted 5-year overall survival rate for rectal cancer by stage and for colon cancer by stage. [†]	- cancer registry with stage data
Proportion of in-hospital or 30-day mortality following non-emergent colon or rectal cancer surgery. [†]	- cancer registry - physicians' billings - hospital discharge abstracts
Rate of local recurrence for rectal cancer surgery patients by stage and for colon cancer surgery patients by stage. [†]	- cancer registry with stage data - cancer centre administrative database [¶] - physicians' billings - hospital discharge abstracts
Proportion of patients undergoing surgery for rectal cancer experiencing anastomotic leak. [†]	- cancer registry - physicians' billings - hospital discharge abstracts

* being tested through ASCO's Quality Oncology Practice Initiative
 † also endorsed by the National Quality Forum
 ‡ developed and endorsed by ASCO and NCCN only, not CoC
 § cancer registry would require stage data captured via Collaborative Staging, which includes number of lymph nodes examined and number of positive nodes
 || such as CCO's Oncology Patient Information System
 ¶ deemed acceptable by Gagliardi et al¹⁸ and considered high priority for CCO's Surgical Oncology Program
 # deemed acceptable by McGory et al¹⁷
 ** physicians' billings and other databases with endoscopic or laboratory services do not indicate whether the test or investigation was for screening purposes

notably that the QI will not be capturing the process at a population level. In its quality monitoring system, Ontario reports rates of FOBT use in eligible adults and guideline-concordant chemotherapy use in Stage III colon cancer patients, but it also provides details surrounding the limitations of each measure, including information on completeness and accuracy.²⁴ As we move toward improved measurement systems in Canada, databases associated with provincial screening programs and outpatient services (such as the National Ambulatory Care Reporting System³⁴) will improve our ability to more adequately measure these important indicators of quality care. Furthermore, the implementation of standardized (synoptic) reporting systems for CRC surgery and pathology³⁵ will permit measurement of the technical processes of care that we cannot efficiently measure at present, but that are vital to quality care (e.g. intraoperative events).¹³

USING QUALITY PERFORMANCE DATA


Despite the recent emphasis on quality indicator development in cancer care, clinicians remain wary of establishing and utilizing specific metrics to assess quality of care.^{29,36} In an Ontario study, physicians working in cancer care expressed strong skepticism of QI measurement and stated their belief that the complexity of cancer care is such that quality cannot be measured.²⁹ However, QIs are not intended to guide patient care or set optimal standards of care for any given patient; rather, they aid in benchmarking and provide a tool for quality assessment, comparison, and improvement.^{10,12,36} For example, there are legitimate reasons for non-receipt of chemotherapy in Stage III colon cancer patients. Certainly, we would not expect every patient diagnosed with Stage III colon cancer to receive chemotherapy (e.g. 100% concordance). However, if there was a decrease over time in the receipt of chemotherapy in this population, or if one jurisdiction had very low rates, the QI would act as a “red flag” for further investigation.

The use and reporting of quality performance data must be considered during the development of quality monitoring systems.²⁹ Quality monitoring systems report findings to health system managers and providers, often allowing them to compare their performance to that of their peers,^{14,16,37} as well as to the public for reasons of accountability.²⁵ However, Canadian physicians have expressed concerns that performance data would be misinterpreted by media, government and the general public.²⁹ The Cancer Quality Council of Ontario reports confidential local (institution) level performance, benchmarked against provincial performance, to managers and providers, but provides the public with graphical, easily interpretable reports showing only regional and provincial data.²⁴ The release of the aggregated public data occurs following the release of the confidential data. In this way, the Council aims to provide stakeholders the opportunity to comment on the measures, validate the data and maintain privacy for each institution.²⁵ Similarly, the ASCO Quality Oncology Practice Initiative does not report individual practice results, releasing only aggregate performance data to the general public.¹⁶

When using performance data, there is also the issue of whether QIs are generalizable across different regions and

institutions.¹³ Indeed, some processes may depend on the local context. For example, low surveillance colonoscopy rates in the 12 months following surgery may represent a lack of knowledge of followup care CPGs or, alternatively, a lack of material or human resources for endoscopic services in that jurisdiction. An understanding of local resources and context, therefore, is necessary to fully interpret QI data.³⁶

NEXT STEPS

A system of valid, reliable, and efficient QIs can aid measuring the quality of CRC care, and, ultimately, be used to target quality improvement efforts. Existing administrative health databases represent efficient data sources to measure QIs, particularly those involved in the processes of cancer care. Future improvements to existing databases, new databases (e.g. those associated with provincial screening programs), electronic medical records, and standardized reporting mechanisms (e.g. for surgery and pathology) will enhance our capacity for QI measurement. Although clinicians have been extensively involved in CPG development, they have traditionally been less involved in the development of QIs and other performance monitoring tools.^{12,38} However, ASCO’s Quality Oncology Practice Initiative,¹⁶ where oncologists developed their own electronic quality monitoring system with consensus-driven QIs and automated data analysis and reporting, demonstrates that oncologists and other cancer care providers can play an important leadership role in quality monitoring and improvement efforts. 

Disclosure

The authors report no potential conflicts of interest pertaining to this article.

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