Bowel Cancer Screening and Interventions: Colonoscopy

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Rotorua GP CME June 2015
DYING OF EMBARRASSMENT:
NZ TOPS BOWEL CANCER RATES
NEW ZEALAND HERALD. WEDNESDAY, JAN 22, 2014
Outline

● Scope of the problem

● Bowel cancer screening
  - Waitemata Bowel Screening Pilot
  - role of colonoscopy

● Surveillance colonoscopy
  - previous polyp
  - previous colorectal cancer

● Quality colonoscopy
Colon Cancer
Scope of the Problem

- Most common cancer in NZ
  - 3030 new cases in 2011
  - 14.4% of all cancers
  - cumulative risk 5.6% by age 75 years (1:18)
  - 1:16 men or 1:21 women
  - risk of CRC rises with age
  - low risk <40 years
  - >90% of cases over 50 years
  - [commonest cancer in men – prostate; women – breast]

- 2nd commonest cause of cancer death in NZ
  - 1191 deaths in 2011
  - 13.4% of all cancer deaths

NZ Cancer Registry, MOH 2014
Rationale for Bowel Cancer Screening and Surveillance

- Early stage disease has better prognosis
- The majority of CRCs evolve through either:
  - adenoma-carcinoma pathway
  - serrated pathway
  - progression typically over quite a long course (5-10 years)
- High risk groups are well established
  - family history of colorectal cancer
  - genetic colorectal cancer syndromes
  - personal history of colonic polyps
  - personal history of colorectal cancer
  - personal history of inflammatory bowel disease

→ Opportunity for early detection
→ For the average risk population costs per life-year gained (LYG) is less than $US50,000 compared to no screening for FOBT, sigmoidoscopy and colonoscopy

Epidemiologic Reviews 2011;33:88-100
Screening Test Options

- Faecal occult blood testing
- Faecal DNA testing
- Flexible sigmoidoscopy
- Colonoscopy
- (Double contrast barium enema)
- Virtual colonoscopy
- Capsule endoscopy
- Serum-based DNA methylation biomarkers
Screening Test Options

**gFOBT/iFOBT:**
- supported by RCTs
- 13% to 33% reduction in CRC mortality

**FLEXIBLE SIGMOIDOSCOPY:**
- supported by RCTs
- 22% to 31% reduction in CRC mortality
- no or minimal reduction in right sided CRC

**COLONOSCOPY:**
- supported by observational studies, RCTs in progress
- allows direct visualisation of the whole colon
- polypectomy can interrupt the progression of precancerous polyps to cancer
- allows determination of appropriate surveillance interval based on index examination
- less frequent intervals between examinations
- increasing acceptability and tolerability
Screening Test Options

- Faecal occult blood testing
- Faecal DNA testing
- Flexible sigmoidoscopy
- Colonoscopy
- (Double contrast barium enema)
- Virtual colonoscopy
- Capsule endoscopy
- Serum-based DNA methylation biomarkers

NOT BEEN SHOWN TO BE COST-EFFECTIVE
## Faecal occult blood testing

<table>
<thead>
<tr>
<th></th>
<th>Mechanism</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guaiac test</strong></td>
<td>Detects heme and haemoglobin, due to its inherent pseudoperoxidase activity</td>
<td>False positive: red meats, plant peroxidases, aspirin False negative: Vitamin C. Do not detect porphyrin and thus relative specific for lower GI bleeding.</td>
</tr>
<tr>
<td></td>
<td>Sensitivity ↑ with rehydration but ↓ specificity</td>
<td></td>
</tr>
<tr>
<td><strong>Immunochemical tests (FIT)</strong></td>
<td>Antibody specific to intact human haemoglobin</td>
<td>More specific for lower GI bleeding. No dietary restrictions. Quantitative so allows selection of an optimal cut-off value</td>
</tr>
<tr>
<td><strong>Heme-porphyrin assays</strong></td>
<td>Detects all 3 components of faecal blood: Hb, heme derived porphyrins and intact heme</td>
<td>Not widely used. Detects upper and lower GI bleeding, plus dietary porphyrins and animal haems</td>
</tr>
</tbody>
</table>
## RCTs using gFOBTs for CRC Screening

<table>
<thead>
<tr>
<th></th>
<th>Minnesota</th>
<th>Funen</th>
<th>Nottingham</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>Volunteers</td>
<td>Population based</td>
<td>Population based</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>3 groups of 15,000</td>
<td>2 groups of 31,000</td>
<td>2 groups of 76,000</td>
</tr>
<tr>
<td><strong>Age range</strong></td>
<td>50-80 years</td>
<td>45-75 years</td>
<td>50-74 years</td>
</tr>
<tr>
<td><strong>Method</strong></td>
<td>Annual or biennial*</td>
<td>Biennial</td>
<td>Biennial</td>
</tr>
<tr>
<td><strong>Colonoscopy rate</strong></td>
<td>38% and 28%</td>
<td>4.3%</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Mortality reduction</strong></td>
<td>33%</td>
<td>18%</td>
<td>15% (13%)</td>
</tr>
<tr>
<td><strong>Absolute reduction</strong></td>
<td>22 per 100,000 PY</td>
<td>16 per 100,000 PY</td>
<td>10 per 100,000 PY</td>
</tr>
<tr>
<td><strong>NNT</strong></td>
<td>4,545</td>
<td>6,250</td>
<td>10,000</td>
</tr>
</tbody>
</table>

*iFOBT associated with higher compliance and higher diagnostic yield of advanced neoplasia*
Waitemata Bowel Screening Pilot

- Men and women aged 50 to 74 years
  - 137,000 eligible over 2 years
- 4-year pilot, October 2011 to December 2015
- Biennial iFOBT
- Colonoscopy offered if iFOBT positive
## WBSP Monitoring Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>55.6%</td>
<td>50.2%</td>
<td>60%</td>
</tr>
<tr>
<td>iFOBT positivity</td>
<td>7.5%</td>
<td>5.7%</td>
<td>6-8%</td>
</tr>
<tr>
<td>Colonoscopy if iFOBT +ve</td>
<td>95.8% (96.1%)*</td>
<td>94.1% (94.6%)*</td>
<td>&gt;90%</td>
</tr>
<tr>
<td>Colonoscopy &lt;11 weeks</td>
<td>99.3% at Dec 2014</td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td>Caecal intubation rate</td>
<td>97%</td>
<td>97%</td>
<td>&gt;95%</td>
</tr>
<tr>
<td>Complications#</td>
<td>3.7</td>
<td></td>
<td>&lt;10 per 1000</td>
</tr>
<tr>
<td>CRC detection rate</td>
<td>3.1</td>
<td>1.4</td>
<td>1.8-9.5 per 1000</td>
</tr>
<tr>
<td>Advanced adenoma detection rate</td>
<td>15.9</td>
<td>7.5</td>
<td>-</td>
</tr>
<tr>
<td>Adenoma detection rate</td>
<td>36.9</td>
<td>22.8</td>
<td>13.3-22.3 per 1000</td>
</tr>
<tr>
<td>PPV +ve iFOBT for cancer</td>
<td>4.4%</td>
<td>2.7%</td>
<td>4.5%-8.6%</td>
</tr>
<tr>
<td>PPV +ve iFOBT for advanced adenoma</td>
<td>24.2%</td>
<td>15.4%</td>
<td>-</td>
</tr>
<tr>
<td>PPV +ve iFOBT for adenoma</td>
<td>56.1%</td>
<td>46.5%</td>
<td>9-6-40.3%</td>
</tr>
</tbody>
</table>
WBSP cancers

Site of cancer

- Right colon: 73
- Left colon: 111
- Rectum: 75

Stage of cancer

- Stage 1: 44%
- Stage 2: 23.7%
- Stage 3: 22.7%
- Stage 4: 8.1%
Waitemata Bowel Screening Program – Resource Implications

- About 2,000 extra colonoscopies per annum
- Detected cancer comprise 19% of the total colon cancer surgical workload
- Surveillance colonoscopy
  - 2192 pts referred to mid October 2014
    - Less than 1 year 5%
    - 1 year surveillance 19%
    - 3 year surveillance 52%
    - 5 year surveillance 23%
- Cancer follow-up

Personal Communication, Dr Mike Hulme-Moir 2015
Indications for Colonoscopy

- Symptoms
- Screening high risk groups
  - family history of colorectal cancer
  - genetic colorectal cancer syndromes
  - personal history of colonic polyps
  - personal history of colorectal cancer
  - personal history of inflammatory bowel disease
- Implicit component of any FOBT screening program
- Average risk population?
Colonoscopy and polypectomy protects against colon cancer

**National polyp study**
- 76% reduction in incidence of CRC in a cohort of patients who underwent colonoscopy and polypectomy compared to SEER reference group
- 53% reduction in CRC mortality after a median of 16 years compared to SEER reference group

NEJM 1993;329:1977-81
NEJM 2012;366:687-96
Long-Term Colorectal-Cancer Incidence and Mortality after Lower Endoscopy

Reiko Nishihara, Ph.D., Kana Wu, M.D., Ph.D., Paul Lochhead, M.B., Ch.B., Teppei Morikawa, M.D., Ph.D., Xiaoyun Liao, M.D., Ph.D., Zhi Rong Qian, M.D., Ph.D., Kentaro Inamura, M.D., Ph.D., Sun A. Kim, M.D., Ph.D., Aya Kuchiba, Ph.D., Mai Yamauchi, Ph.D., Yu Imamura, M.D., Ph.D., Walter C. Willett, M.D., Dr.P.H., Bernard A. Rosner, Ph.D., Charles S. Fuchs, M.D., M.P.H., Edward Giovannucci, M.D., Sc.D., M.P.H., Shuji Ogino, M.D., Ph.D., and Andrew T. Chan, M.D., M.P.H.
Long-Term Colorectal Cancer Incidence and Mortality after Lower Endoscopy

- Nurses’s Health Study and Health Professional Follow-up Study
- 88,902 participants
- Follow-up 22 years
- Participants were asked whether they had undergone either sigmoidoscopy or colonoscopy
- Medical records and pathology reports reviewed
- 1,815 incident colorectal cancers
- 474 deaths from colorectal cancers

NEJM 2013;369:1095-105
Long-Term Colorectal Cancer Incidence and Mortality after Lower Endoscopy

- Hazard ratios for CRC
  - 0.57 (0.45-0.72) after polypectomy
  - 0.60 (0.53-0.68) after negative sigmoidoscopy
  - 0.44 (0.38-0.52) after negative colonoscopy

- Reduced incidence of proximal CRC
  - 0.73 (0.57-0.92) after negative colonoscopy

- Hazard ratio for death from CRC
  - 0.59 (0.45-0.76) after screening sigmoidoscopy
  - 0.32 (0.24-0.45) after screening colonoscopy

- Reduced mortality from proximal CRC
  - 0.47 (0.29-0.76) after screening colonoscopy
Effect of screening sigmoidoscopy and screening colonoscopy on colorectal cancer incidence and mortality: systematic review and meta-analysis of randomised controlled trials and observational studies

Hermann Brenner professor of epidemiology¹², Christian Stock senior researcher in epidemiology¹³, Michael Hoffmeister senior researcher in epidemiology¹
<table>
<thead>
<tr>
<th>Examination</th>
<th>Incidence*</th>
<th>Mortality*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any site</td>
<td>Proximal</td>
</tr>
<tr>
<td>Sigmoidoscopy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 randomised trials</td>
<td>0.51</td>
<td>0.76</td>
</tr>
<tr>
<td>10 observational</td>
<td>(0.39-0.65)</td>
<td>(0.65-0.90)</td>
</tr>
<tr>
<td>studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colonoscopy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 observational</td>
<td>0.31</td>
<td>0.44</td>
</tr>
<tr>
<td>studies</td>
<td>(0.12-0.77)</td>
<td>(0.15-1.31)</td>
</tr>
</tbody>
</table>

* Relative risk
## Screening Colonoscopy: High Risk Groups

<table>
<thead>
<tr>
<th>Risk CRC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>2-fold One first degree relative with CRC &gt;55 years</td>
</tr>
<tr>
<td>Category 2</td>
<td>3-6 fold One first degree relative with CRC &lt;55 years Two first degree relatives on the same side of the family diagnosed at any age</td>
</tr>
<tr>
<td>Category 3</td>
<td>50% + • FAP, HNPCC or other familial CRC syndrome • One first-degree relative plus two or more first- or second-degree relatives, all on the same side of the family, with a diagnosis of CRC, at any age • Two first-degree relatives, or one first-degree relative plus one or more second-degree relatives, all on the same side of the family, with a diagnosis of CRC and one such relative – was diagnosed with CRC under the age of 55 years, or – developed multiple bowel cancers, or – developed an extracolonic tumour suggestive of hereditary non-polyposis colorectal cancer (i.e., endometrial, ovarian, stomach, small bowel, upper renal tract, pancreas or brain) • At least one first- or second-degree family member diagnosed with CRC in association with multiple bowel polyps • A personal history or one first-degree relative with CRC diagnosed under the age of 50, particularly where colorectal tumour immunohistochemistry has revealed loss of mismatch repair gene (hMLH1 or hMSH2)</td>
</tr>
</tbody>
</table>
## Screening Colonoscopy: High Risk Groups - Action

<table>
<thead>
<tr>
<th></th>
<th>Risk CRC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>2-fold</td>
<td>No screening recommendations</td>
</tr>
<tr>
<td>Category 2</td>
<td>3-6 fold</td>
<td>Offer colonoscopy every 5 years commencing age 50 (or from an age 10 years before the earliest age at which CRC was diagnosed in the family, which ever come first)</td>
</tr>
</tbody>
</table>
| Category 3 | 50%+ | Refer to Genetic Services or NZ Familial Gastrointestinal Cancer Service Timing of 1st colonoscopy dependent on cancer syndrome and genetic testing  
  e.g. HNPCC – begin age 20 to 25 years or 10 years before the youngest case in the immediate family |

NZGG 2012
Polyp Follow-up

Guidelines
Table 4. Relative Risk of Advanced Neoplasia Within 5.5 Years Based on Baseline Finding

<table>
<thead>
<tr>
<th>Baseline finding</th>
<th>No advanced neoplasia, n (%)</th>
<th>Advanced neoplasia, n (%)</th>
<th>RR&lt;sup&gt;a&lt;/sup&gt;</th>
<th>95% CI</th>
<th>P value</th>
<th>Cancer n (%)</th>
<th>HGD/cancer per 1000 person-yr (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No neoplasia (298)</td>
<td>291 (97.6)</td>
<td>7 (2.4)</td>
<td>1.00</td>
<td></td>
<td></td>
<td>1 (0.3)</td>
<td>0.7 (0–2.0)</td>
</tr>
<tr>
<td>Tub Ad &lt;10 mm (622)</td>
<td>584 (93.9)</td>
<td>38 (6.1)</td>
<td>2.56</td>
<td>1.16–5.67</td>
<td>.02</td>
<td>4 (0.6)</td>
<td>1.5 (0–2.9)</td>
</tr>
<tr>
<td>1 or 2 (496)</td>
<td>473 (95.4)</td>
<td>23 (4.6)</td>
<td>1.92</td>
<td>0.83–4.42</td>
<td>.13</td>
<td>3 (0.4)</td>
<td>1.4 (0–2.9)</td>
</tr>
<tr>
<td>&gt;3 (126)</td>
<td>111 (88.1)</td>
<td>15 (11.9)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.01</td>
<td>2.10–11.96</td>
<td>&lt;.001</td>
<td>1 (0.8)</td>
<td>1.9 (0–5.5)</td>
</tr>
<tr>
<td>Tub Ad &gt;10 mm (123)</td>
<td>104 (84.6)</td>
<td>19 (15.5)</td>
<td>6.40</td>
<td>2.74–14.94</td>
<td>&lt;.001</td>
<td>1 (1.2)</td>
<td>6.2 (0–13.5)</td>
</tr>
<tr>
<td>Villous adenoma (81)</td>
<td>68 (83.9)</td>
<td>13 (16.1)</td>
<td>6.05</td>
<td>2.48–14.71</td>
<td>&lt;.001</td>
<td>1 (1.2)</td>
<td>6.2 (0–14.7)</td>
</tr>
<tr>
<td>HGD (46)</td>
<td>38 (82.6)</td>
<td>8 (17.4)</td>
<td>6.87</td>
<td>2.61–18.07</td>
<td>&lt;.001</td>
<td>2 (4.4)</td>
<td>26.0 (3.2–48.8)</td>
</tr>
<tr>
<td>Cancer (23)</td>
<td>15 (65.2)</td>
<td>8 (34.8)</td>
<td>13.56</td>
<td>5.54–33.18</td>
<td>&lt;.001</td>
<td>5 (21.7)</td>
<td>74.8 (14.9–134.7)</td>
</tr>
</tbody>
</table>

Number of adenomas<sup>c</sup> at baseline (n)

<table>
<thead>
<tr>
<th></th>
<th>No advanced neoplasia, n (%)</th>
<th>Advanced neoplasia, n (%)</th>
<th>RR&lt;sup&gt;a&lt;/sup&gt;</th>
<th>95% CI</th>
<th>P value</th>
<th>Cancer n (%)</th>
<th>HGD/cancer per 1000 person-yr (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 or 2 (617)</td>
<td>577</td>
<td>40 (6.5)</td>
<td>7 (1.1)</td>
<td>3.3 (1.2–5.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 or 4 (145)</td>
<td>122</td>
<td>23 (15.9)</td>
<td>2 (1.4)</td>
<td>6.6 (0.1–13.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5–9 (64)</td>
<td>53</td>
<td>11 (17.2)</td>
<td>3 (4.7)</td>
<td>13.1 (0.0–27.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10+ (8)</td>
<td>7</td>
<td>1 (12.5)</td>
<td>0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE. Advanced neoplasia defined as tubular adenoma ≥10 mm, adenoma with villous histology or high-grade dysplasia, or invasive cancer. HGD, high-grade dysplasia; Tub Ad, tubular adenomas.

<sup>a</sup>Adjusted for age and family history.

<sup>b</sup>Compared with patients with 1 or 2 tubular adenomas <10 mm at baseline, patients with 3 or more had a higher rate of advanced neoplasia (P < .002).

<sup>c</sup>Adenoma number, irrespective of size and histology; not included in the multivariate model.
Assumes complete colonoscopy, adequate bowel prep and complete polyp resection
## Multi-Society Task Force on Colorectal Cancer Colon Polyp Surveillance: Clinical Decision Tool

| No polyps, or hyperplastic polyps in rectum/sigmoid | Repeat in 10 years |
| Neoplasia found | | |

<table>
<thead>
<tr>
<th>Serrated polyps/lesions</th>
<th>High risk adenomas</th>
<th>Low risk adenomas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serrated polyposis</strong></td>
<td>&gt; 10 Adenomas</td>
<td>1–2 Tubular adenomas</td>
</tr>
<tr>
<td>Repeat in 1 year</td>
<td>Repeat in less than 3 years</td>
<td>&lt; 10 mm</td>
</tr>
<tr>
<td></td>
<td>3–10 Adenomas</td>
<td>Repeat in 5–10 years</td>
</tr>
<tr>
<td>≥ 10 mm or With dysplasia or traditional serrated adenoma</td>
<td>Repeat in 3 years</td>
<td></td>
</tr>
<tr>
<td>Repeat in 3 years</td>
<td>Villous adenoma(s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or tubular adenoma(s) ≥ 10 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Repeat in 3 years</td>
<td></td>
</tr>
<tr>
<td>&lt; 10 mm in Proximal colon and without dysplasia</td>
<td>Adenoma(s) with high grade dysplasia</td>
<td></td>
</tr>
<tr>
<td>Repeat in 5 years</td>
<td>Repeat in 3 years</td>
<td></td>
</tr>
</tbody>
</table>

These recommended intervals assume a complete exam to cecum, adequate bowel prep, and complete removal of polyps at the baseline exam.
Sessile serrated polyps
Surveillance: Post Colon Cancer Resection

- Clear colon of synchronous disease
- First follow-up colonoscopy 1 year
- If first follow-up negative next exam in 3-5 years
- If patient under 50 years consider closer intervals
- CEA
- Consider annual CT scan and CXR
Surveillance: Post Rectal Cancer Resection

- Best approach may depend on how the cancer was treated
- Lower local recurrence rates associated with total mesorectal excision and with neoadjuvant radiation/chemotherapy
- If risk of local recurrence high
  - Consider flexi-sigmoidoscopy or rectal EUS every 3-6 months for first 2 years
- Other surveillance same as for colon cancer
Surveillance: Inflammatory Bowel Disease

- **Risk**
  - Individuals with longstanding (>8-10 years) extensive ulcerative colitis have an increased risk of CRC
  - Studies suggest 2% by 10 years, 8% by 20 years and 18% by 30 years.
  - Individuals with total or extensive colitis are at greater risk of developing CRC than those with left sided or colitis affecting only rectum and sigmoid
  - Individuals with longstanding extensive Crohn's disease have a similar risk

- **Recommendation**
  - Refer individuals with UC and CR of 8-10 years duration for colonoscopy with serial biopsies to define disease extent and to examine for dysplasia OR chromoendoscopy and directed biopsy
Limitations of Colonoscopy

- Colonoscopy and polypectomy prevents about 80% of colorectal cancers

- Less protective against proximal CRC
- Missed adenomas
  - Tandem colonoscopy studies (Rex 6%)
  - CT colonoscopy studies (Pickhardt 12% and Van Gelder 17%)

- Missed cancers i.e. neoplasia within 3 years of a clear colonoscopy
  - 0.63% - pooled data from 8 US prospective colonoscopy studies after median follow-up of 4 years
  - 2.9% - Dutch community-based study of CRC diagnosed within 5 years of colonoscopy

- Complications
  - bleeding, perforation etc
Possible causes of Missed Cancer after Colonoscopy

- Biological variation in growth rates of tumours
- Incomplete removal of polyps
  - technical limitations in detection
  - hidden mucosa
- Flat polyps
- Incomplete colonoscopy
- Inadequate bowel preparation
- Suboptimal examination technique
Quality Colonoscopy

- Bowel preparation
  - split prep
  - runway time
- Caecal intubation rate
  - >95% (?>98%)
- Polyp detection rate
  - Adenoma detection rate
    - Males >25% and females >15%
  - Adenoma per colonoscopy
    - Males >0.50 and females >0.20
  - Serrated lesion detection rate
- Adherence to recommended screening and surveillance intervals
  - Careful inspection
  - Withdrawal time
  - Training
  - High definition imaging
Colonoscopy Audit

Endoscopy Auckland and MercyAscot Endoscopy
% Terminal Ileum Intubation

% Patient Discomfort > 2

% Polyps

TRENDS

% Adjusted Caecal Intubation Rate
% adjusted caecal intubation rate

% patient discomfort > 2

% terminal ileal intubation

% polyps

2013 99.2%

2013 11.3%

2013 60.3%
All Endoscopists (n=65,642 procedures)

Excluding endoscopists with < 100 Procedures (n=65,433 procedures 7 endoscopists excluded)

\[ r = 0.42 \]
\[ P = 0.03 \]
Overall Polyps

Hyperplastic Polyps

Serrated Polyps

Adenoma Polyps

Detection Rate (%)

Mean Withdrawal Time (min)

$r = 0.9646$

$< 0.0001$

$r = 0.9501$

$< 0.0001$

$r = 0.9395$

$0.0002$

$r = 0.9053$

$0.0008$
Effect of a Time-Dependent Colonoscopy Withdrawal Protocol on Adenoma Detection During Screening Colonoscopy.
Barclay CGH 2008;6:1091-1098

Figure 2. Physician adenoma detection rates versus colonoscopic withdrawal times in examinations without polyp removal. Baseline: $r_s = 0.90; P < .001$; postintervention: $r_s = 0.76; P = .004$. 
Take home message

- Screening for colorectal cancer is effective
  - average risk
  - high risk
- Make sure your patient with a history of bowel cancer or polyps has appropriate surveillance
- Make sure your patient gets a quality colonoscopy
Have you had a colonoscopy?

Thank you

Self colonoscopy in the sitting position.