QUALITY METRICS IN COLONOSCOPY

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# Colonoscopy and CRC Mortality: The Left-Right Conundrum

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Population</th>
<th>Overall (OR or SMR)</th>
<th>Left Colon</th>
<th>Right Colon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baxter (2009)</td>
<td>Ontario, Canada</td>
<td>0.63 (0.57-0.69)</td>
<td>0.33 (0.28-0.39)</td>
<td>0.99 (0.86-1.14)</td>
</tr>
<tr>
<td>Singh (2010)</td>
<td>Manitoba, Canada</td>
<td>0.71 (0.61-0.82)</td>
<td>0.53 (0.42-0.67)</td>
<td>0.94 (0.77-1.17)</td>
</tr>
<tr>
<td>Baxter (2012)</td>
<td>SEER-Medicare</td>
<td>0.40 (0.37, 0.43)</td>
<td>0.24 (0.21, 0.27)</td>
<td>0.58 (0.53, 0.64)</td>
</tr>
<tr>
<td>Nishihara (2013)</td>
<td>Nurses &amp; Physician Health Studies</td>
<td>0.32 (0.24, 0.45)</td>
<td>0.18 (0.10, 0.31)</td>
<td>0.47 (0.29, 0.76)</td>
</tr>
<tr>
<td>Doubeni (2018)</td>
<td>Kaiser Permanente</td>
<td>0.33 (0.21, 0.52)</td>
<td>0.25 (0.12, 0.53)</td>
<td>0.35 (0.18, 0.65)</td>
</tr>
<tr>
<td>Kahi (2018)</td>
<td>US Veterans</td>
<td>0.39 (0.35, 0.43)</td>
<td>0.28 (0.24, 0.32)</td>
<td>0.54 (0.47, 0.63)</td>
</tr>
</tbody>
</table>
Colonoscopy is Operator-Dependent!

- Operator dependency:
  - Cecal Intubation
  - Withdrawal time and technique
  - Adenoma detection (3-4 fold)
  - Detection of flat and depressed (non-polypoid) neoplasms
  - Detection of serrated lesions (up to 18-fold)
  - Incomplete polypectomy (worse for large and/or serrated lesions)
  - Operator specialty (GI in general better than non-GI).
The ideal colonoscopy quality measure

- Practical to measure
- Amenable to rapid intervention
- Reliable
- Incorruptible
- Evidence-based
- Associated with relevant outcomes

...does not exist.
Colonoscopy Quality Assessment

Preprocedure

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

2. Frequency with which informed consent is obtained, including specific discussions of risks associated with colonoscopy, and fully documented

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)

4. Frequency with which ulcerative colitis and Crohn's colitis surveillance is recommended within proper intervals

Intraprocedure

5. Frequency with which the procedure note documents the quality of preparation

6. Frequency with which bowel preparation is adequate to allow the use of recommended surveillance or screening intervals

7. Frequency with which visualization of the cecum by notation of landmarks and photodocumentation of landmarks is documented in every procedure (priority indicator)

8. Frequency with which adenomas are detected in asymptomatic average-risk individuals (screening) (priority indicator)

   Adenoma detection rate for male/female population

   Adenoma detection rate for male patients

   Adenoma detection rate for female patients

9a. Frequency with which withdrawal time is measured

9b. Average withdrawal time in negative-result screening colonoscopies

10. Frequency with which biopsy specimens are obtained when colonoscopy is performed for an indication of chronic diarrhea

11. Frequency of recommended tissue sampling when colonoscopy is performed for surveillance in ulcerative colitis and Crohn's colitis

12. Frequency with which endoscopic removal of pedunculated polyps and sessile polyps <2 cm is attempted before surgical referral

Postprocedure

13. Incidence of perforation by procedure type (all indications vs colorectal cancer screening/polyp surveillance) and post-polypectomy bleeding

   Incidence of perforation—all examinations

   Incidence of perforation—screening

   Incidence of post-polypectomy bleeding

14. Frequency with which post-polypectomy bleeding is managed without surgery

15. Frequency with which appropriate recommendation for timing of repeat colonoscopy is documented and provided to the patient after histologic findings are reviewed

POST-COLONOSCOPY COLORECTAL CANCER (PCCRC)

- Designation for interval CRC diagnosed after colonoscopy
- **Definition:**
  CRC diagnosed after colonoscopy (where no CRC was found), before the next recommended colonoscopy

**Endoscopist-related variables are most important risk factor for PCCRC**

Pooled analysis of 9167 patients in 8 North American adenoma cohorts
- 58 CRC, median follow-up 47 months
- Nearly 70% probable missed or incompletely resected lesions

PCCRC Limitations

- Rates are difficult to determine
  - Variable definitions across studies
  - Adjudication errors in studies using linked administrative and cancer registry data
    → Study with manual chart review of suspected PCCRC cases:
      - 21 of 45 (47%) were administrative errors
      - Most common: Failure to return after inadequate bowel prep

  *Gotfried et al. J Clin Gastroenterol 2015;49:483–90*

- Requires long observation periods
- Relatively uncommon
- Not amenable to rapid quality interventions.
• Adenoma Detection Rate*
• ADR derivatives and extenders
  - Overall ADR
  - Mean Adenoma per Colonoscopy
  - Advanced Adenoma Detection Rate
  - Polyp Detection Rate
  - (Proximal) Serrated Polyp Detection Rate

• Cecal Intubation Rate*
• Withdrawal Time
• Frequency of appropriate surveillance intervals*

*ACG-ASGE Priority Indicators.
Adenoma Detection Rate: Prime Quality Metric

Proportion of screening colonoscopies with at least one adenoma in asymptomatic, average-risk individuals aged ≥ 50

• Targets:
  Men: ≥ 30%
  Women: ≥ 20%
  Mixed male/female population: ≥ 25%

**ADR: Validation (and vindication)**

- **Polish screening colonoscopy program**
  - 45,000 subjects, 186 endoscopists
  - Patients whose endoscopists’ ADR was < 20% had at least 10-fold higher risk of PCCRC compared to those with ADR ≥ 20%
    
    Kaminski et al. NEJM 2010; 362: 1795-1803
  
  - 146,860 colonoscopies, 294 endoscopists, annual feedback
  - 74.5% of endoscopists increased their ADR
  - Increased ADR associated with CRC death HR of 0.50 (95% CI, 0.27-0.95)
    
    Kaminski et al. Gastroenterology 2017; 153:98-105

- **Kaiser Permanente colonoscopy study**
  - 315,000 subjects, 136 endoscopists
  - HR of PCCRC 0.52 (0.35-0.69) for patients scoped by endoscopists with ADR > 33.5% versus those with ADR < 19%
  
  - Risk of PCCRC decreased by 3% for each 1% ADR increase
    
    Corley et al. NEJM 2014; 370: 1298-1306.
Colonoscopy Quality Influences Surveillance Yield

• 7171 participants with no or 1 to 2 nonadvanced adenomas at first-time screening colonoscopy.

• Risk of metachronous advanced neoplasia (AN) investigated at surveillance colonoscopy, according to clinical characteristics and ADR

• In multivariate analysis, the risk for metachronous AN was strongly associated with increasing age, male sex, increasing number of adenomas, and the ADR of the baseline endoscopist

• Risk of metachronous AN was reduced (adjusted OR, 0.66; 0.46-0.95) in patients of endoscopists with an ADR in the highest tertile, compared with patients of endoscopists with ADRs in the lowest tertile

**ADR measurement: The devil is in the details!**

- Point estimates of ADR do not account for variability due to chance
- Reliable estimates require a large number of screening colonoscopies per provider (500 or more) for narrow 95% CI:

<table>
<thead>
<tr>
<th>N colonoscopies</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
<th>35%</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>5-25</td>
<td>9-31</td>
<td>13-37</td>
<td>17-43</td>
<td>22-48</td>
<td>26-54</td>
</tr>
<tr>
<td>100</td>
<td>8-22</td>
<td>12-28</td>
<td>17-33</td>
<td>21-39</td>
<td>26-44</td>
<td>30-50</td>
</tr>
<tr>
<td>200</td>
<td>10-20</td>
<td>14-26</td>
<td>19-31</td>
<td>24-36</td>
<td>28-42</td>
<td>33-47</td>
</tr>
<tr>
<td>500</td>
<td>12-18</td>
<td>16-24</td>
<td>21-29</td>
<td>26-34</td>
<td>31-39</td>
<td>36-44</td>
</tr>
<tr>
<td>1000</td>
<td>13-17</td>
<td>18-22</td>
<td>22-28</td>
<td>27-33</td>
<td>32-38</td>
<td>37-43</td>
</tr>
</tbody>
</table>

*Do et al. Gastrointest Endosc 2013; 77: 376-80.*
ADR measurement: The devil is in the details!

• Retrieval of histology reports, data entry
  - Could be labor-intensive for endoscopists and their units

• Limitation to screening examinations
  - Could limit eligibility of certain endoscopists with lower volumes
  - Could increase labor-intensive aspect

• Potentially corruptible- “One and Done”
  - May result from reimbursement policies which pay for one polypectomy, regardless of actual number performed

• Serrated lesions not included.
ADR by colonoscopy indication

- In general, surveillance ADR > screening ADR > diagnostic ADR

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>ADR Surveillance</th>
<th>ADR Screening</th>
<th>ADR Diagnostic</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Hampshire Registry 2009-2011</td>
<td>9100</td>
<td>37%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Indiana University Database 1999-2012</td>
<td>21,766</td>
<td>49.7%</td>
<td>38.1%</td>
<td>24.3%</td>
</tr>
</tbody>
</table>


- Varying exclusion criteria used to calculate ADR can significantly affect overall ADRs (although relative rankings of endoscopists less affected).

<table>
<thead>
<tr>
<th>Screening</th>
<th>Surveillance</th>
<th>Diagnostic</th>
<th>Correlation ADR screening-overall</th>
<th>Screening ADR (%)</th>
<th>Overall ADR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
<td>40</td>
<td>0.53 (0.19, 0.78)</td>
<td>15</td>
<td>19.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>22.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>24.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>26.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40</td>
<td>30.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>35.2</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>30</td>
<td>0.55 (0.21, 0.79)</td>
<td>15</td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>23.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>25.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>28.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40</td>
<td>32.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>37.4</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
<td>30</td>
<td>0.57 (0.25, 0.80)</td>
<td>15</td>
<td>20.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>25.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>27.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40</td>
<td>32.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>37.3</td>
</tr>
</tbody>
</table>

* Bootstrap analysis, sample with 53% female, 47% male

Mean Adenoma Per Colonoscopy

• Total number adenomas / total number of screening colonoscopies
  More comprehensive measure of adenoma detection!

• Endoscopists could have similar ADRs but significant variation in total adenoma detection

• The ADR does not provide information about incremental adenomas after the first adenoma

Denis et al. Dig Liv Dis 2014; 46:176-81
Lee et al. Gut 2012; 61: 1050-7
ADR is necessary but may not be sufficient

- 2 groups of endoscopists in LA (teaching vs non-teaching)
- 3318 VA patients

<table>
<thead>
<tr>
<th></th>
<th>Teaching</th>
<th>Non-teaching</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR</td>
<td>28.8%</td>
<td>25.7%</td>
<td>0.052</td>
</tr>
<tr>
<td>APC</td>
<td>0.56</td>
<td>0.43</td>
<td>0.014</td>
</tr>
<tr>
<td>AADR</td>
<td>13.2%</td>
<td>9.4%</td>
<td>0.0007</td>
</tr>
<tr>
<td>ADR-plus</td>
<td>0.93</td>
<td>0.66</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

Mean Adenoma Per Colonoscopy

- Intuitively more comprehensive measure of colonoscopy quality
- Overcomes “one and done” issue with standard ADR

BUT…

- Could increase costs if submitting adenomas in separate bottles
- More cumbersome to measure
- Benchmarks not yet validated (i.e. showing independent association with PCCRC risk).
Advanced adenoma detection rate (AADR)

- Advanced adenoma detection may be more clinically relevant
  - More rapid progression to CRC
  - High conventional ADR due mostly to increased detection of diminutive adenomas

- Correlation with ADR is uncertain:
  - 14 endoscopists, 1933 screening colonoscopies
  - ADR range 22.2% to 44.7%
  - AADR range 2.0% to 18.2%
  - No correlation between ADR and AADR
    \[ \rho = -0.42 \text{ (95\% CI } -0.77 \text{ to } 0.14, P=0.13) \]
    

- Measurement is challenging (variability in polyp size estimation, inter-observer variability among pathologists).
Possible exception: FIT-ADR

- USMSTF suggests separate benchmarks for colonoscopies for FIT + → 45% in men, 35% in women

  *Robertson et al. Gastroenterology 2017;152(5):1217-37*

- Recent data suggest measuring FIT-ADR alone is insufficient

<table>
<thead>
<tr>
<th></th>
<th>FIT-colonoscopy group N = 207</th>
<th>Screening colonoscopy group N = 601</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR</td>
<td>72.9%</td>
<td>50.0%</td>
<td>0.003</td>
</tr>
<tr>
<td>Total adenomas (mean ± SD)</td>
<td>3.3 ± 3.6</td>
<td>1.4 ± 2.3</td>
<td>0.033</td>
</tr>
<tr>
<td>Advanced neoplasm detection rate</td>
<td>32.4%</td>
<td>11.0%</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>CRC</td>
<td>2</td>
<td>5</td>
<td>0.73</td>
</tr>
<tr>
<td>Sessile serrated polyp detection rate</td>
<td>4.3%</td>
<td>3.3%</td>
<td>0.61</td>
</tr>
</tbody>
</table>

Polyp Detection Rate

Proportion of screening colonoscopies with at least one polyp in asymptomatic, average-risk individuals aged ≥ 50

• Advantage: No need for manual pathology entry, collected automatically with procedure reports/billing (polypectomy rate)
• Correlates well with ADR, can be converted to ADR

Williams et al. Gastrointest Endosc 2012; 75: 576-82

Limitations of PDR

• More corruptible than ADR (distal small HP polyps)
• May still require periodic ADR measurement
• No prospective data regarding its validity as quality measure, independently of ADR.
## Proximal serrated polyp detection rate

- Growing interest due to contribution of serrated pathway to PCCRC
- Variability of PSP-DR exceeds that of ADR:

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>N screening colons</th>
<th>N endoscopists</th>
<th>N polyps</th>
<th>ADR</th>
<th>PSP-DR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hetzel (2010)</td>
<td>7192</td>
<td>13</td>
<td>4535</td>
<td>13.5%-36.4%</td>
<td>1.4%-7.6%</td>
</tr>
<tr>
<td>Kahi (2011)</td>
<td>6681</td>
<td>15</td>
<td>11,049</td>
<td>17%-47%</td>
<td>1%-18%</td>
</tr>
<tr>
<td>De Wijkerslooth (2013)</td>
<td>1354</td>
<td>5</td>
<td>1635</td>
<td>24%-40%</td>
<td>6%-22%</td>
</tr>
<tr>
<td>Payne (2014)</td>
<td>7215</td>
<td>32 sites</td>
<td>5548</td>
<td>17.4%-43.5%</td>
<td>0%-9.8%</td>
</tr>
</tbody>
</table>

*Hetzel et al. Am J Gastroenterol. 2010; 105: 2656-64*
*Kahi et al. Clin Gastroenterol Hepatol. 2011; 42-6*
*De Wijkerslooth et al. Gastrointest Endosc 2013; 77: 617-23*
Relation between ADR and PSP-DR

• Significant correlation between ADR and PSP detection rate in several studies
  
  Zorzi et al. Gut 2015;64(9):1389-9

• Limitations of PSP-DR
  - Benchmark not validated
  - High variability in serrated polyp classification among pathologists
  - Corruptible by inclusion of small distal HP polyps
  - High correlation with ADR implies little added value for independent metric.
Cecal Intubation Rate

- Cecal intubation: Passage of scope tip proximal to IC valve, allowing visualization of entire cecal caput including medial wall
- Fundamental step to assess colonoscopy completeness and quality
- Exclude poor prep, when cecal intubation is not intended

- Effective endoscopists should be able to achieve rates of $\geq 90\%$ in all cases, and $\geq 95\%$ in screening colonoscopies

- Higher risk of proximal PCCRC associated with low CIR


- Corruptible---importance of photodocumentation
- Necessary…but insufficient.
Withdrawal Time

- Detection of lesions is increased when average WT is ≥ 6 minutes
- Metric applies for screening examinations in intact colons, with no biopsy/polypectomy

- Study from Minnesota, about 77,000 screening colonoscopies by 51 MDs
  - Longer mean WT associated with higher ADR (3.6% per minute)
  - PCCRC: Compared with WT ≥6 min, the adjusted incidence rate ratio for WT <6 minutes was 2.3 (95% CI: 1.5–3.4; P < .0001).


- Prospective studies have not shown consistent correlation between WT (duration/recording/mandating policy), and ADR/PDR

  Moritz et al. Endoscopy 2012; 44: 476-81
  Taber et al. GIE 2010; 71: 782-6
Withdrawal Time

• Longer withdrawal time implies more thorough colon mucosa inspection
  - Swiss university study, 7 experienced endoscopists
  - Without knowledge of being monitored: Median WT 4.5 min, ADR 21.4%
  - After being informed of monitoring: Median WT 7.3 min, ADR 36.0%

• Better technique almost invariably requires more time: Cleansing, distention, examination of proximal side of folds
• Value as a standalone measure is uncertain
• Amenable to corruption
• WT may be most relevant to correct the performance of physicians with low ADR and short WT.
Misuse of Surveillance Colonoscopy

- **VHA study of 1455 Veterans:**
  - **Underuse:** More than 50% of those with high-risk adenomas did not undergo surveillance
  - **Overuse:** More than 25% of patients with low-risk adenomas received surveillance colonoscopy too early


- **Dutch community-based study (3000 patients with a first adenoma):**
  - Less than 25% of patients received appropriate surveillance
  - In nearly half, surveillance occurred too early

  *van Heijningen et al. Gut 2015;64: 1584–92*

- **Aggregate data from 74 Italian CRC FIT-based screening programs:**
  - Nearly 50,000 surveillance recommendations
  - 37% of recommendations were inappropriate
  - Over 70% of patients with low–risk or no adenomas received inappropriate surveillance recommendations

### Appropriate surveillance intervals

**2012 Recommendations for Surveillance and Screening Intervals in Individuals With Baseline Average Risk**

<table>
<thead>
<tr>
<th>Baseline colonoscopy: most advanced finding(s)</th>
<th>Recommended surveillance interval (y)</th>
<th>Quality of evidence supporting the recommendation</th>
<th>New evidence stronger than 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>No polyps</td>
<td>10</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Small (&lt;10 mm) hyperplastic polyps in rectum or sigmoid</td>
<td>10</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>1–2 small (&lt;10 mm) tubular adenomas</td>
<td>5–10</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>3–10 tubular adenomas</td>
<td>3</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>&gt;10 adenomas</td>
<td>&lt;3</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>One or more tubular adenomas ≥10 mm</td>
<td>3</td>
<td>High</td>
<td>Yes</td>
</tr>
<tr>
<td>One or more villous adenomas</td>
<td>3</td>
<td>Moderate</td>
<td>Yes</td>
</tr>
<tr>
<td>Adenoma with HGD</td>
<td>3</td>
<td>Moderate</td>
<td>No</td>
</tr>
<tr>
<td>Serrated lesions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessile serrated polyp(s) &lt;10 mm with no dysplasia</td>
<td>5</td>
<td>Low</td>
<td>NA</td>
</tr>
<tr>
<td>Sessile serrated polyp(s) ≥10 mm</td>
<td>3</td>
<td>Low</td>
<td>NA</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessile serrated polyp with dysplasia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional serrated adenoma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serrated polyposis syndrome&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>Moderate</td>
<td>NA</td>
</tr>
</tbody>
</table>

USMSTF Post CRC Resection Surveillance Recommendations

• High-quality perioperative clearing with colonoscopy preoperatively or within a 3- to 6-month interval after surgery in the case of obstructive CRC.

• First surveillance colonoscopy 1 year after surgery (or 1 year after the clearing perioperative colonoscopy).

• Interval to the next colonoscopy should be 3 years (4 years after surgery or perioperative colonoscopy), and then 5 years (9 years after surgery or perioperative colonoscopy).

• Patients with rectal cancer with increased risk of local recurrence: Consider flexible sigmoidoscopy or EUS every 3-6 months for the first 2-3 years after surgery, in addition to colonoscopic surveillance for metachronous neoplasia.

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: **Target: ≥ 90%**

Future quality metric?

• Inadequate polypectomy is prevalent, and contributes to PCCRC
  
  *Pohl et al. Gastroenterology 2013;144:74–80*

• Assessing colon polypectomy competency and its association with established quality metrics:
  
  - 13 high-volume colonoscopists, 130 polypectomy videos reviewed by 2 observers and graded by Direct Observation of Polypectomy Skills (DOPyS) tool
  - Polypectomy competency rates ranged between 30% and 90%
  - Polypectomy competency rates did not significantly correlate with ADR (r = 0.4; P =0.2) or withdrawal time (r = 0.2; P =0.5)

→ **Efforts to educate colonoscopists in polypectomy techniques and develop a metric of polypectomy quality are needed.**

  *Duloy et al. Gastrointest Endosc. 2018;87:635-44.*
“My Endoscopy Unit does not have a colonoscopy quality monitoring program”
Hawthorne effect
The alteration of behavior by the subjects of a study due to their awareness of being observed.
Interventions to improve quality: What works?

- **Most promising: Education and active monitoring**
  - Training to improve neoplasia recognition and teach techniques to improve ADR:
    - EQUIP1 and 2: ADR of trained group increased from 36% to 47% and sustained over at least 5 months
    - EQUIP3: Multicenter intervention increased ADR, but not more than controls
      - Wallace et al. Gastrointest Endosc 2017;85:538-45
  - Report cards (programmatic) with individualized feedback, standards of practice → Lead to about 10% absolute improvement in mean ADR
    - Kahi et al. Gastrointest Endosc 2013; 77: 925-31
Train-Colonoscopy-Leaders Program

- 40 colonoscopy screening centers with suboptimal performance in the Polish screening program (center leader ADR≤25%) during pre-intervention phase
- Randomized to TCL (assessment, hands-on training, post-training feedback) or feedback only
- TCL course significantly improved ADR, proximal ADR and non-polypoid lesion detection rate in screening colonoscopy
- Training of screening center leaders in teaching high quality colonoscopy improved their own practice and their center
- Sustained effect over 1.5 years

“That they may have life and have it more abundantly”