Colonoscopy Quality: Impact on Outcomes

Great Plains Quality Innovation Network
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Learning Objectives

Following this presentation, participants will be able to:

• Discuss the role of quality colonoscopy in CRC prevention and adenomatous polyp detection
• Understand evidence-based quality indicators for colonoscopy
• Recognize and avoid overuse of screening and surveillance colonoscopy
• Identify responsibilities of endoscopy facilities and teams related to quality improvement in screening for CRC
Colorectal Cancer (CRC)

- 2\textsuperscript{nd} most common cause of cancer death in the US
  - More than 134,000 new cases expected in US in 2015
  - Nearly 50,000 US deaths
- 1.2 million Americans living with CRC
- Incidence and death rates have fallen steadily past 20 years

Cancer Facts and Figures 2015
Overall CRC death rate decline in the US

CRC mortality decline per decade:

- 4% (1970-1980)
- 11% (1980-1990)
- 15% (1990-2000)
- 27% (2000-2011)

Siegel et al, CEBP 2015
Decline in CRC Incidence

• Decline due to:
  – Improvements in treatment
  – Screening → earlier cancer detection and improved outcomes
  – Screening → polyp removal → prevention

• Recent study estimates that screening has prevented approximately 550,000 cases of colorectal cancer in the US over the past three decades.

Yang, Cancer 2014
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Age to Begin Screening</th>
<th>Recommendations</th>
</tr>
</thead>
</table>
| **Average risk**  
No risk factors  
No symptoms\(^2\) | < Age 50  
\geq Age 50 | No screening needed  
Screen with any one of the following options:  
* Tests That Find Polyps and Cancer  
  FS q 5 yrs\(^*\)  
  CS q 10 yrs\(^*\)  
  DCBE q 5 yrs\(^*\)  
  CTC q 5 yrs\(^*\)  
  OR  
  * Tests That Primarily Find Cancer  
  gFOBT q 1 yr\(^*/**\)  
  FIT q 1 yr\(^*/**\)  
  sDNA\(^**\) |
| **Increased risk**  
CRC or adenomatous polyp in a first-degree relative\(^3\) | Age 40 or 10 years younger than the earliest diagnosis in the family, whichever comes first | Colonoscopy\(^4\) |
| **Highest risk**  
Personal history for > 8 years of Crohn’s disease or ulcerative colitis or a hereditary syndrome (HNPCC or, FAP, AFAP) | Any age | Needs specialty evaluation and colonoscopy |
<table>
<thead>
<tr>
<th>Quality indicator</th>
<th>Grade of recommendation</th>
<th>Measure type</th>
<th>Performance target (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preprocedure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Frequency with which colonoscopy is performed for an indication that is included in a published standard list of appropriate indications, and the indication is documented</td>
<td>1C+</td>
<td>Process</td>
<td>&gt;80</td>
</tr>
<tr>
<td>2. Frequency with which informed consent is obtained, including specific discussions of risks associated with colonoscopy, and fully documented</td>
<td>1C</td>
<td>Process</td>
<td>&gt;98</td>
</tr>
<tr>
<td>3. Frequency with which colonoscopies follow recommended post-polypectomy and post-cancer resection surveillance intervals and 10-year intervals between screening colonoscopies in average-risk patients who have negative examination results and adequate bowel cleansing (priority indicator)</td>
<td>1A</td>
<td>Process</td>
<td>≥90</td>
</tr>
<tr>
<td>4. Frequency with which ulcerative colitis and Crohn’s colitis surveillance is recommended within proper intervals</td>
<td>2C</td>
<td>Process</td>
<td>≥90</td>
</tr>
<tr>
<td><strong>Intraprocedure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Frequency with which the procedure note documents the quality of preparation</td>
<td>3</td>
<td>Process</td>
<td>&gt;98</td>
</tr>
<tr>
<td>6. Frequency with which bowel preparation is adequate to allow the use of recommended surveillance or screening intervals</td>
<td>3</td>
<td>Process</td>
<td>≥85 of outpatient examinations</td>
</tr>
<tr>
<td>7. Frequency with which visualization of the cecum by rotation of landmarks and photodocumentation of landmarks is documented in every procedure (priority indicator)</td>
<td>1C</td>
<td>Process</td>
<td>≥90</td>
</tr>
<tr>
<td>8. Frequency with which adenomas are detected in asymptomatic average-risk individuals (screening) (priority indicator)</td>
<td>1C</td>
<td>Outcome</td>
<td>≥25</td>
</tr>
<tr>
<td>Adenoma detection rate for male/female population</td>
<td></td>
<td></td>
<td>≥30</td>
</tr>
<tr>
<td>Adenoma detection rate for male patients</td>
<td></td>
<td></td>
<td>≥20</td>
</tr>
<tr>
<td>Adenoma detection rate for female patients</td>
<td></td>
<td></td>
<td>≥20</td>
</tr>
<tr>
<td>9a. Frequency with which withdrawal time is measured</td>
<td>2C</td>
<td>Process</td>
<td>&gt;98</td>
</tr>
<tr>
<td>9b. Average withdrawal time in negative-result screening colonoscopies</td>
<td>2C</td>
<td>Process</td>
<td>≥6 min</td>
</tr>
<tr>
<td>10. Frequency with which biopsy specimens are obtained when colonoscopy is performed for an indication of chronic diarrhea</td>
<td>2C</td>
<td>Process</td>
<td>&gt;98</td>
</tr>
<tr>
<td>11. Frequency of recommended tissue sampling when colonoscopy is performed for surveillance in ulcerative colitis and Crohn’s colitis</td>
<td>1C</td>
<td>Process</td>
<td>&gt;98</td>
</tr>
<tr>
<td>12. Frequency with which endoscopic removal of pedunculated polyps and sessile polyps &lt;2 cm is attempted before surgical referral</td>
<td>3</td>
<td>Outcome</td>
<td>&gt;98</td>
</tr>
<tr>
<td><strong>Postprocedure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Incidence of perforation by procedure type (all indications vs colorectal cancer screening/polyp surveillance) and post-polypectomy bleeding</td>
<td>1C</td>
<td>Outcome</td>
<td>&lt;1:500</td>
</tr>
<tr>
<td>Incidence of perforation—all examinations</td>
<td></td>
<td></td>
<td>&lt;1:1000</td>
</tr>
<tr>
<td>Incidence of perforation—screening</td>
<td></td>
<td></td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Incidence of post-polypectomy bleeding</td>
<td></td>
<td></td>
<td>≥90</td>
</tr>
<tr>
<td>14. Frequency with which post-polypectomy bleeding is managed without surgery</td>
<td>1C</td>
<td>Outcome</td>
<td>≥90</td>
</tr>
<tr>
<td>15. Frequency with which appropriate recommendation for timing of repeat colonoscopy is documented and provided to the patient after histologic findings are reviewed</td>
<td>1A</td>
<td>Process</td>
<td>≥90</td>
</tr>
</tbody>
</table>
Key Quality Indicators

- Prep Quality
- Cecal Intubation Rate
- Withdraw Time
- Adenoma Detection Rate (ADR)*
- Appropriate Follow Up Intervals

*Can be viewed as a function of the other quality measures.
Key Quality Indicators

Prep Quality

• Procedure note should document prep quality as:
  – “Good” — no or minimal solid stool with large amounts of clear fluid requiring suctioning
  – “Fair” — collections of semi-solid debris cleared with difficulty
  – “Poor” — collections of semi-solid debris that cannot be effectively cleared

• Goal — at least 90 percent of cases listed as “good”
Patient prep

Good prep in right colon

Poor prep in right colon
Patient prep

• Most commonly recommended is now polyethylene glycol (PEG)

• PEG is safer than sodium phosphate (NaP) in patients with CHF or renal/hepatic compromise

• Split dosing is better tolerated and more effective
Key Quality Indicators

Prep Quality Impacts:

- Follow up interval
  - Poor prep often requires short follow up
- Complication rate
- Cecal intubation rate
- Adenoma detection rate
ADR vs. prep quality

Detection rate of advanced histology by neoplasia size and preparation quality

Volume 75, No. 3 : 2012 Gastrointestinal Endoscopy
Key Quality Indicators

Cecal Intubation Rate

- Tip of the colonoscope is passed beyond the ileocecal valve lip, allowing effective visualization of the medial wall of the cecum lying proximal to the ileocecal valve
- Photo-documentation important to confirm that the cecum was intubated.
- Recommended benchmarks (ACG/ASGE task force)
  - 90% for all exams
  - 95% for screening exams
- Low intubation rates associated with low ADR and increased risk of interval cancers
Key Quality Indicators

Withdrawal Time

- Withdrawal time, not including polyp resection, should avg at least 6–9 min
- Strong correlation with ADR in some studies

Barclay et al. NEJM;2006;355:2533
Key Quality Indicators

Adenoma Detection Rate (ADR)

- ADR – rate of detection of adenomatous polyps at screening colonoscopy in population age 50+
- At least one adenoma should be found 30 percent of the time in men, and 20 percent of the time in women (25 percent composite*)
- Studies indicate wide variation in ADR, even among clinicians in same practice
- ADR inversely associated with risk for:
  - Interval cancers (cancer after “normal” screening exam, diagnosed before next screen is due)
  - CRC death

*ACG/ASGE task force 2015
ADR and Outcomes: Kaiser

• Data from 314,872 colonoscopies performed between January 1, 1998 and December 31, 2010

• 136 gastroenterologists
  – To be included GI had to have completed > 300 colonoscopies and 75 or more screening examinations during the study period

• ADRs ranged from 7.4% to 52.5%.

Corley et al. NEJM 2014: 370: 1298-1306
ADR and Risk of Interval Cancer

Quintile 1 – ADR < 20%
Quintile 5 – ADR > 33%

Corley et al. NEJM 2014: 370: 1298-1306
# ADR and Risk of Fatal Cancer

### Quintile 1 – ADR < 20%

- **Adjusted Hazard Ratio (HR)**: 1.00
- **95% Confidence Interval (CI)**: 0.65 – 1.61
- **No. of Deaths**: 43

### Quintile 2 – ADR < 20%

- **Adjusted Hazard Ratio (HR)**: 1.02
- **95% Confidence Interval (CI)**: 0.55 – 1.17
- **No. of Deaths**: 35

### Quintile 3 – ADR < 20%

- **Adjusted Hazard Ratio (HR)**: 0.80
- **95% Confidence Interval (CI)**: 0.33 – 0.81
- **No. of Deaths**: 29

### Quintile 4 – ADR < 20%

- **Adjusted Hazard Ratio (HR)**: 0.51
- **95% Confidence Interval (CI)**: 0.22 – 0.65
- **No. of Deaths**: 28

### Quintile 5 – ADR > 33%

- **Adjusted Hazard Ratio (HR)**: 0.38
- **95% Confidence Interval (CI)**: 0.22 – 0.65
- **No. of Deaths**: 12

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**Corley et al. NEJM 2014: 370: 1298-1306**
Improving ADR

What does not work?

• Mandating longer withdrawal time does not increase the ADR (Sawhaney, et al. Gastro 2008;135;1892)

• Passive notification does not increase ADR (Shaukat et al. CGH 2009;7:1335)
Improving ADR

Proven interventions

• Physician report cards and standardized practice protocols are effective (Kahi et al. Gastrointest Endosc 2013; Keswani et al. Am J Gastroenterol 2015)

• Educational interventions can increase the ADR (Coe et al. Am J Gastro 2013;108:219)
Mayo Endoscopic Quality Improvement Program (EQUIP)

- ADRs measured at baseline
- 15 endoscopists randomly assigned to undergo EQUIP training.
- Baseline and post-training study ADRs examined for all endoscopists (trained and un-trained) to evaluate the impact of training.
- A total of 1,200 procedures were completed in each of the two study phases.
Mayo “Endoscopic Quality Improvement Program (EQUIP study)”

• Training
  – 2 Educational sessions (1-1.5 hours each)
    • Techniques to improve detection (with videos)
    • Videos of highest ADR physicians
  – Monthly feedback on ADR and WD time
    • Results posted on ASC wall (de-identified)
    • Individual informed of ADR and group data
  – Measured ADR at baseline
  – Repeat after intervention

Individual endoscopist ADRs in EQUIP (phase I and phase II)

Size of plotting symbols is proportional to number of procedures.
Colonoscopy Follow Up Intervals

• In the average-risk population, colonoscopy screening is recommended in all current guidelines at 10-year intervals.

• Post-polypectomy surveillance intervals vary, depending on histology, size and number of lesions removed.

• Screening and post-polypectomy surveillance colonoscopy is frequently performed at intervals that are shorter than those recommended in guidelines.

• Performing colonoscopy too often not only increases patients’ exposure to procedural harm, but also drains resources that could be more effectively used to adequately screen those in need.
Appropriate Colonoscopy Intervals

• For those at average risk, begin at 50 years old and repeat every 10 years if results are negative
• Patients with first-degree relative diagnosed with CRC at age 60 are considered average risk
Appropriate Colonoscopy Intervals

• Patients with more than one first-degree relative with CRC or one first-degree relative diagnosed before age 60 should be screened every five years beginning at age 40 (or 10 years before the age at which relative was diagnosed with CRC)
Recommended Follow Up Intervals

No polyp
Small hyperplastic polyps
1-2 small tubular adenomas
3-10 tubular adenomas
>10 adenomas
Any adenoma >10 mm
Any adenoma with villous elements or hi-grade dysp

10 years
10 years
5-10 years
3 years
<3 years
3 years
3 years
# Overutilization of colonoscopy

## Colorectal Cancer Screening and Surveillance Endoscopy Exam Findings and Median Time to Next Colonoscopy

<table>
<thead>
<tr>
<th>SCREENING</th>
<th>N (%)</th>
<th>Median Time (years)</th>
<th>IQR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INCIDENT SCREENING COLONOSCOPY</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Total = 1,429</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No polyps</td>
<td>713 (50)</td>
<td>6.9</td>
<td>5.1-10.0</td>
</tr>
<tr>
<td>Hyperplastic polyp(s) only</td>
<td>338 (24)</td>
<td>5.7</td>
<td>4.9-9.7</td>
</tr>
<tr>
<td>1–2 small tubular adenoma(s)</td>
<td>257 (18)</td>
<td>5.1</td>
<td>3.3-6.3</td>
</tr>
<tr>
<td>3–10 adenomas, large adenoma, villous histology or high-grade dysplasia</td>
<td>109 (8)</td>
<td>2.9</td>
<td>2.0-3.4</td>
</tr>
<tr>
<td>Malignancy or &gt; 10 adenomas&lt;sup&gt;b&lt;/sup&gt;</td>
<td>12 (1)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Kruse et al. JGIM 2015
Overutilization of colonoscopy

- Among 12,071 Medicare beneficiaries (ages 70+) who underwent polypectomy/biopsy from 2001-2004, 45.7 percent had a repeat colonoscopy in five years (Cooper G, et al. *Cancer* 2013; DOI: 10.1002/cncr.27990)

- Among 24,000 Medicare beneficiaries who had normal colonoscopy from 2001-2003, 46.2 percent had a repeat colonoscopy within seven years (Goodwin J, et al. *Arch Intern Med*, May 11, 2011)
Overuse of Colonoscopy Screening After a Negative Exam in the Medicare Population

Figure 2. Cumulative percentage of repeated colonoscopies for patients 66 years or older who underwent a complete a colonoscopy between 2001 and 2003. The blue line is for all patients with a complete colonoscopy between 2001 and 2003 (N=236,145). The green line is for patients who had a negative colonoscopy result (n=114,468). The black line is for patients who had a negative colonoscopy finding with no indication other than screening (n=24,071).

Other quality measures

• Documentation of Informed consent
  – Includes discussion of risks (bleeding, perforation, infection, etc.)
  – Also includes benefits of colonoscopy and alternative screening tests

• Number of mucosally-based pedunculated polyps and sessile lesions removed by endoscopic resection

• Incidence of perforation, other complications
A quality colonoscopy report

- Date and time of procedure
- Procedure planned
- Patient information
- Risk factors and co-morbidities
- Indications for colonoscopy
- Signed consent
- Sedation or anesthesia plan
- Colonoscope type, model, no.
- Adequacy of bowel prep
- Reached cecum? Retroflexed?
- Withdrawal time in minutes
- Findings
- Number of specimens sent to lab
- Assessment
- Unplanned complication/events
- Pathology
- Recommendations
- Follow-up plan/recall
Select References

• Anderson JC, Butterly LF. Colonoscopy: Quality Indicators. Clin Transl Gastroenterol. 2015 Feb; 6(2): e77