Closing the Quality Loop: Facilitating Improvement in Oncology Practice Through Timely Access to Clinical Performance Indicators

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Abstract

Purpose: Health care organizations and professionals are being called on to develop clear and transparent measures of quality and to demonstrate the application of the data to performance improvement at the system and provider levels.

Materials and Methods: Cancer Care Ontario (CCO) initiated a pathology reporting project aimed at improving the quality of cancer pathology by standardizing the content, format, and transmission of reports to a central registry and enabling the information to be available for planning, quality measurement, and quality improvement. This population-based quality-improvement project involved more than 400 Ontario pathologists and more than 100 hospitals. Clinically relevant quality indicators that used the newly available data were developed and shared. Synoptic pathology data were electronically captured at the point of report development and used to automate the timely generation of clinical performance indicators that support quality improvement in surgical oncology. These reports provided comparison data at the organizational, regional, and population levels.

Results: Monthly quality indicator reports are generated and distributed to each cancer center and are used to generate dialogue at the professional, organizational, and regional levels regarding evidence-informed quality-improvement opportunities. Since the launch of the project, colorectal lymph node retrieval rates have increased from 76% to 87%, and pT2 prostatectomy margin positivity rates have decreased from 37% to 21%.

Conclusion: High-quality, complete cancer pathology reports are important not only for contemporary oncological practice, but also for secondary users of pathology information including tumor registries, health planners, epidemiologists, and others involved in quality-improvement activities and research.

Introduction

Quality and performance indicators provide a quantitative, evidence-based foundation for clinicians, organizations, researchers, and health system planners to monitor and evaluate the functioning of professional and organizational systems. Health care organizations and professional groups are asked to develop clear quality measures and metrics that can lead to performance improvements at system and provider levels. To increase clinician engagement in the quality agenda, emphasis is on the development of indicators that are meaningful to the providers, those that focus on what is being done well, and areas for improvement. The best performing health care organizations take local ownership of quality measurement, with involvement from the specialty areas in defining and improving against measures most relevant to the specialty. Even with standards identified, these measures will provide little added value unless they are addressed not only at the population level, but also at the regional and organizational levels.

In the field of oncology, there has been much interest in the development and utilization of cancer care performance and quality indicators in various jurisdictions worldwide. In 2004, Cancer Care Ontario (CCO) initiated a pathology reporting project aimed at improving the quality of cancer pathology by standardizing the content, format, and transmission of reports. This large-scale project involved more than 400 Ontario pathologists and more than 100 hospitals producing more than 70,000 cancer pathology reports annually. Structured pathology reporting was implemented on the basis of nationally and provincially endorsed College of American Pathologists (CAP) electronic cancer checklists that use innovative electronic tools in hospital laboratory information systems linked by an electronic pathology (e-Path) network.

High-quality, complete cancer pathology reports describing diagnostic, prognostic, and predictive elements are required for contemporary oncological practice. Several studies have documented the benefits of structured synthetic cancer pathology reports, including the elimination of missing information, increased completeness and accessibility of information, and increased clinician satisfaction. Structured synthetic reporting also enables expanded use of the cancer pathology reports for automated tumor registration, automated stage capture, and quality-improvement projects.

This project focuses on the use of synaptic pathology data to automate the timely generation of clinical performance...
Materials and Methods

Implementation of Synoptic Cancer Pathology Reporting

From 2004 to 2007, the pathology reporting project focused on a transition from narrative to synoptic-like reporting. At the outset of the project in 2004-2005, 45% of Ontario hospitals used narrative reporting (levels 1 and 2), and 55% used synoptic-like structured reporting (levels 3 and 4). No hospital used discrete data field (DDF) true synoptic reporting (levels 5 and 6). The transition from synoptic-like to DDF synoptic reporting commenced in 2008 and initially focused on the implementation of CAP electronic cancer checklists for five common cancers: lung, breast, colorectal, prostate, and endometrium. In subsequent years, DDF reporting was implemented in more than 60 CAP checklists. Content standards (mandatory elements of CAP checklists), formatting standards (North American Association of Centralized Cancer Registries) and transmission standards (Health Level 7) were defined, and funding was provided to hospitals for implementing electronic reporting solutions. As depicted in Table 1, at the time of this report, 92% of Ontario hospitals had enabled synoptic pathology reporting capability in DDF format (level 5 or 6).

The pathology project used a multifaceted approach incorporating clinical leadership at provincial, regional, and hospital levels, communities of practice (CoPs) to address clinical and informatics issues, audit and feedback, knowledge transfer and facilitation from CCO project team members. An in-depth review of change management strategies is beyond the scope of this publication.

Development of Quality Indicators

As part of an overall strategy on quality improvement and as part of the synoptic pathology implementation, CCO committed to developing clinical indicators that support quality improvement in oncology. The quality reports can be used by health system planners, administrators, providers, and researchers to monitor performance, identify areas of high performance, and highlight areas for improvements.

The goal of this initiative is similar to that of the ASCO Quality Oncology Practice Initiative (QOPI) in that outcomes of this innovative initiative have provided strategies for improving quality by facilitating timely reporting of quality indicators to clinicians, health system administrators, and researchers. In addition, consistent with the IHI Framework for Engaging Physicians in Quality and Safety, the purpose of the quality reports is to generate light, not heat, and increase opportunities for dialogue and evidence-based quality improvement. To date, the feedback from clinicians has been extremely positive and has enabled dialogue within and across professions regarding quality improvement opportunities to enhance patient outcomes.

Pathology Process Indicators

As a prerequisite to measuring quality, synoptic pathology reporting compliance and completeness rates were also measured. The synoptic reporting compliance rate measures adherence to the standardized reporting protocol and is defined as the number of pathology reports submitted in DDF synoptic format divided by the total number of pathology reports, expressed as a percentage. The pathology report completeness rate, which in itself is a quality indicator for pathology practice, is defined as the number of pathology reports submitted in DDF synoptic format that include all mandatory elements of the respective CAP checklist divided by the total number of DDF pathology reports, expressed as a percentage. When the project commenced in 2004, a manual audit of pathology reports showed a 75% completeness rate against the CAP standard. Target rates of 90% were set for each of the pathology process indicators. The completeness target is consistent with the American College of Surgery, Commission on Cancer accreditation standard that requires 90% of all eligible pathology reports to contain the required data elements outlined in the CAP checklists.

Establishing Surgical and Pathology Quality Indicators

The number of lymph nodes identified and examined in colorectal cancer (CRC) is important in achieving accuracy in cancer staging, thus influencing the correct usage of adjuvant chemotherapy. Inadequate lymph node examination has been linked to poorer patient outcomes. In 2003, Wright reported that only 27% of stage II colon cancer resection reports in Ontario described the presence of a sufficient number of lymph nodes. In light of this information, CCO published evidence-based guidelines, selected a quality indicator, set a target for the metric, and initiated a knowledge translation effort to drive improvement. The indicator selected was the CRC lymph node retrieval rate, defined as the proportion of colorectal cancer resection reports in which the removal of at least 12 lymph nodes is documented. This indicator reflects both surgical quality (ie, an adequate amount of mesenteric, pericolonic, or perirectal tissue was removed) and pathology quality (ie, all lymph nodes were harvested and properly examined).

The second metric identified was the pT2 prostate margin positivity rate, defined as the percentage of organ-confined radical prostatectomy cases in which the margin is reported as positive. Margin status in prostate cancer is a significant prognostic factor and is influenced by patient selection, pathological...
examination, and surgical technique. A preliminary manual audit of 2,074 radical prostatectomy pathology reports from 2005 to 2006 showed a margin positivity rate of 31.3% for organ-confined (pT2) disease. The prostate cancer CoP within CCO determined that the rate was unacceptably high and set a conservative provincial target of less than 25% for this indicator. To support achievement of the target, the Guideline for Optimization of Surgical and Pathological Quality Performance for Radical Prostatectomy in Prostate Cancer Management (2008) was developed, which includes surgical and pathology recommendations to enhance the standardized approach to surgical technique and pathology handling and reporting.

Using Technology to Enable Timely Reporting of Quality Indicators

Before the current pathology project, an e-Path network linking hospitals and commercial laboratories to the Ontario Cancer Registry at CCO was established to enable electronic transmission of pathology reports. During the course of the pathology reporting project, this network was enhanced to handle DDF (level 6) synoptic reporting. At the time of this report, more than 95% of Ontario’s 110 acute care hospitals send pathology reports to CCO, in real time or in daily batches. The pathology reports are stored within a data repository at the Ontario Cancer Registry, which is mined for DDF pathology data elements required to generate quality indicators.

Data obtained from the synoptic pathology reports were analyzed on a monthly basis. Pathology and surgical quality monitoring reports were generated depicting indicator results at the organizational and regional levels as compared with the established targets. An e-mail was sent to all relevant individuals indicating when monthly or quarterly updates were available; summary results for that period were also included in the message. These reports were accessed through a secure Web-based repository (i-Port) accessible only to registered users at the hospital (eg, regional vice presidents, surgical lead, pathology lead, and within CCO). The data mined from the synoptic reports enabled access to quality indicator results within 6 to 8 weeks of the surgical date. Aggregate quality metrics can be displayed at the provincial, regional, or hospital level by using template reports designed through consultation with clinician users. The data at the aggregate level include identifiers such as hospital name and region to enable networking and knowledge sharing. A key factor contributing to the success of the implementation was the ongoing monitoring by CCO and the inclusion of the quality indicator data in the quarterly performance reviews of the Regional Cancer Programs. Both administrative and clinical leaders for the Regional Cancer Programs participate in the quarterly reviews, which cover a broad range of quality indicators, including those addressed here. The provision of timely, meaningful feedback has been identified as a characteristic of high-performing organizations.

In some jurisdictions, such as Ontario, quality indicators are published and released on public Internet sites accessible by patients, providers, and other interested parties. An example of this is the Cancer Services Quality Index, an annual report that provides information on quality indicators such as synoptic reporting rate, lymph node sampling in CRC surgery, and margin status in prostate cancer surgery.

### Results

#### Synoptic Pathology Compliance and Completeness

As of December 2011, more than 90% of Ontario hospitals had implemented DDF (level 6) synoptic reporting, with greater than 90% of pathology reports for breast, colorectal, prostate,

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### Table 1. Rate of Ontario Hospital Adoption of Synoptic Cancer Pathology Reporting From 2004 to 2012

<table>
<thead>
<tr>
<th>Reporting Levels</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameter</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td><strong>Style</strong></td>
<td>Narrative</td>
<td>Narrative</td>
<td>Level 2+</td>
<td>Level 3+</td>
<td>Level 4+</td>
<td>Level 5+</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>No CAP content</td>
<td>CAP content</td>
<td>Synoptic-like structured format</td>
<td>Electronic reporting tools using drop down menus</td>
<td>Standardized reporting language</td>
<td>Common data and messaging standards with C-keys, SNOMED CT, or other</td>
</tr>
<tr>
<td><strong>Format</strong></td>
<td>Data in single text field</td>
<td>Data in single text field</td>
<td>Data in single text field</td>
<td>Data in single text field</td>
<td>Data in discrete data fields</td>
<td>Data in discrete data fields</td>
</tr>
<tr>
<td><strong>Timeliness of performance indicator reporting</strong></td>
<td>Months to years after clinical procedure</td>
<td>Months to years after clinical procedure</td>
<td>Months to years after clinical procedure</td>
<td>Months to years after clinical procedure</td>
<td>8-10 weeks after clinical procedure</td>
<td>6-8 weeks after clinical procedure</td>
</tr>
</tbody>
</table>

#### Percentage of Ontario hospitals

<table>
<thead>
<tr>
<th>Year</th>
<th>Reporting Level 1</th>
<th>Reporting Level 2</th>
<th>Reporting Level 3</th>
<th>Reporting Level 4</th>
<th>Reporting Level 5</th>
<th>Reporting Level 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004/2005</td>
<td>5%</td>
<td>40%</td>
<td>50%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>2006/2007</td>
<td>0%</td>
<td>5%</td>
<td>70%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>2008/2009</td>
<td>0%</td>
<td>0%</td>
<td>65%</td>
<td>17%</td>
<td>18%</td>
<td>0%</td>
</tr>
<tr>
<td>2009/2010</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>20%</td>
<td>78%</td>
<td>0%</td>
</tr>
<tr>
<td>March 2012</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>92%</td>
</tr>
</tbody>
</table>

Abbreviations: CAP, College of American Pathologists; SNOMED CT, Systematized Nomenclature of Medicine Clinical Terms.
Surgical Quality Indicators

Since the launch of the project in 2008, the CRC lymph node retrieval rates have increased from 70% (2008-2009) to 87% (2010-2011; Appendix Figure A1). The completeness rates for reports received in a DDF format have been consistently greater than 90% (data not shown).

Figure 1. Percentage of synoptic pT2 prostate resection pathology reports with positive margins, by health region, January 2010-December 2011.

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Figure 1. Percentage of synoptic pT2 prostate resection pathology reports with positive margins, by health region, January 2010-December 2011.

Figure 2. Percentage of synoptic pT2 prostate resection pathology reports with positive margins, by hospital, within region D (January 2010-December 2011). Although region D has the lowest pT2 margin positivity rate in the province, there is significant interhospital variation, ranging from 10% to 50%.

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ship of the data and assume an active role in ongoing system and personal performance.3

Before the establishment of the DDF cancer pathology database, the clinical indicator work required coders to manually extract the information from pathology reports, resulting in long delays in generating the indicators. The manual process would take many months to a year or longer versus the current process, which only takes a few weeks. Synoptic pathology reporting enables data capture and collection, at the population level, during the process of care rather than through post hoc manual chart reviews involving a sample or subset of the population. Access to population-based data also maximizes the ability to provide comparator-level data, even for smaller cancer centers in which small data sets would typically be problematic for statistical analysis.

The timely identification of regional and hospital variations can point to areas of high performance and areas for improvement. At the hospital level, the reports are being shared at existing forums such as departmental meetings, grand rounds, and multidisciplinary cancer conferences or tumor boards. This has provided opportunities for dialogue regarding current practice and opportunities for improvement. The generation of reports on a regular basis also allows a mechanism for ongoing monitoring of any quality improvement initiatives that may have been implemented.

Chart-level reports can also be provided if the validity of the data is being questioned or where there is an apparent discrepancy between institutionally derived data and those generated by the CCO quality program. In addition to quarterly reports, users can access the data on an ad hoc basis for the purpose of educational sessions, academic detailing (eg, face-to-face educational sessions with content experts), and knowledge sharing of best practices. Reports can detail indicator results with comparisons of the provincial standard, regional comparison, and comparison of hospitals within regions. The system is also capable of providing individual provider-level data. Synoptic reporting compliance and completeness rates can be generated for individual pathologists, and lymph node retrieval and prostate margin positivity rates can be generated for pathologist-surgeon pairs.

At the provincial level, CCO leveraged the flexibility enabled by electronic pathology reporting and the timely availability of data available on the indicators by presenting the data through a series of regional multidisciplinary presentations targeted at the underperforming regions as a way to improve quality. The purpose of these presentations is to provide the clinicians with their results (at the hospital level only at this point) and engage in dialogue regarding best practices and evidence-based quality improvement strategies. The ability to present timely and relevant data (eg, within 6-8 weeks of actual surgical date) allows for dialogue that is relevant to the current group of physicians, practice environment, and patient population. The provision of timely and relevant feedback has been demonstrated as a key characteristic of high-performing organizations.15 Feedback from these multidisciplinary sessions has been extremely positive. The next focus of reporting is to provide data at the individual clinician level, with evaluation results of a pilot study under review at the time of this report.

The major attributes of data systems used to improve the quality of cancer care include having well-established quality of care measures, computer access to information on patient and outcomes, standardized reporting, population-based cancer registries, the ability to repeat studies to monitor for trends, established benchmarks for quality improvement, data systems to support local quality assurance, public reporting, adaptability, and the protection of personal health information.34 The implementation of standardized synoptic pathology reports with timely feedback on quality indicators described herein reflects these attributes.

Regardless of the indicators being focused on, or the level of reporting (eg, population, region, institution, or provider), quality-improvement initiatives add value by placing data in the hands of the clinicians in a timely manner and in meaningful formats that enable clinicians and health system administrators to use the data to enhance performance, with the ultimate goal of improving patient outcomes. The data collection, reporting, and performance measures described here will be used to identify and address future quality indicators.

In conclusion, high-quality complete cancer pathology reports not only are required for modern oncological practice, but are also important for secondary users of pathology information, including tumor registries, government agencies, health planners, epidemiologists, and others involved in quality-improvement activities and research. The results of this large-scale quality improvement initiative have demonstrated that structured pathology reporting can support the development and maintenance of performance indicators that can contribute to quality improvement at the population, regional, and organizational level.

Authors’ Disclosures of Potential Conflicts of Interest
The author(s) indicated no potential conflicts of interest.

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Data analysis and interpretation: John Srigley, Sara Lankshear, Thomas McGowan
Manuscript writing: John Srigley, Sara Lankshear, Thomas McGowan, Marta Yurcan
Final approval of manuscript: All authors

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3. Mountford J, Shojania, K: Refocusing quality measurement to best support improvement: Local ownership of quality measurement by clinicians. BMJ Qual Safety. doi: 10.1136/bmjqs-2012-000859
Appendix

Figure A1. Percentage of colorectal synoptic pathology reports with 12 or more nodes examined (2010-2011). The data show a high level of performance across all 14 regions (LHINs).

Figure A2. Percentage of synoptic pT2 prostate cancer resection pathology reports with positive margins (June 2008-December 2011).