Improving Your Adenoma Detection Rate

Jill Tinmouth, Associate Professor, University of Toronto
Jerry McGrath, Associate Professor, Memorial University of Newfoundland

Feb. 11 2017
**CanMEDS Roles Covered**

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical Expert</strong></td>
<td>(as Medical Experts, physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional values in their provision of high-quality and safe patient-centered care. Medical Expert is the central physician Role in the CanMEDS Framework and defines the physician’s clinical scope of practice.)</td>
</tr>
<tr>
<td><strong>Communicator</strong></td>
<td>(as Communicators, physicians form relationships with patients and their families that facilitate the gathering and sharing of essential information for effective health care.)</td>
</tr>
<tr>
<td><strong>Collaborator</strong></td>
<td>(as Collaborators, physicians work effectively with other health care professionals to provide safe, high-quality, patient-centred care.)</td>
</tr>
<tr>
<td><strong>Leader</strong></td>
<td>(as Leaders, physicians engage with others to contribute to a vision of a high-quality health care system and take responsibility for the delivery of excellent patient care through their activities as clinicians, administrators, scholars, or teachers.)</td>
</tr>
<tr>
<td><strong>Health Advocate</strong></td>
<td>(as Health Advocates, physicians contribute their expertise and influence as they work with communities or patient populations to improve health. They work with those they serve to determine and understand needs, speak on behalf of others when required, and support the mobilization of resources to effect change.)</td>
</tr>
<tr>
<td><strong>Scholar</strong></td>
<td>(as Scholars, physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others, evaluating evidence, and contributing to scholarship.)</td>
</tr>
<tr>
<td><strong>Professional</strong></td>
<td>(as Professionals, physicians are committed to the health and well-being of individual patients and society through ethical practice, high personal standards of behaviour, accountability to the profession and society, physician-led regulation, and maintenance of personal health.)</td>
</tr>
</tbody>
</table>
**Conflict of Interest Disclosure**

(over the past 24 months)

Name: Dr. Jerry McGrath

<table>
<thead>
<tr>
<th>Commercial or Non-Profit Interest</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janssen</td>
<td>advisory board</td>
</tr>
<tr>
<td>Abbvie</td>
<td>advisory board</td>
</tr>
<tr>
<td>Takeda</td>
<td>advisory board</td>
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(over the past 24 months)

Name: Dr. Jill Tinmouth

No relevant relationships with any commercial or non-profit organizations
Learning Objectives

At the end of this session participants will be able to:

I. Review commonly-used colonoscopy quality indicators;

II. Focus on the strengths and limitations of adenoma detection rate as a quality indicator;

III. Review principles of good colonoscopy practice that should enhance adenoma detection;

IV. Highlight new technology and approaches that may help optimize adenoma detection.
Quality Indicators for Colonoscopy
Quality Indicators for Colonoscopy

- Increasingly, physicians performance is being measured
- Goal: To improve the quality of care
Colonoscopy quality indicators - Guidance

UK key performance indicators and quality assurance standards for colonoscopy

Colin J Rees, Swan Thomas Gibson, Matt D Rutter, Phil Baragwanath, Rupert Pullan, Mark Feeney, Neil Haslam, on behalf of the British Society of Gastroenterology, the Joint Advisory Group on GI Endoscopy, the Association of Coloproctology of Great Britain and Ireland

Colonoscopy quality assurance in Canada: A systematic review and clinical practice guideline

Jill Tinnmouth MD PhD, Erin B Kennedy MHSic, David Baron MD, Mae Burke RN, Stanley Feinberg MD, Michael Gould MD, Nancy Baxter MD PhD, Nancy Lewis PhD

Cologuard fecal immunochemical test (FICT) for the perioperative setting

D Todd H Baron, MD, Amitabh Chak, MD, Jonathan Cohen, MD, MD, Brian C Jacobson, MD, MPH, Klaus Mergener, MD, PhD, MD, Douglas O Faigel, MD, ASGE Co-Chair

European guidelines for quality assurance in colorectal cancer screening and diagnosis. First Edition

Endoscopy 2012; 44: SE88-SE105

Can J Gastroenterol Hepatol Vol 28 No 5 May 2014

Can J Gastroenterol Hepatol Vol 28 No 5 May 2014
# UK Colonoscopy quality indicators, 2016

<table>
<thead>
<tr>
<th>Quality Indicators - Process</th>
<th>Minimal Standard</th>
<th>Aspirational target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cecal intubation rate (unadj.)</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Adenoma detection rate (all)</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>Adequate bowel preparation (no repeat)</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Rectal retroversion rate</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Withdrawal time</td>
<td>Mean ≥ 6min</td>
<td>Mean ≥ 10min</td>
</tr>
<tr>
<td>Colonoscopy volume</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Tattoo lesions ≥ 2cm</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Polyp retrieval rate</td>
<td>90%</td>
<td></td>
</tr>
</tbody>
</table>

Rees et al, Gut 2016;65:1923–1929
## UK Colonoscopy quality indicators, 2016

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<tr>
<th>Quality Indicator - Process</th>
<th>Minimal Standard</th>
<th>Aspirational target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic biopsies (diarrhea)</td>
<td>100% rectal</td>
<td>95% right and rectal</td>
</tr>
<tr>
<td>Sedation level (&lt;70 yrs, ≥70 yrs)</td>
<td>Auditable outcome</td>
<td></td>
</tr>
<tr>
<td>Patient comfort level</td>
<td>Auditable outcome</td>
<td></td>
</tr>
<tr>
<td>Use of reversal agents</td>
<td>Auditable outcome</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality Indicator - Outcome</th>
<th>Minimal Standard</th>
<th>Aspirational target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perforation (overall, dx, polyp, dil, stent)</td>
<td>Various</td>
<td>Various</td>
</tr>
<tr>
<td>Post-polypectomy bleeding rate</td>
<td>&lt;1 in 200</td>
<td>&lt;1 in 1000</td>
</tr>
<tr>
<td>Post-colonoscopy colorectal cancer</td>
<td>Auditable outcome</td>
<td></td>
</tr>
<tr>
<td>Unplanned admission rate</td>
<td>Auditable outcome</td>
<td></td>
</tr>
</tbody>
</table>

Rees et al, Gut 2016;65:1923–1929
Questions

What kind of quality indicator is ADR?
1. Structure
2. Process
3. Outcome

Given that ADR is a “process indicator”, what are some pros and cons?
Adenoma Detection Rate

What is it? Strengths and Limitations.
Strengths of Adenoma Detection Rate

- Widely accepted national benchmark on quality for screening colonoscopy.
- Easy to calculate.
  \[
  \text{ADR} = \frac{\# \text{ patients with at least one adenoma}}{\# \text{ screening colonoscopies}}
  \]
- Comparisons can be made annually on an individual basis as well as between endoscopists.
- ADR is a predictor for Interval Cancer
- ADR is also related to the Risk of Fatal Cancer
What should your ADR target be?

- Depends on indication.
- FIT positive CPAC goal $\geq 50\%$.
- US multitask force on colon cancer screening

<table>
<thead>
<tr>
<th>Table 3. Tools for patients to enhance colonoscopy quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions for patients to ask prospective colonoscopists to help ensure a high-quality examination</td>
</tr>
<tr>
<td>1. What is your adenoma detection rate? (should be $\geq 25%$ overall or $\geq 30%$ for male patients and $\geq 20%$ for female patients)</td>
</tr>
<tr>
<td>2. What is your cecal intubation rate (should be $\geq 95%$ for screening colonoscopies and $\geq 90%$ overall)</td>
</tr>
<tr>
<td>3. Do you use split-dosing of bowel preparations? (effective bowel prep</td>
</tr>
</tbody>
</table>

Rex et al., AJG 2017;112:1016-30.
Quality Indicators for Colonoscopy and the Risk of Interval Cancer

- Purpose of this study was to validate quality indicators.
- 186 endoscopists
- 45,026 subjects.
- Highest rate of Interval Cancer was seen in those with low ADRs.
- Conclusion:
  - The ADR is an independent predictor of the risk of interval colorectal cancer after screening colonoscopy.

Kaminski et. al. NEJM 2010; 362: 1795-803.
Adenoma Detection Rate and Risk of Colorectal Cancer and Death.

- The purpose was to evaluate the association between the ADR and the risks of colorectal cancer and cancer-related death 6mo-10yrs after colonoscopy.
- 314,872 colonoscopies
- by 136 gastroenterologists

<table>
<thead>
<tr>
<th>Adenoma Detection Rate</th>
<th>Interval Cancer</th>
<th>Hazard Ratio (95% CI)</th>
<th>Unadjusted Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous rate</td>
<td>712</td>
<td>0.97 (0.96–0.98)</td>
<td>7.7</td>
</tr>
<tr>
<td>Rate quintile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quintile 1: 7.35–19.05%</td>
<td>186</td>
<td>1.00 (reference)</td>
<td>9.8</td>
</tr>
<tr>
<td>Quintile 2: 19.06–23.85%</td>
<td>144</td>
<td>0.93 (0.70–1.23)</td>
<td>8.6</td>
</tr>
<tr>
<td>Quintile 3: 23.86–28.40%</td>
<td>139</td>
<td>0.85 (0.68–1.06)</td>
<td>8.0</td>
</tr>
<tr>
<td>Quintile 4: 28.41–33.50%</td>
<td>167</td>
<td>0.70 (0.54–0.91)</td>
<td>7.0</td>
</tr>
<tr>
<td>Quintile 5: 33.51–52.51%</td>
<td>76</td>
<td>0.52 (0.39–0.69)</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Corely et al. NEJM 2014; 370: 1298-1306.
Interval Cancer

Corley et al. NEJM 2014; 370: 1298-1306.
Interval Cancer

Risk of Advanced Stage Cancer

Corley et al. NEJM 2014; 370: 1298-1306.
Interval Cancer

Risk of Advanced Stage Cancer

Risk of Fatal Cancer

Corley et al. NEJM 2014; 370: 1298-1306.
Non modifiable Factors Associated with ADR

Adler et al., Gut 2013.
Weaknesses of ADR

“One and Done”
• ADR cannot distinguish between endoscopists who detect one adenoma and those who detect ≥2 adenomas.

“Histology-Endoscopy Disconnect”
• Pathology reports are usually not linked to Endoscopy reporting programs.
• Often easier to report on PDR: Polyp Detection Rate
Weaknesses of ADR

“Ceiling for ADR”
- What is the benefit of detecting additional diminutive polyps.
- Impact of higher ADR endoscopists on surveillance colonoscopy demand.

“Indication Gaming”
- Coding the indication differently for participants who have an adenoma. For example rectal bleeding may be coded as screening if polyps are detected.
Weaknesses of ADR

“ADR and serrated lesions”

• Sessile Serrated Adenoma/polyp technically not part of ADR measurement.
  

• Mixed data on correlation of ADR and serrated lesion.
  
Questions

What indicator(s) could be an alternative to ADR?
1. Adenomas per colonoscopy
2. Polyp Detection Rate
3. Adenoma Miss Rate
Alternatives to ADR

Adenomas per Colonoscopy (APC)
• the total number of adenomas detected per colonoscopy.
• studies show mixed results
  • ADR missed substantial differences compared with APC. Wang et al. GIE 2013 Jan; 77(1): 71-8.
  • ADRs and APCs were significantly correlated
    \[ r=0.82 \]
    \[ r=0.91 \]

Adenomas Miss Rate (AMR)
• may be significant for endoscopists with high ADRs who examine the rest of colon with less care after detecting first polyp. Aniwan et al. AJG. 2016 May; 111(5): 723-9.
  • Cross Sectional Study with back-to-back colonoscopies
  • No significant differences in ADRs but AMRs differed significantly
  • AMRs = 36, 27, 21, and 13%; \( P=0.01 \)
Endoscopic Techniques to Improve ADR

What is the evidence?
Who has the higher ADR?

A.  

B.
“Free” strategies to improve ADR

- Behavioural factors
- Upskilling courses

Colonoscopy
- Distend well
- Interrogate folds & flexures
- Clean well
- Roll the patient

- Good bowel prep
- Withdrawal time
Bowel Preparation

- Better bowel preparation quality Better ADR
- Split dose prep improves ADR

Adler et al., Gut 2013;62:236–241
Clark et al., Am J Gastroenterol 2014; 109:1714–1723
# Bowel Preparation

### Table 2. Pooled odds ratio and estimated risk differences for comparisons of adenoma detection rates with different strata of bowel preparation quality

<table>
<thead>
<tr>
<th>Comparison (number)</th>
<th>Number of studies</th>
<th>Odds ratio (95% CI)</th>
<th>Relative risk difference (95% CI)</th>
<th>Absolute risk difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate quality (N=13,413) vs. high quality (N=34,211)</td>
<td>9</td>
<td>0.94 (0.80, 1.10)</td>
<td>−5% (−17, 8%)</td>
<td>−1% (−3, 2%)</td>
</tr>
<tr>
<td>Intermediate quality (N=9,556) vs. low quality (N=3,699)</td>
<td>7</td>
<td>1.39 (1.08, 1.79)</td>
<td>31% (7, 59%)</td>
<td>5% (1, 9%)</td>
</tr>
<tr>
<td>High quality (N=34,211) vs. low quality (N=4,899)</td>
<td>9</td>
<td>1.41 (1.21, 1.64)</td>
<td>32% (17, 49%)</td>
<td>5% (3, 8%)</td>
</tr>
<tr>
<td>Adequate (N=31,047) vs. inadequate (N=4,058)</td>
<td>9</td>
<td>1.30 (1.19, 1.42)</td>
<td>24% (15, 33%)</td>
<td>4% (2, 5%)</td>
</tr>
<tr>
<td>Excellent (N=6,794) vs. good (N=9,054)</td>
<td>4</td>
<td>1.04 (0.90, 1.21)</td>
<td>3% (−7, 14%)</td>
<td>1% (−2, 4%)</td>
</tr>
</tbody>
</table>

CI, confidence interval.

* Two studies reported only polyp detection rates.

* Four studies reported only polyp detection rates.

Adler et al., Gut 2013;62:236–241
Clark et al., Am J Gastroenterol 2014; 109:1714–1723
Bowel Preparation

- Better bowel preparation quality → Better ADR

- Split dose prep improves ADR

- Fair/intermediate quality preparation is sufficient → NO need for early surveillance for intermediate preparation

Adler et al., Gut 2013;62:236–241
Clark et al., Am J Gastroenterol 2014; 109:1714–1723
Withdrawal time: Controversial?

- Conflicting studies on effect of withdrawal time on ADR

<table>
<thead>
<tr>
<th></th>
<th>WT &lt;6 min</th>
<th>WT ≥ 6 min</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any neoplasia</td>
<td>11.8%</td>
<td>23.8%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Advanced neoplasia</td>
<td>2.6%</td>
<td>6.4%</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Observational Data:

Corley et al., GIE 2011;74:656-65
Barclay et al., NEJM 2006;355:2533-41
Barclay et al., CGH 2008;6:1091–1098
Shaukat et al., Gastro 2015;149:952–957
Hilsden et al., GIE 2015;82:887-94
Withdrawal time: Controversial?

- Conflicting studies on effect of withdrawal time on ADR

Interventions to Improve WT:
- No effect (n=12)
- Benefit (n=1):

<table>
<thead>
<tr>
<th></th>
<th>WT ≥ 8 min</th>
<th>WT &lt; 8 min</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any neoplasia</td>
<td>37.8%</td>
<td>23.3%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Advanced neoplasia</td>
<td>6.6%</td>
<td>4.5%</td>
<td>0.13</td>
</tr>
</tbody>
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Corley et al., GIE 2011;74:656-65
Barclay et al., NEJM 2006;355:2533-41
Barclay et al., CGH 2008;6:1091–1098
Shaukat et al., Gastro 2015;149:952–957
Hilsden et al., GIE 2015;82:887-94
Withdrawal time: Controversial?

- Conflicting studies on effect of withdrawal time on ADR
- Withdrawal time IS significantly associated with PCCRC
  - If WT <6 min:
    2.3 more PCCRCs

What is the active ingredient in WT?

Corley et al., GIE 2011;74:656-65
Barclay et al., NEJM 2006;355:2533-41
Barclay et al., CGH 2008;6:1091–1098
Shaukat et al., Gastro 2015;149:952–957
Hilsden et al., GIE 2015;82:887-94
Endoscopic technique

- 5 Academic 3° care centers, 11 GIs
- Reviewed 20 videos / GI
- Withdrawal technique score & withdrawal time
- Compared low vs high ADR

PLUS: Repetitive exam of colonic segments & torquing to flatten folds

Techniques: Look behind folds, clean pools, distend adequately

Lee et al., GIE 2011;74:128-34
Endoscopic technique

• 5 Academic 3° care centers, 11 GIs
• Reviewed 20 videos / GI
• Withdrawal technique score & withdrawal time
• Compared low vs moderate vs high ADR
• High vs low ADR:
  • Better technique scores (p = 0.0001)
  • No difference in WT

Lee et al., GIE 2011;74:128-34
Endoscopic technique: Changing position

- RCT, 6 hospitals, 17 endoscopists, Korea

- Most benefit:
  - Transverse and left colon
  - Low baseline ADR

East et al., GIE 2011;73:456-63
Lee et al., Am J Gastroenterol 2016; 111:63–69
Upskilling: "Train the colonoscopy leader"

- RCT, 38 screening center leaders with ADR<25%, Poland

Kaminski MF et al., Gut 2015;0:1–9
“Behaviours” associated with worse ADR

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Type of intervention</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty: which types of polyps to remove</td>
<td>Education</td>
<td>Interactive or group-learning educational programs</td>
</tr>
<tr>
<td>Style of endoscopy team leadership</td>
<td>Training</td>
<td>MD leadership training, team-based approaches, incl. structured team goals</td>
</tr>
<tr>
<td>Poor focus due to distractions</td>
<td>Enablement</td>
<td>Minimize distractions in endo unit</td>
</tr>
<tr>
<td>Technique during withdrawal</td>
<td>Training</td>
<td>Interactive practice of exam techniques</td>
</tr>
<tr>
<td>Difficulty detecting certain types of adenoma</td>
<td>Training</td>
<td>Detecting flat and depressed polyps</td>
</tr>
<tr>
<td>Examiner fatigue and pain</td>
<td>Training</td>
<td>Physical therapy to mitigate</td>
</tr>
<tr>
<td>Perceived pressure due to the # exams expected/shift</td>
<td>Environmental restructuring</td>
<td>Schedule modification and backup to support MDs who encounter long cases</td>
</tr>
<tr>
<td>Social pressure to finish exams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valuing a meticulous exam</td>
<td>Persuade &amp; incent</td>
<td>Culture of valuing quality, incentives</td>
</tr>
</tbody>
</table>

Atkins et al., GIE 2016;83:617-26
Endoscopic Image Enhancement

What is on the horizon?
NBI: Narrow Band Imaging

NBI selectively projects light in two wavelengths
- blue (415nm): vascularity
- green (540nm): submucosal vessels
- Adenomas have a distinct vascular pattern.

Medical Literature shows variable results:

*Dinesen et al. Gastrointest Endosc. 2012*

#adenomas: 0.645 vs. 0.59, P=0.105


ADR: 48.3% vs. 34.4%, P=0.01
Other Image Enhancement

FICE: Flexible spectral Imaging Colour Enhancement
  • digitally transforms the endoscopic image.

  ![FICE Images](image1)

i-SCAN
  • Post processor imaging enhancement.
  • Allows image, contrast and tone enhancement.

  ![i-SCAN Images](image2)
Chromoendoscopy

An endoscopic technique that uses stains during endoscopy to highlight differences in mucosa, as well as dysplastic and malignant changes.

Improvements in ADR demonstrated in some studies.

Especially good for small or flat mucosal lesions.

- Methylene Blue
- Indigo Carmine
- CongoRed
- Lugol
- Crestyl Violet

Pohl et al. Gut. 2011
Park et al. Scand J Gastroenterol. 2008
Methods to Depress Haustral Folds

**Endocuff**
- Plastic cuff with rows of flexible, hinged, wings.
- Small increase in ADR.

**Balloon Assisted Colonoscopy**
- An inflatable balloon is integrated to the distal portion of the scope.
- The balloon is inflated on withdrawal to flatten and straighten folds.
Methods to Increase Field of View

**Full Spectrum Endoscopy (FUSE)**
- a 330° viewing angle
- side lenses
- Decreased AMR *Gralnek, Lancet Oncol. 2014*

**Retroscope**
- flexible catheter with camera and light source
- occupies working channel

**Panoramic Third Eye**
- External side by side camera
- 330° of view
- Increases the diameter of the scope
Take Away Message

• ADR is an important colonoscopy quality indicator.
• Associated with death from interval cancers.
• Important to be aware of ADR strengths and weaknesses.
• Want to improve your ADR?
  • New technologies are less important than good clinical practice and good endoscopic technique.