

Development and Implementation of a Cancer Quality Index in Queensland, Australia: A Tool for Monitoring Cancer Care

Euan T. Walpole, MBBS^{1,2,3}; David E. Theile, MBBS³; Shoni Philpot³; and Philippa H. Youl, PhD³; for Cancer Alliance Queensland

QUESTION ASKED: How can we effectively develop and implement a quality-indicator tool to support cancer clinicians and health care administrators monitor performance and improve patient care?

SUMMARY ANSWER: Involvement of clinicians, health administrators, and data custodians was a critical factor in the development of five domains and 16 indicators focused on clinical outcomes and then implementation of the quality-index tool. The choice of indicators was also guided by the availability of population-level data collected in public and private health care facilities.

WHAT WE DID: We developed and implemented a Cancer Quality Index (CQI) in Queensland, Australia. The CQI is a tool for reviewing, comparing, and sharing information on the safety and quality of cancer treatments and outcomes for public and private cancer services. Development of the CQI was overseen by a clinician-led committee and included a systematic review of current indices, clinical practice guidelines, and cancer care pathways. The CQI is supported by population-based diagnostic, demographic, pathological, and treatment (including surgery, radiation, and systemic therapy) data all linked and housed within a central repository. The CQI includes five quality dimensions and 16 indicators. Currently, the focus is on breast, colorectal, gynecological, hepatobiliary, non-small-cell lung, upper GI, and urological cancers. Additional cancers will be added to the CQI going forward.

WHAT WE FOUND: The CQI provides a baseline for monitoring current investments in cancer care, including the introduction of new anticancer therapies and changes in clinical practice. When we analyzed a subset of indicators in a data set of 99,728 patients diagnosed from 2005 to 2014, we found the CQI was sensitive in detecting changes in indicator outcomes over time.

BIAS, CONFOUNDING FACTORS, DRAWBACKS: The changes we observed across time were relatively small, and thus chance may have played a role. That said, the data used in this study were from a linked population-based data set of high quality. Although the CQI includes five dimensions and 16 quality indicators, it does focus primarily on clinical outcomes and not necessarily process.

REAL-LIFE IMPLICATIONS: The CQI is a tool for reviewing, comparing, and sharing with the public information on the safety and quality of cancer treatments and outcomes. The primary aim for the CQI is to assist clinicians and health administrators improve patient care. Confidential, individualized hospital results, in addition to aggregated results, are provided to each public and private facility regularly. In addition, individual clinicians can be provided their patients' individual results as requested. To continue the quality improvement process, several cancer-specific, clinician-led subcommittees have been established to help determine where additional focus is required and to oversee ongoing development of cancer- and treatment-specific indicators and reporting of results.

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PURPOSE Many cancer-specific assessment tools to measure health care performance have been developed. However, reporting on quality indicators at a population level is uncommon. We describe the development and implementation of a Cancer Quality Index (CQI) and examine the sensitivity of the index to detect change over time.

METHODS In developing the CQI, we reviewed existing indices, guidelines, and cancer care pathways. Our choice of indicators was additionally guided by the availability of population-wide data. A series of pilot indicators underwent trial use and were evaluated, and outcomes were discussed before a final set of indicators was established. The process was overseen by a clinician-led quality assurance committee that included hospital administrators and data custodians.

RESULTS The CQI includes five quality dimensions and 16 indicators for public and private cancer services using population-wide information. The following are the five indicators: Effective, Efficient, Safe, Accessible, and Equitable. We demonstrated the sensitivity of the CQI to measure change over time by examining outcomes such as time to first treatment and 30-day surgical mortality, using linked cancer registry and health administrative data for 99,728 patients with cancer diagnosed between 2005 and 2009 and 2010 and 2014.

CONCLUSION The CQI is a valuable tool to track progress in delivering safe, quality cancer care within health care services. Critical to its development and implementation has been the involvement of clinicians from several disciplines and the availability of population-based data. We found the CQI to be a sensitive tool able to detect changes over time.

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INTRODUCTION

There has been significant growth in the development and implementation of quality indicators in health care. It has been suggested that measures of health care performance should be based on research and clinical evidence of efficacy, and be linked to an overarching health service strategy.¹

Cancer-specific quality assessment tools that include performance indicators have been developed in several countries. For example, the United Kingdom's National Health Service uses indicators focusing on health care improvement, access, effective health care delivery, and patient experience and outcomes.² ASCO developed the Quality Oncology Practice Initiative, a program for outpatient oncology practices.³ Furthermore, the International Cancer Benchmarking Partnership is a global initiative aimed at understanding

why differences in survival exist across similar jurisdictions.⁴ Analysis of and reporting on quality indicators are uncommon, however, at a population level, mainly due to a lack of source data covering all aspects of individual quality indicators.⁵ A lack of central oversight has also been cited as an impediment to monitoring health care outcomes.⁶ To address this, the Cancer Quality Council of Ontario (CQCO) developed a series of seven quality indicators (Safe, Effective, Accessible, Responsive, Equitable, Integrated, and Efficient)⁷ that focus on measuring performance against a set of strategic objectives. Clinical data to support the indicators are collected at a regional level under contractual obligations linked to the Ontario cancer registry and supported through other administrative data sets.⁸ During development, CQCO recognized the unique challenges in the delivery of quality and timely cancer

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care for a population living in a geographically large province.⁹ These challenges are similar to those found in Australia, a geographically large country where cancer services are primarily concentrated in major cities.

In Australia, health care is funded and administered at national, state or territory, and local government levels. Although there is a fully funded public health care system through which residents have access to free medical and hospital care, just over half also have some level of private health insurance.¹⁰ Australian State and Territory governments are primarily responsible for the delivery and management of public health services, including public hospitals and for the regulation of private health care facilities.¹¹ We describe here the development and implementation of a cancer quality index and examine the sensitivity of the index to detect change over time.

METHODS

Setting

Queensland is the third most populous Australian state (population approximately 5 million) and is also the most decentralized state, with 40% of the population living outside the capital city of Brisbane. Cancer services are provided in public and private health care facilities. To accommodate the high proportion of the population living outside the capital city, regional cancer centers that provide integrated cancer care were established on a rolling basis during 2014 and 2015.

Developing a Cancer Quality Index in Queensland, Australia

Reporting outcomes relating to cancer services has been ongoing in Queensland over several years; however, this has been on an ad hoc basis and restricted to data extracted from hospital-based clinic databases. What has been missing is population-wide information on the main treatments patients receive and the outcomes after those treatments. Furthermore, no nationally agreed cancer quality index currently exists in Australia.

To address this, Cancer Alliance Queensland (CAQ) developed a clinician-led safety and quality program. CAQ is an organization within the Queensland Department of Health whose aim is to support and promote clinician-led improvement of cancer services in Queensland. Under CAQ, the Cancer Control Safety and Quality Partnership is a gazetted (through legislation) quality assurance committee with authority to access identifiable data. This committee is clinician-led with hospital administrators and data custodians also represented.

Part of the committee's role has been the development of the Queensland Cancer Quality Index (CQI), a tool for reviewing, comparing, and sharing information on the safety and quality of cancer treatments and outcomes for

public and private cancer services. In Queensland, the proportion of patients with cancer who access public or private cancer services varies across tumor sites and treatment types. For example, for surgery, approximately 60% of patients with breast cancer and 30% of patients with head and neck cancer have their procedure in a private facility. For radiation therapy approximately 15% of patients receive treatment in private facilities, compared with 50% of patients with breast cancer. Performance indicators linked to clinical outcomes aligned with national benchmarks represent a key service action in the Queensland Government's current Cancer Care Statewide Health Service Strategy.¹²

Development and Selection of Cancer Quality Indicators

Several steps were undertaken during the development of the CQI under the direction of QAC's quality assurance committee, with initial work beginning in 2012. First, an extensive literature search was conducted to review current oncology indices and in what settings they are used (eg, country, health system, population), published reviews of clinical indicators,^{1,2,5,13,14} and relevant clinical practice guidelines. We also reviewed cancer care pathways used in public and private health care facilities locally and at a national level, along with documented performance indicators for multidisciplinary care. In developing the CQI, we undertook a detailed examination of the Cancer System Quality Index developed by the CQCO.⁷⁻⁹ The Cancer System Quality Index's seven quality dimensions were discussed in detail, and we retained five of the dimensions. The choice of indicators was also guided by the availability of population-wide data. A series of pilot indicators underwent trial use and were evaluated, and outcomes were discussed by clinicians, hospital administrators, and data custodians before the final set of indicators was established.

The CQI includes five quality dimensions and 16 indicators (Fig 1) and provides population-wide information on the main treatments received by patients with cancer. The focus is in surgery, radiation therapy, and IV systemic therapy for breast, colorectal, gynecological, hepatobiliary, non-small-cell lung, upper GI, and urological cancers. The CQI provides an important baseline for monitoring current investments in cancer care, including the introduction of new anticancer therapies and changes in clinical practice. In addition, after the establishment of regional cancer centers, the CQI will be able to monitor outcomes for rural and regional patients, who have historically suffered poorer outcomes than their urban counterparts.¹⁵ The systems for data collection and data linkage are well established within one central location. Our statewide Queensland Oncology Repository links and consolidates patient information on cancer diagnoses and deaths from the Queensland Cancer Register, Queensland Hospital Admitted Data Collection, and on surgery, radiation therapy, and IV systemic therapy. The Queensland Oncology Repository also includes data

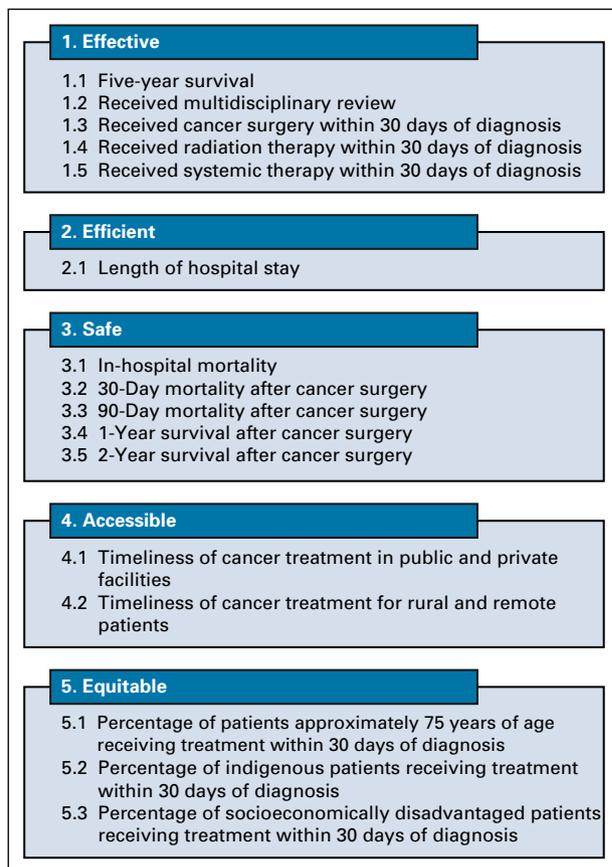


FIG 1. The Queensland Cancer Quality Index.

collected from multidisciplinary team meetings primarily in the public sector. Regular quality checks are conducted by expert coders and clinical analysts. Reporting and dissemination of the data are managed through QAC. When reporting results using the CQI, each hospital is provided their individual confidential results along with aggregated state-based results.

Using the CQI to Detect Change Over Time

The CQI covers 16 indicators across five dimensions; however, here we present a brief sample of results for some key indicators and comparing two time periods—2005 to 2009 and 2010 to 2014 (our most recent data)—to highlight the sensitivity of the CQI as a tool to detect change over time. Additional information on outcomes for other quality indicators for the same time periods is available on our website.¹⁶

Identifying patients with cancer and categorization of cancer procedures. Our data set included only primary invasive cancers. If an individual had an invasive cancer at two different sites, then that individual counted as two cases. If an individual was diagnosed on two or more occasions with an invasive cancer at the same site within the defined time period, then the individual counted as only one case and the date of diagnosis was based on the earlier diagnosis. Potential cancer-related procedures were identified from

the Australian Classification of Health Interventions¹⁷ and *International Classification of Diseases, Tenth Edition, Australian Modification*.¹⁸

Identification of the cancer cohort. In all, there were 240,710 cases of invasive cancer diagnosed in Queensland in the period 2005 to 2014. Cases were then filtered to remove duplicate records ($n = 3,102$) along with patients diagnosed with cancers not included in the current CQI ($n = 129,769$). Of the 107,839 remaining cases, 8,111 patients (7.5%) did not have an in-patient treatment record, leaving 99,728 cases included in the data presented here. Cancer sites included breast, colon, rectal, gynecological (ie, cervical, ovarian, uterine, and vulva), hepatobiliary (ie, pancreatic, biliary tract, and duodenal), non-small-cell lung, upper GI (ie, esophagus and gastric), and urological (ie, bladder and testicular). Other cancers (eg, melanoma, prostate) will be added to the CQI later.

Included variables and measures. Variables included age, sex, cancer type, and type of facility (ie, public or private). Residence at the time of diagnosis was categorized into three groups, metropolitan, regional and rural/remote, on the basis of the Australian Geographical Classification.¹⁹

Analysis

All rates were adjusted by age and sex to account for differences in cancer populations across the two time periods. Thirty-day mortality represents the proportion of patients dying within 30 days of their cancer surgery (major resection). Time to first cancer treatment was calculated as the proportion of patients receiving either surgery, radiation therapy, or IV systemic therapy within 30 days of their pathological diagnosis. We calculated the absolute percentage change in rates between the two time periods (ie, 2005 to 2009 and 2010 to 2014).

RESULTS

Overall, 99,728 individuals were diagnosed with one of the included cancers (46,619 between 2005 and 2009 and 53,109 between 2010 and 2014).

Safe Quality Dimension

30-Day mortality after surgery (quality indicator 3.1). We observed an approximately 1% reduction in 30-day surgical mortality for major resections of the colon, rectum, and bladder (Table 1). Similar results were seen in 90-day mortality, with the largest reduction observed for cystectomy (4.1%, 95% CI, 1.6% to 6.9%).

Accessible Quality Dimension

Time to receive treatment by type of facility (quality indicator 4.1). Overall, 83.9% of patients received either surgery, radiation therapy, or IV systemic therapy. Across all cancer groups, a higher proportion of private hospital patients received treatment within 30 days of diagnosis compared with those in the public system (Table 2). In relation to differences across the two time periods, for most cancers

TABLE 1. Proportion of All Patients Who Died Within 30 and 90 Days of Cancer Surgery Over Two Time Periods for Selected Major Resections

Cancer	30-Day Mortality			90-Day Mortality		
	2005-2009 (%)*	2010-2014 (%)*	Percentage Change Between 2005-2009 and 2010-2014 (95% CI)	2005-2009 (%)*	2010-2014 (%)*	Percentage Change Between 2005-2009 and 2010-2014 (95% CI)
Breast resection	11,798 (0.1)	14,074 (0.1)	—	11,798 (0.2)	14,074 (0.2)	—
Colon major resection	7,367 (3.1)	7,768 (2.4)	-0.7 (0.2 to 1.2)†	7,367 (5.7)	7,768 (4.2)	-1.5 (0.8 to 2.2)†
Rectal major resection	3,185 (2.2)	3,231 (1.3)	-0.9 (0.3 to 1.6)†	3,185 (4.0)	3,231 (2.8)	-1.2 (0.3 to 2.1)†
Ovarian major resection	722 (0.7)	868 (0.2)	-0.5 (-0.2 to 1.4)	722 (2.0)	868 (0.2)	-1.8 (0.8 to 3.1)†
Pancreaticoduodenectomy	341 (2.6)	443 (2.7)	+0.1 (-2.5 to 2.4)	341 (4.1)	443 (3.8)	-0.3 (-2.5 to 3.3)
Non-small-cell lung resection	1,368 (1.7)	1,662 (0.9)	-0.8 (-0.1 to 1.7)	1,368 (3.5)	1,662 (2.3)	-1.2 (0.0 to 2.5)
Esophagectomy	384 (0.6)	415 (1.2)	+0.6 (-0.9 to 2.24)	384 (2.7)	415 (2.8)	+0.1 (-2.4 to 2.50)
Gastrectomy	526 (3.6)	439 (4.9)	+1.3 (-1.3 to 4.0)	526 (6.3)	439 (6.1)	-0.2 (-3.0 to 3.3)
Cystectomy	416 (1.5)	481 (0.4)	-1.1 (-0.2 to 2.8)	416 (5.8)	481 (1.7)	-4.1 (1.6 to 6.9)†
Total for all major resections	26,107 (1.4)	29,381 (1.0)	-0.4 (0.2 to 0.6)†	26,107 (2.7)	29,381 (1.9)	-0.8 (0.6 to 1.1)†

NOTE. Dashes indicate there was no change in percentages over time.

*Rates have been adjusted for age and sex.

† $P < .01$.

there were some decreases over time in the number of public patients receiving their initial cancer treatment 30 days or less from diagnosis. A small reduction in the number of private patients treated within 30 days of diagnosis was also detected from the earlier to the most recent time period (Table 2).

Time to receive first treatment by residential location (quality indicator 4.2). Table 3 shows the proportion of patients receiving their first cancer treatment within 30 days diagnosis, according to residential location between 2010 and 2014 (2005 to 2009 data not shown because differences between residential groups were similar and there

TABLE 2. Proportion of Patients Receiving First Cancer Treatment Within 30 Days of Diagnosis, According to Type of Health Care Facility, Over Time

Cancer	Public Facility Patients			Private Facility Patients		
	2005-2009 (%)*	2010-2014 (%)*	Percentage Change Between 2005-2009 and 2010-2014 (95% CI)†	2005-2009 (%)*	2010-2014 (%)*	Percentage Change Between 2005-2009 and 2010-2014 (95% CI)†
Breast	5,231 (55)	6,348 (45)	-10 (8.2 to 11.8)‡	6,975 (87)	8,263 (81)	-6 (4.8 to 7.1)‡
Colon	3,834 (70)	4,443 (62)	-8 (6.0 to 10.0)‡	4,572 (83)	4,518 (82)	-1 (-0.6 to 2.6)
Rectal	2,018 (45)	2,199 (38)	-7 (4.0 to 9.9)‡	2,202 (70)	2,278 (70)	—
Cervical	488 (32)	613 (21)	-11 (5.8 to 16.2)‡	247 (53)	264 (50)	-3 (-5.6 to 11.6)
Ovarian	412 (77)	498 (79)	+2 (-3.4 to 7.5)	472 (89)	565 (87)	-2 (-2.0 to 5.9)
Uterine	838 (33)	1,015 (31)	-2 (-2.3 to 6.3)	905 (88)	1,099 (84)	-4 (0.9 to 7.0)‡
Vulva	111 (28)	175 (22)	-6 (-4.1 to 16.5)	90 (62)	120 (63)	-1 (-11.9 to 14.1)
Hepatobiliary	521 (51)	680 (49)	-3 (-3.7 to 7.7)	598 (75)	857 (73)	-2 (-2.6 to 6.5)
Non-small-cell lung	3,249 (44)	3,762 (37)	-7 (4.7 to 9.3)‡	1,781 (68)	2,236 (60)	-8 (5.0 to 10.9)‡
Esophagogastric	983 (36)	1,155 (32)	-4 (-0.2 to 8.0)	774 (63)	837 (60)	-3 (-1.7 to 7.7)
Bladder	949 (36)	1,073 (34)	-2 (-2.2 to 6.2)	1,012 (45)	1,032 (44)	-1 (-3.3 to 5.3)
Testicular	371 (98)	436 (97)	-1.0 (-1.3 to 3.3)	304 (97)	313 (98)	+1.0 (-1.6 to 3.8)

NOTE. Dash indicates there was no change in percentages over time.

*Rates have been adjusted for age and sex.

†Includes surgery, radiation therapy, or IV systemic therapy.

‡ $P < .01$.

TABLE 3. Proportion of Patients With Cancer Whose Time From Diagnosis to First Treatment Was 30 Days or Less, by Residential Location for Years 2010-2014

Cancer	Total No. of Patients in Metropolitan Areas (%)*	Total No. of Patients in Regional Areas (%)*	Total No. of Patients in Rural and Remote Areas (%)*	Percentage Difference	
				Regional and Metropolitan (95% CI)†	Rural/Remote and Metropolitan (95% CI)†
Breast	9,244 (69)	3,182 (59)	2,185 (59)	-10 (8.1 to 12.0)‡	-10 (7.7 to 12.3)‡
Colon	5,390 (74)	2,170 (71)	1,401 (69)	-3 (0.8 to 5.3)‡	-5 (2.4 to 7.7)‡
Rectal	2,559 (57)	1,071 (51)	847 (49)	-6 (2.4 to 9.5)‡	-8 (4.1 to 11.8)‡
Cervical	530 (30)	177 (30)	170 (31)	—	+1 (-6.6 to 9.2)
Ovarian	701 (84)	220 (82)	142 (82)	-2 (-3.4 to 8.1)	—
Uterine	1,242 (59)	517 (59)	355 (55)	—	-4 (-1.7 to 9.9)
Vulva	184 (41)	62 (32)	49 (41)	-9 (-5.1 to 21.6)	—
Hepatobiliary	985 (63)	344 (60)	208 (64)	-3 (-2.9 to 0.0)	+1 (-6.3 to 7.9)
Non-small-cell lung	3,618 (43)	1,397 (47)	983 (53)	+4 (0.9 to 7.1)‡	+10 (6.5 to 13.5)‡
Esophagogastric	1,180 (46)	497 (40)	315 (41)	-6 (0.8 to 11.1)‡	-5 (-1.2 to 11.0)
Bladder	1,256 (38)	508 (40)	341 (36)	+2 (-3.0 to 7.1)	-2 (-3.8 to 7.6)
Testicular	463 (97)	140 (99)	146 (96)	+2 (-1.6 to 4.1)	-1 (-1.9 to 5.7)

NOTE. Dashes indicate there was no change in percentages over time.

*Rates have been adjusted for age and sex.

†Includes surgery, radiotherapy, or IV systemic therapy.

‡ $P < .01$.

were no significant changes over time). There were some small differences when examining the percentage change between regional and metropolitan and rural/remote and metropolitan patients by cancer site. For example, 10% (95% CI, 8.1% to 12.0%) fewer regional patients with breast cancer received treatment within 30 days from diagnosis compared with metropolitan patients, with a similar difference observed between rural/remote and metropolitan patients. These differences were also observed in patients with rectal cancer.

DISCUSSION

We presented here the development and implementation of the Queensland CQI and provided an example of how the CQI can be used as a tool to monitor cancer care in Queensland, Australia. Our CQI was modeled on similar quality indices and the quality index developed by the CQCO.^{7,8} A key to the development and implementation of the CQI has been the extensive involvement of clinicians at all stages of the process and the availability of a large and comprehensive population-based data repository, two factors critical to the monitoring and reporting of cancer care.

In our process, clinicians from several disciplines were involved in the development of the indicators. Clinicians whose care is being assessed are reportedly more confident in the process knowing that colleagues have been closely involved in the development of items used to measure

performance.^{1,20,21} Furthermore, the type, comprehensiveness, and reliability of available data underpin the CQI. To our knowledge, our Queensland Oncology Repository represents the largest data set containing comprehensive, linked clinical and administrative population-based data on patients with cancer in an Australian setting.

Values of the CQI include its sensitivity to detect change over time and as a tool for clinicians to review and compare practice, and identify areas for improvement. The purpose of examining indicators over time in this article was to assess the sensitivity of the CQI to detect change, rather than look at the impact of reporting results, because it is too early in the history of the CQI to do so.

An additional value of the CQI is that it is supported by population-level data collected in public and private health care facilities, which is rare.^{5,8} Using the CQI, we could detect a reduction in the number of public facility patients receiving treatment within 30 days of diagnosis from earlier to later periods across several cancers. These changes were not as evident in private facility patients.

In Australia, there is no agreed-upon national recommended waiting time for cancer surgery; however, there are categories that describe the urgency of planned surgeries (including cancer surgery) in public hospitals. Currently, the majority of patients diagnosed with colorectal, breast, or lung cancer are listed as urgent (ie, recommended surgery within 30 days of seeing a surgeon).²⁰ Again, although the CQI is not designed to detect reason(s) for these

differences, it does inform the need to interrogate the data further.

Queensland is the most decentralized Australian state, thus our CQI includes an indicator to measure time to access treatment of regional, rural, and remote patients with cancer. We found few differences according to residential location. For most cancers, slightly more patients living in metropolitan areas received treatment within 30 days of diagnosis compared with patients in regional or rural/remote areas, but these differences were relatively small. Similarly, data from Ontario showed a higher proportion of patients in metropolitan locations having surgery within the recommended period compared with other locations.²¹ In Queensland, regional cancer centers were established during 2014 and 2015 to provide radiation therapy and chemotherapy services to regional patients with cancer.¹⁵ Continued monitoring of this indicator will help provide evidence of their value in delivering timely cancer treatment.

How Can the CQI be Used to Improve Quality of Cancer Care?

The CQI is a tool for reviewing, comparing, and sharing with the public, information on the safety and quality of cancer treatments and outcomes. The primary aim for its use is to assist clinicians and health administrators to improve patient care by highlighting areas where cancer services are performing well and identify areas for improvement. Confidential individualized hospital results, in addition to aggregated results, are provided to each public and private facility regularly. CQI aggregated reports are also publicly available on our website.¹⁶ Our implementation processes were based on those used by Cancer Care Ontario, whereby confidential indicator reports are provided for individual institutions and aggregated reports are made available to the public a few months later. The delay in public reporting allows health care stakeholders time to comment on the results.⁹ Although providing an index of quality and safety is beneficial, it must be accompanied by mechanisms to act on the results. CQI reports are provided to clinicians, administrators, and individual hospital quality assurance committees for review and to act on as necessary. To further enhance the CQI, we have established eight cancer-specific, clinician-led subcommittees and two treatment-specific committees (radiation and systemic therapy) whose roles are to determine where additional focus is

required and oversee ongoing development of cancer- and treatment-specific indicators and the reporting of results. Similarly, CCO uses groups of clinical providers to help identify gaps in quality assessment.²² Other groups have included education and the use of quality improvement plans combined with audit reports in their implementation processes with varying levels of success.²³

Strengths, Limitations and Lessons Learned

A strength of the CQI is the linkage and the inclusion of data from a wide variety of sources, along with the quality of the data. Because cancer is a notifiable disease in each Australian State and Territory, ascertainment is high. In addition, on average, approximately 91% of notifications have histological verification. Missing data are routinely followed-up with the notifying institution.

Although the CQI covers five dimensions and 16 quality indicators, we restricted results in this article to three key indicators. These were chosen because they represented internationally recognized indicators of surgical quality and accessibility. A limitation of using the CQI as a tool to analyze trends over time is that it primarily focuses on clinical outcomes and not necessarily on process. This precludes the identification of factors that may influence outcomes. These factors may include a patient case mix, changes in surgical practice, surgical volume and training, centralization of complex cancer surgery, or changes in the distribution of stage at diagnosis. Furthermore, although survival statistics are readily available, they are limited by the quality of population-based cancer-staging information. An ongoing project to improve these data is underway and will be added to future iterations of the CQI.

The involvement of clinicians and data custodians during all phases of the development of the CQI was vital. Ensuring indicators were of importance and relevance to stakeholders and were scientifically valid was also a key factor during the CQI's development. Implementation of the CQI or other quality indices at a system level requires ongoing support from clinicians, health administrators, and data custodians.

The CQI is a valuable tool to track progress in delivering safe, quality cancer care in Queensland public and private health services. Uniquely, the CQI covers public and private cancer services at a population-level and proved to be a sensitive tool in detecting changes over time.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST AND DATA AVAILABILITY STATEMENT

Disclosures provided by the authors and data availability statement (if applicable) are available with this article at DOI <https://doi.org/10.1200/JOP.18.00372>.

AUTHOR CONTRIBUTIONS

Conception and design: All authors

Collection and assembly of data: Shoni Philpot

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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