Colonoscopy Quality Improvement: Quality Indicators and Benchmarks

Douglas K. Rex, MD, FACP, FACG
Director of Endoscopy
Indianapolis, Indiana
Indian University School of Medicine
Indianapolis, Indiana

Introduction
Increasing efforts to reform health care and contain medical expenditures have accelerated the push to define, capture, and enforce quality measures for delivered care. This trend is evident particularly for procedural and preventative measures that can have a marked effect on patient outcomes and health care costs, such as the use of colonoscopy for screening and surveillance for colorectal cancer (CRC). Although the use of colonoscopy as a CRC screening tool has reduced patient mortality, variability in endoscopists’ performance, which has been demonstrated for adenoma detection rates (ADR), assessment of bowel preparation, complication rates, use of appropriate screening and surveillance intervals, and effective polyp resection, suggest that objective measures are needed to evaluate performance and improve quality.1,2 This review discusses the current and emerging landscape regarding quality indicators and benchmarks for colonoscopy.

Quality Measurement for Colonoscopy-Based Screening And Surveillance

Colonoscopy is the dominant screening test for CRC in the United States.1 Unlike basic testing used to screen for other diseases (e.g., blood pressure measurements and lipid profile reviews as preventative steps in cardiovascular disease; glucose testing for diabetes mellitus), colonoscopy is highly operator-dependent. The quality of this procedure is dependent on the skill and training of the gastrointestinal (GI) endoscopist. Other factors such as adequacy of bowel preparation have a significant effect on the success and cost-effectiveness of colonoscopy programs.

Efforts to increase the quality of colonoscopy have been in effect for more than a decade.3 The US Multi-Society Task Force on Colorectal Cancer and a combined task force of the American Society for Gastrointestinal Endoscopy and the American College of Gastroenterology have published recommendations for measuring quality in the technical performance of colonoscopy.4,5 These publications are comprehensive in their scope, covering multiple aspects of pre-procedural evaluation and patient selection, intra-procedural technical performance, and post-procedural monitoring of complications.

However, resources for measuring quality may be limited, thereby creating a need to identify priority quality indicators that should be measured in all clinical programs (Table).6,8 Ideal quality indicators are easy and thus feasible to measure; possess clinical relevance (are related to important outcomes); and illustrate substantial variation in performance among endoscopists. Several measures within colonoscopy-based CRC screening/surveillance satisfy these criteria.

Cecal Intubation Rate
Current recommendations are that endoscopists should be able to achieve cecal intubation in at least 90% of all colonoscopies and 95% of screening colonoscopies.4,5 Cecal intubation is defined as passage of the colonoscope tip fully into the cecal caput, with visualization of the mucosa between the appendiceal orifice and the ileocecal valve. Photodocumentation of the appendiceal orifice and ileocecal valve is expected. Low cecal intubation has been associated with an increased risk for interval cancer in the proximal colon.10

Adenoma Detection Rate
ADR is the fraction of patients 50 years of age and older undergoing initial screening colonoscopy who have one or more conventional adenomas detected.4,5 ADR is the most important colonoscopy quality marker as it relates directly to the principle goal of colonoscopy: detection and resection of precancerous lesions and thereby protection against CRC. ADRs below the recommended threshold of 20% for a mixed-gender patient population predicted a 10-fold higher risk for developing an interval cancer after colonoscopy.11 Guidelines recommend that the ADR be at least 25% in men and 15% in women,4,5 and there is considerable variability in the ADR among endoscopists (Figure 1).12 A number of efforts to improve ADR in poor performers have been unsuccessful, but recently some effective strategies have been identified.

Education
Effective methods for improving ADRs have involved some element of education, typically focused on lesion recognition and improved examination technique. Endoscopists should understand the full range of appearances of precancerous lesions in the colon and be able to recognize flat and depressed conventional adenomas as well as serrated lesions in the proximal colon. Sessile serrated polyps (a term synonymous with sessile serrated adenoma) are invariably sessile or flat, have a pale color, and often have a “mucus cap” on the surface and/or adherent debris that often clusters at the lesion edge. The Mayo Clinic Jacksonville’s EQUIP (Endoscopic Quality Improvement Project) trial randomized 50% of the institution’s faculty to an educational intervention that focused on lesion recognition and specific colonoscopic techniques, such as examining carefully behind folds, to improve ADRs; educational intervention resulted in an improvement in the ADR from 36% to 47%.13

Withdrawal Technique
Barclay et al found that ADRs were well stratified according to whether endoscopists had an average withdrawal time in normal colonoscopies greater than or less than 6 minutes.14 Endoscopists whose withdrawal times were greater than 6 minutes detected more than twice as many patients with adenomas that were 1 cm or larger in size. In a subsequent study, the group evaluated the effect of an educational program combined with enforced 8-minute withdrawal times. The timer sounded every 2 minutes during withdrawal, and served as a reminder that the endoscopist should spend at least 2 minutes examining each quarter of the colon length. This intervention produced across-the-board improvements in ADRs (Figure 2).15

Bowel Preparation
Bowel preparation quality also affects ADR. Split-dose and same-day bowel preparations are the most important development in bowel preparation efficacy in the past 2 decades. In a retrospective study of more than 5,000 colonoscopies, use of split-dose bowel preparations resulted in a marked improvement in bowel preparation quality and an increase in ADRs from 26% to 32% (P<0.001).14 Another study suggested that, for patients who are scheduled for afternoon colonoscopy, early morning/same-day bowel preparation resulted in a better quality examination compared with previous-day or split-dose preparations.7 Split- and same-day dosing of bowel preparations have their greatest benefit in the proximal colon. Colonoscopy is consistently more effective in preventing distal compared with proximal colon cancer,7 an effect that may result partly from the tendency of bowel preparation quality to be worse in the cecum and right colon when preparations are given entirely the day or evening before colonoscopy. Additional potential causes of worse protection against proximal cancer include the rightward distribution of lesions that are endoscopically more subtle (including flat and depressed conventional adenomas and serrated lesions), and the more rapid movement through the polyloid-cancer sequence in tumors that are microsatellite unstable or hypermethylated. Both of these molecular features are more common in tumors arising in the proximal colon.

Appropriate Use of Screening/ Surveillance Intervals
Another determinant of the overall utility of colonoscopy for CRC prevention is the interval between examinations. Although detailed evidence-based guidelines have been published with recommended intervals for screening/surveillance examinations based on age, risk factors, and observations during colonoscopy, there is considerable variability in guideline adherence in clinical practice. All current recommendations are that beginning at age 50, colonoscopy should be performed for screening every 10 years in average-risk persons. The recommended interval is 5 years for certain high-risk family histories (CRC in multiple first-degree

Table. High-Yield Quality Indicators of Colonoscopy-Based Screening and Surveillance for CRC and Suggested Interventions To Improve Performance

<table>
<thead>
<tr>
<th>Quality Indicator</th>
<th>Suggested Interventions To Improve Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR</td>
<td>Comprehensive education and training</td>
</tr>
<tr>
<td></td>
<td>Timer-enforced withdrawal ≥8 min</td>
</tr>
<tr>
<td></td>
<td>Split-dose or same-day bowel prep</td>
</tr>
<tr>
<td></td>
<td>Recognition of right-sided sessile serrated adenomas</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assurance of appropriate screening/surveillance intervals</th>
<th>Distribution of a wallet-size card with a summary of post-polypectomy guidelines to all endoscopists</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR, adenoma detection rate; CRC, colorectal cancer</td>
<td>Placement of guideline charts near computers used for typing endoscopy reports, and distribution of the guidelines in a monthly continuous quality improvement meeting</td>
</tr>
</tbody>
</table>

Adapted from references 6-9
relatives or a single first-degree relative diagnosed with CRC at age <60 years. However, there is clear evidence of systematic use of 5-year intervals for screening in the Medicare population, despite evidence that the yield of repeat screening in 5 years is remarkably low in average-risk persons who have initial negative examinations, and recent evidence that the protective effect of a negative screening colonoscopy performed by a gastroenterologist exceeds 20 years.

Several studies suggest that some gastroenterologists repeat colonoscopy for polyp surveillance either more or less frequently than guidelines recommend, which results in increased costs of care and risk for complications or increased risk for cancer, respectively. This over- or underuse of colonoscopy stems from a variety of potential causes, including unfamiliarity or disagreement with guidelines; systematic problems with health care management systems and patient tracking; suboptimal reimbursement arrangements (e.g., absence of reimbursement or financial incentives for overdue colonoscopy); or noncompliance by patients or referring physicians.

In one survey of endoscopists who reported familiarity with society guidelines regarding intervals for screening/surveillance, incorrect answers to common scenarios regarding appropriate intervals were given in 18% to 40% of hypothetical cases. In a study describing actual utilization of surveillance colonoscopy, 42% of patients received surveillance on time, 38% too early (median difference, 1.2 years too early) and 20% too late (median difference, 1 year too late). Sanaka et al investigated the utility of several interventions to improve adherence to recommended surveillance intervals: Distribution of a wallet-size card with a summary of post-polypectomy guidelines to all endoscopists; placement of guideline charts near computers used for typing endoscopy reports; and distribution and reinforcement of the guidelines in a monthly continuous quality improvement meeting. These interventions resulted in an improvement in the compliance rate with guidelines postintervention (P<0.001) from 57.2% at baseline to 81%.

Quality Reporting and Oversight
Currently, there are no mandatory reporting/tracking systems in place for quality measures for colonoscopy and CRC detection/surveillance in the United States. However, the landscape for regulatory and reimbursement continues to evolve, shifting from quantity to quality of health care delivery with motivators of either pay-for-quality performance or reimbursement penalties for failure to meet certain threshold metrics. Based on the quality markers discussed previously, tracking and reporting systems for colonoscopy quality indicators may include some combination of measuring adequacy of bowel preparation, ADRs, cecal intubation rates, and appropriate use of screening/surveillance intervals. Data that currently are being reported on a voluntary basis to the GI Quality Improvement Consortium (GIQuIc) and the American Gastroenterological Association (AGA) Digestive Health Outcomes Registry may help establish the most appropriate benchmarks for high-quality colonoscopy.

Even if these reporting and tracking systems remain purely voluntary for the near term, groups that participate could realize substantial benefits. For example, quality metrics relative to targets or other practices could be used by groups to identify system errors and to identify practitioners within their groups who would benefit from additional training and education to improve overall group performance and patient outcomes. Furthermore, groups that participate in these quality reporting systems will be well positioned in the likely event that quality measures will be used for accreditation/credentialing purposes, marketing purposes, and reimbursement determinations.

Participation in colonoscopy quality improvement has been made much easier by the development of national registries such as GIQuIc and the AGA Registry that allow electronic submission of procedural data and which provide electronic feedback on group and individual performance with benchmarking.

Conclusion
Variable performance in colonoscopy has now been demonstrated for adenoma detection, cancer prevention, cecal intubation, polyp resection effectiveness, and use of screening and surveillance intervals. Achievement of high levels of adequate bowel preparation reduces costs by reducing the need for early repeat procedures. Interest in colonoscopy quality continues to grow. Active participation in colonoscopy quality improvement programs will improve patient outcomes and position endoscopists for expected changes in health care assessment and reimbursement.

References