Improving Your Adenoma Detection Rate

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FEB. 11 2017

CanMEDS Roles Covered

X	**Medical Expert** (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.)
	Communicator (as Communicators, physicians form relationships with patients and their families that facilitate the gathering and sharing of essential information for effective health care.)
	Collaborator (as *Collaborators*, physicians work effectively with other health care professionals to provide safe, high-quality, patient-centred care.)
X	**Leader** (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.)
	Health Advocate (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.)
X	**Scholar** (as *Scholars*, physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others, evaluating evidence, and contributing to scholarship.)
	Professional (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.)

Conflict of Interest Disclosure

(over the past 24 months)

Name: Dr. Jerry McGrath

Commercial or Non-Profit Interest	Relationship
Janssen	advisory board
Abbvie	advisory board
Takeda	advisory board

Conflict of Interest Disclosure

(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;

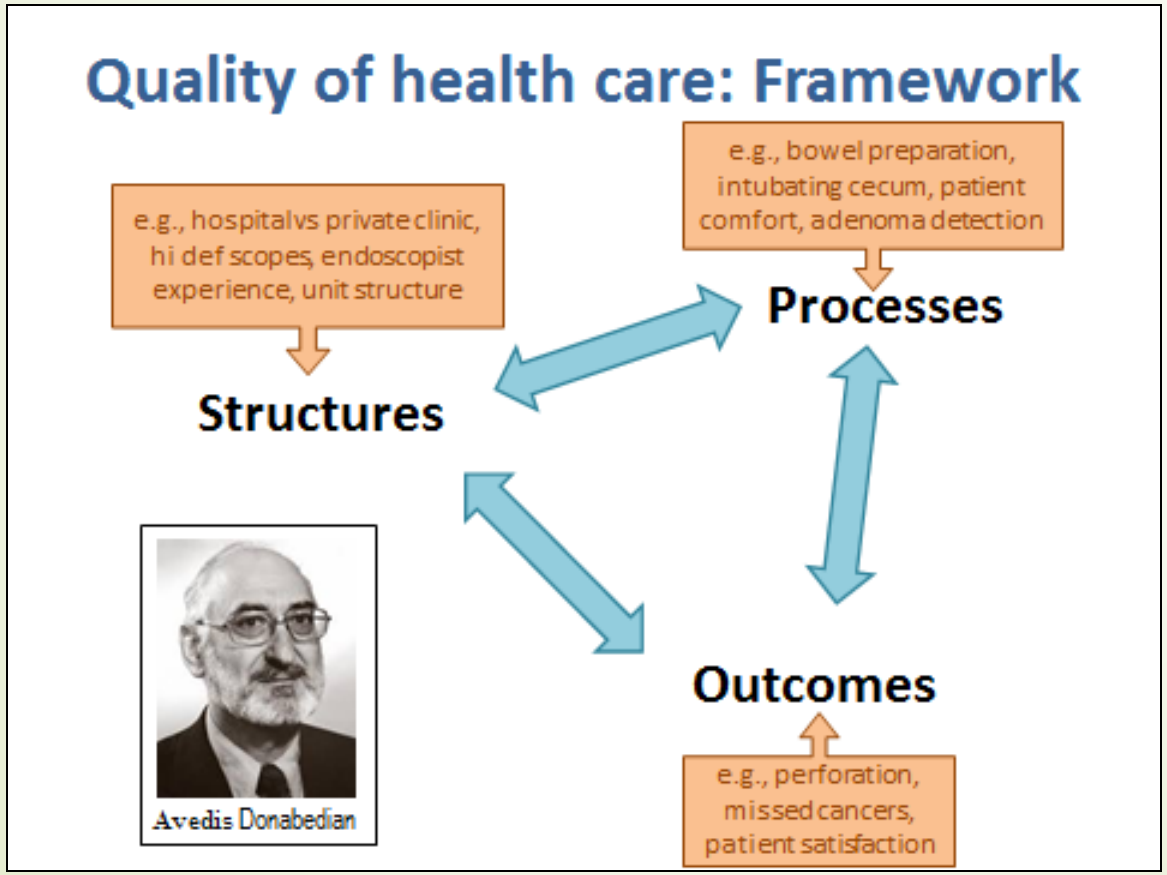
III. Review principles of good colonoscopy practice that should enhance adenoma detection;

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



Pros and cons

Colonoscopy quality indicators - Guidance

Guidelines

OPEN ACCESS

UK key performance indicators and quality assurance standards for colonoscopy

Colin J Rees,[1,2,3] Siwan Thomas Gibson,[4] Matt D Rutter,[2,3,5] Phil Baragwanath,[6] Rupert Pullan,[7] Mark Feeney,[7] Neil Haslam,[8] on behalf of: the British Society of Gastroenterology, the Joint Advisory Group on GI Endoscopy, the Association of Coloproctology of Great Britain and Ireland

Rees CJ, *et al*. *Gut* 2016;**65**:1923–1929. doi:10.1136/gutjnl-2016-312044

ean guidelines for quality assurance in colorectal r screening and diagnosis. First Edition

ty assurance in endoscopy in colorectal cancer ning and diagnosis

Co-Funded by the Health Programme of the European Union

Authors: R. Valori[1], J-F. Rey[2], W. S. Atkin[3], M. Bretthauer[4], C. Senore[5], G. Hoff[6], E. J. Kuipers[7], L. Altenhofen[8], R. Lambert[9], G. Minoli[10]

Institutions: Institutions are listed at the end of article.

Endoscopy 2012; 44: SE88–SE105

guidelines on safety and quality indica

David Armstrong MB BChir[1], Alan Barkun MDCM[2], Ron Bridges MD[3], Rose Cart
Catherine Dubé MD[3], Robert Enns MD[6], Roger Hollingworth MD[7], Donald Ma
Sylviane Forget MD[10], Grigorios Leontiadis MD[1], Jonathan Meddings MD[11], Pete
Roland Valori MD[14]; on behalf of the Canadian Association of Gastroenterology Safety and Quality Indicators in Endoscopy Consensus Gr

Can J Gastroenterol Vol 26 No 1 January 2012

Colonoscopy quality assurance in Ontario: ystematic review and clinical practice guideline

Jill Tinmouth MD PhD[1], Erin B Kennedy MHSc[2], David Baron MD[3], Mae Burke RN[4], Stanley Feinberg MD[3], Michael Gould MD[5], Nancy Baxter MD PhD[4], Nancy Lewis PhD[5]

Can J Gastroenterol Hepatol Vol 28 No 5 May 2014

CURRENT ENDOSCOPIC PRACTICES – THE EXPERTS SPEAK

Canadian credentialing guidelines for colonoscopy

Joseph Romagnuolo MD FRCPC FASGE MScEpid[1], Robert Enns MD FRCPC[2], Terry Ponich MD FRCPC[3], Jonathon Springer MD FRCPC[4], David Armstrong MA MB BChir FRCPC FRCP(UK) AGAF FACG[5], Alan N Barkun MD CM MSc FRCPC[6]

Can J Gastroenterol Vol 22 No 1 January 2008

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,

ASGE/ACG Taskforce on Quality in Endoscopy

GASTROINTESTINAL ENDOSCOPY Volume 63, No. 4 : 2006

UK Colonoscopy quality indicators, 2016

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

Rees et al, Gut 2016;65:1923–1929

UK Colonoscopy quality indicators, 2016

Quality Indicator - Process	Minimal Standard	Aspirational target
Diagnostic biopsies (diarrhea)	100% rectal	95% right and rectal
Sedation level (<70 yrs, ≥70 yrs)	Auditable outcome	
Patient comfort level	Auditable outcome	
Use of reversal agents	Auditable outcome	
Quality Indicator - Outcome	**Minimal Standard**	**Aspirational target**
Perforation (overall, dx, polyp, dil, stent)	Various	Various
Post-polypectomy bleeding rate	<1 in 200	<1 in 1000
Post-colonoscopy colorectal cancer	Auditable outcome	
Unplanned admission rate	Auditable outcome	

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.

$$\textbf{ADR} = \frac{\text{\# patients with at least one adenoma}}{\text{\# screening colonoscopies}}$$

- 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?

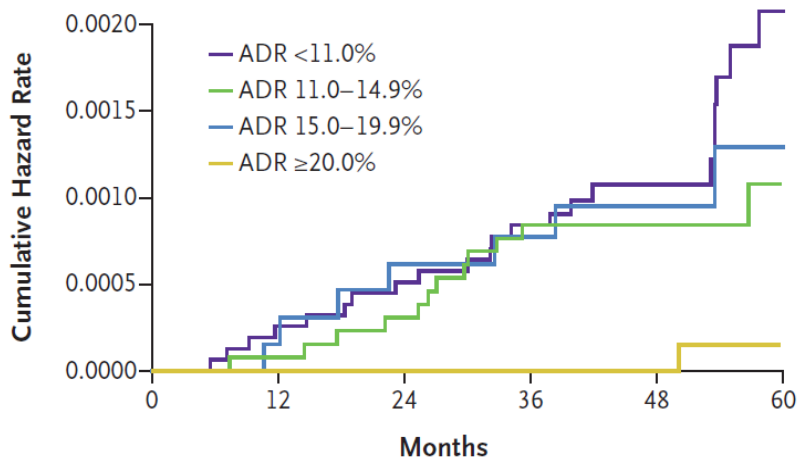
- Depends on indication.
- FIT positive CPAC goal ≥50%.
- US multitask force on colon cancer screening

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

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.*



No. at Risk						
ADR <11.0%	15,883	15,805	15,744	15,669	9355	4717
ADR 11.0–14.9%	13,281	13,223	13,182	13,120	7571	4003
ADR 15.0–19.9%	6,607	6,582	6,562	6,539	4022	2529
ADR ≥20.0%	9,255	9,235	9,202	9,166	7155	5548

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.

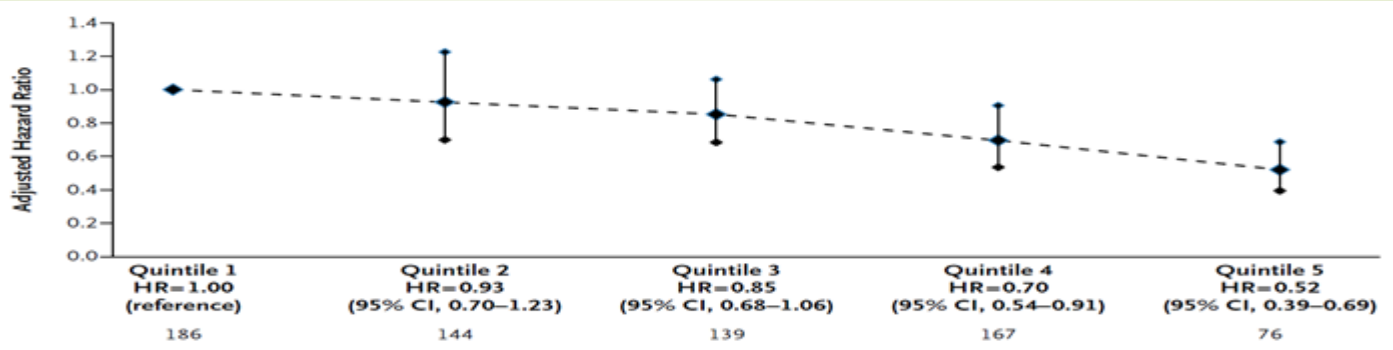
- 314,872 colonoscopies
- by 136 gastroenterologists

Table 2. Adenoma Detection Rate and Risk of an Interval Colorectal Cancer among All Patients.

Adenoma Detection Rate	Interval Cancer	Hazard Ratio (95% CI)*	Unadjusted Risk
	no. of cases		*no. of cases/ 10,000 person-yr*
Continuous rate	712	0.97 (0.96–0.98)	7.7
Rate quintile			
Quintile 1: 7.35–19.05%	186	1.00 (reference)	9.8
Quintile 2: 19.06–23.85%	144	0.93 (0.70–1.23)	8.6
Quintile 3: 23.86–28.40%	139	0.85 (0.68–1.06)	8.0
Quintile 4: 28.41–33.50%	167	0.70 (0.54–0.91)	7.0
Quintile 5: 33.51–52.51%	76	0.52 (0.39–0.69)	4.8

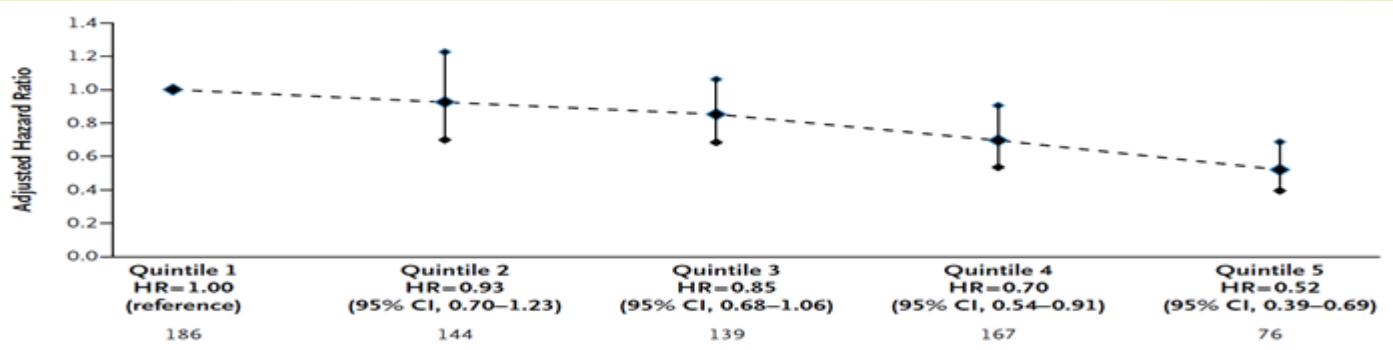
Corely et al. NEJM 2014; 370: 1298-1306.

Interval Cancer

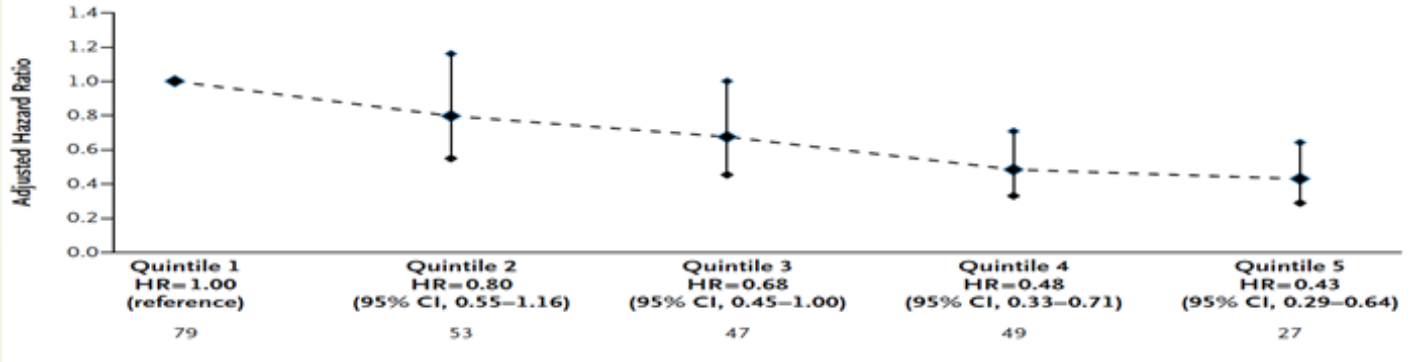


Corley et al. NEJM 2014; 370: 1298-1306.

Interval Cancer

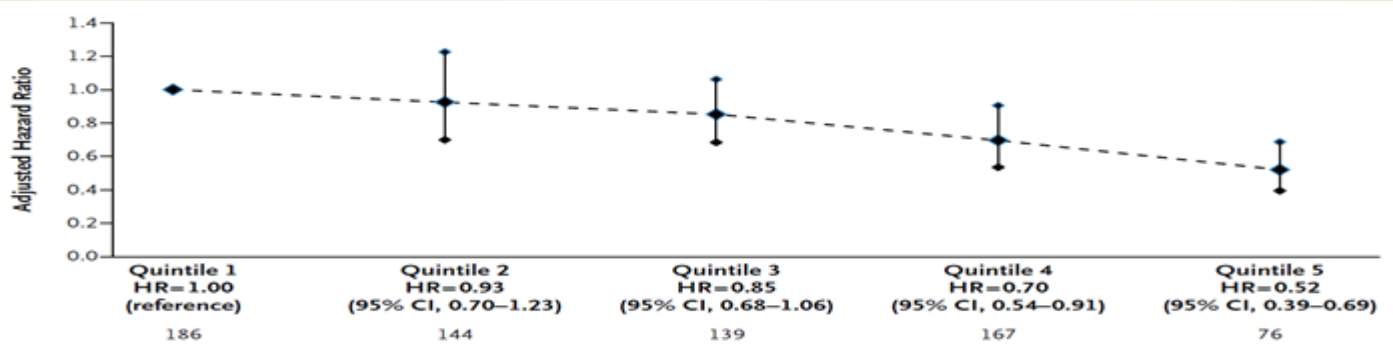


Risk of Advanced Stage Cancer

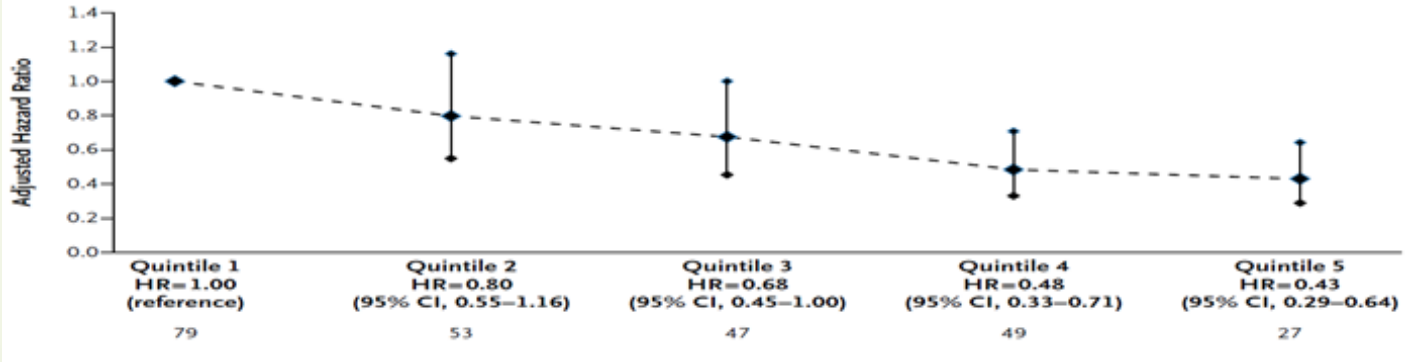


Corley et al. NEJM 2014; 370: 1298-1306.

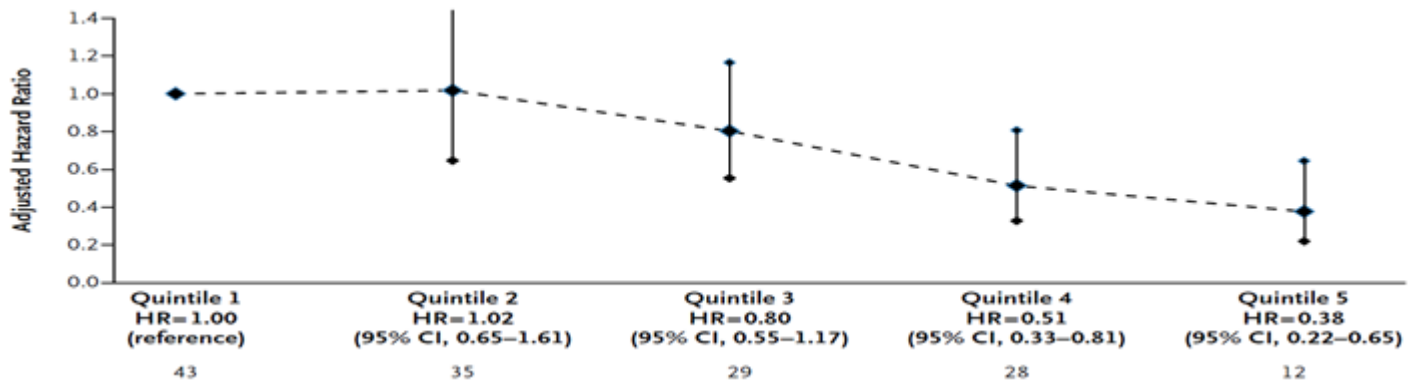
Interval Cancer



Risk of Advanced Stage Cancer



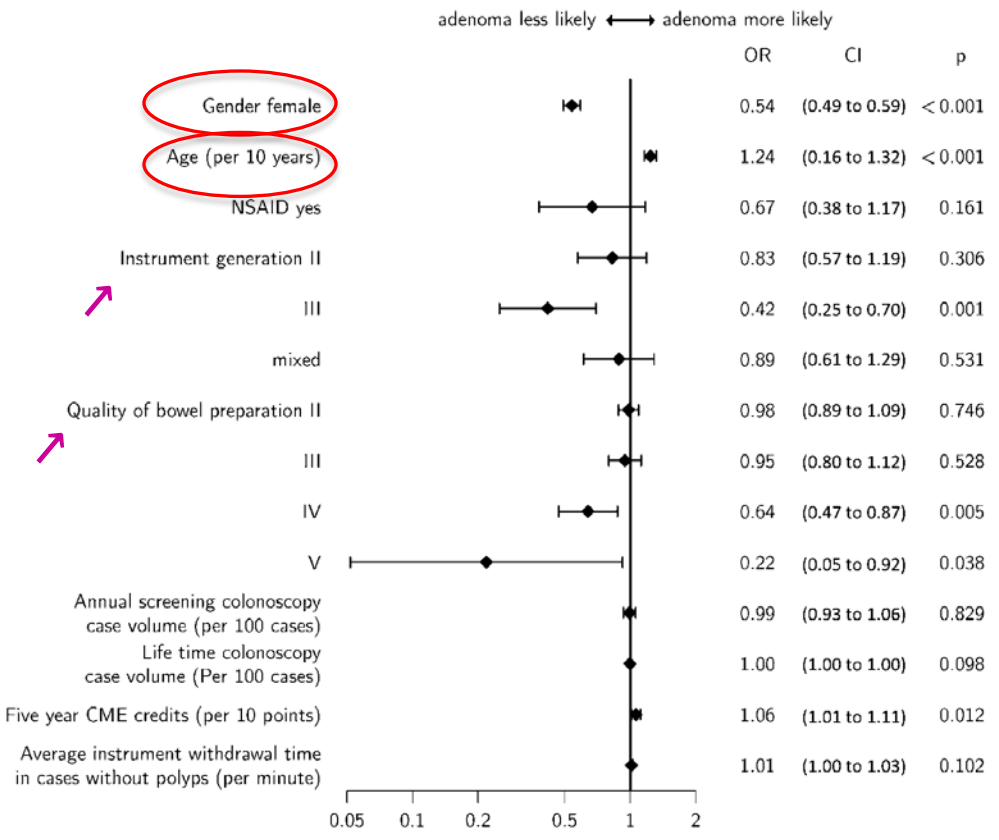
Risk of Fatal Cancer



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

Non modifiable Factors Associated with ADR

Figure 1 A forest plot showing the results of fitting a two-level binary mixed linear model to the data of the complete cases (92%). The plot shows ORs with 95% CIs on a log-odds scale.



Gut 2013;**62**:236–241. doi:10.1136/gutjnl-2011-300167

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

<u>“ADR and serrated lesions"</u>

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

  Rex et al. GIE 2015;81:31-53.

- Mixed data on correlation of ADR and serrated lesion.

  Kahi et al. GIE 2012; 75:515-20.

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 Rex et al. GIE 2014 Mar; 79(3): 448–454.

    r=0.91 Park et al. Scandinavian Journal of Gastroenterology 2016 2016 Jul;51(7):886-90.

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

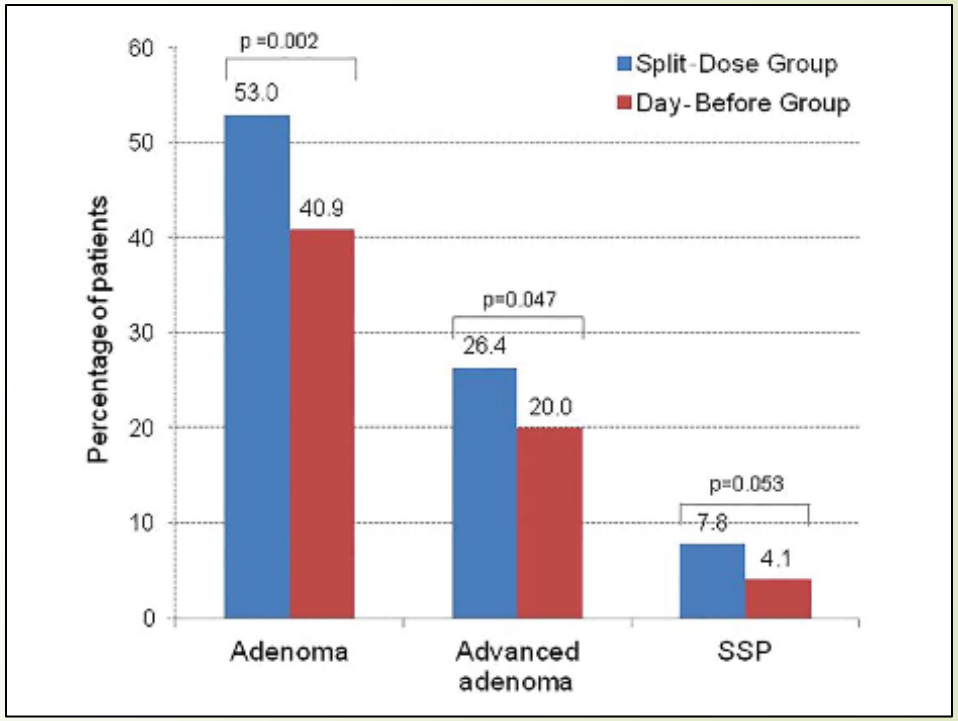
Colonoscopy

- 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
Radaelli F, et al. Gut 2017;66:270–277
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

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

CI, confidence interval.
[a]Two studies reported only polyp detection rates.
[b]Four studies reported only polyp detection rates.

Adler et al., Gut 2013;62:236–241
Radaelli F, et al. Gut 2017;66:270–277
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
Radaelli F, et al. Gut 2017;66:270–277
Clark et al., Am J Gastroenterol 2014; 109:1714–1723

Withdrawal time: Controversial?

- Conflicting studies on effect of withdrawal time on ADR

Observational Data:

	WT <6 min	WT ≥ 6 min	p-value
Any neoplasia	11.8%	23.8%	<0.001
Advanced neoplasia	2.6%	6.4%	0.005

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):

	WT ≥ 8 min	WT < 8 min	p-value
Any neoplasia	37.8%	23.3%	<0.0001
Advanced neoplasia	6.6%	4.5%	0.13

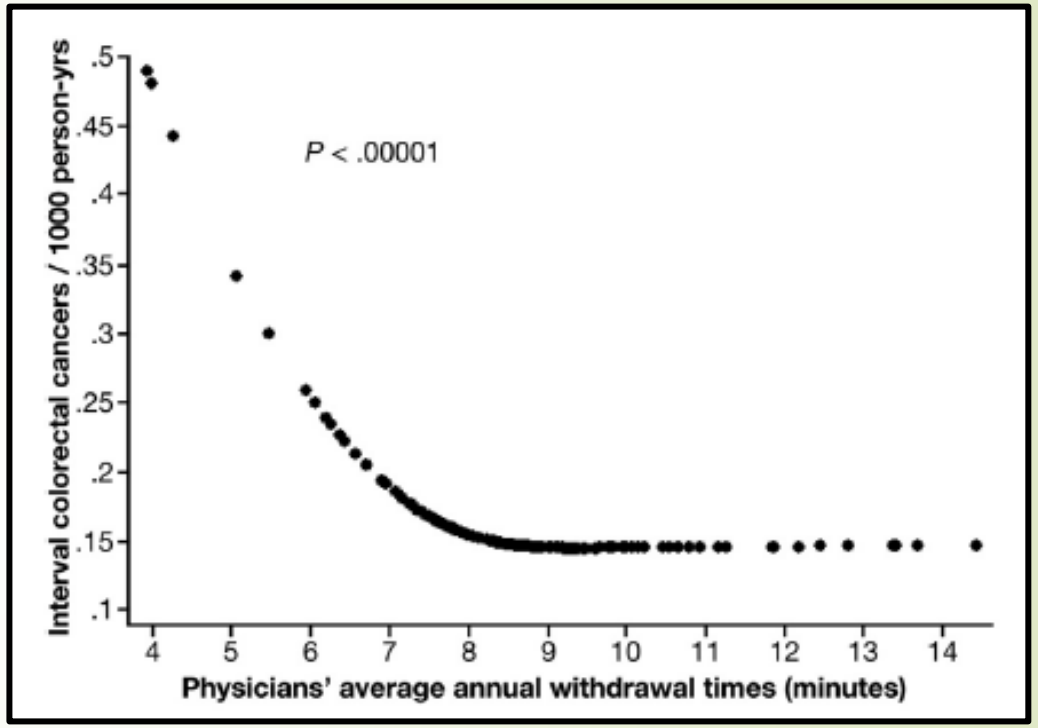
Corley et al., GIE 2011;74:656-65
Barclay et al., NEJM 2006;355:2533-41
Barclay et al., CGH 2008;6:1091–1098
Shaukat et al., Gastro 2015;149:952–957
Hilsden et al., GIE 2015;82:887-94

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?



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Endoscopic technique

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

Scale for quality criteria:

0	1	2	3	4	5
↓					↓
NOT looking behind folds					Look behind all folds
NOT cleaning pools					Cleaning all pools
NOT distended or in spasm					Good distension

	Fold E	Adequacy of Cleansing	Adequacy of Distension

or rating the quality of withdrawal technique. AO, appendiceal orifice; IC, ileocecal.

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

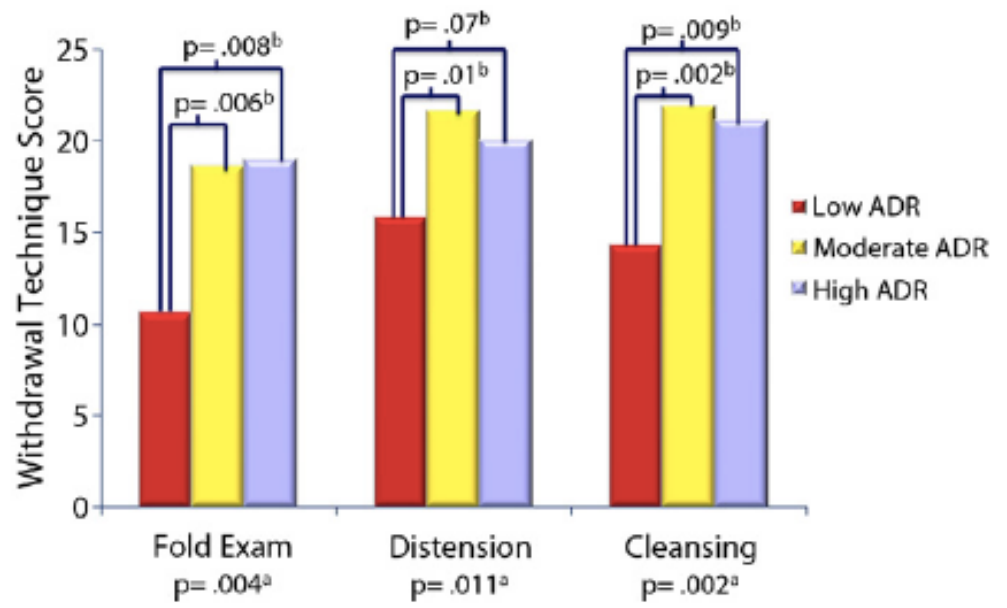
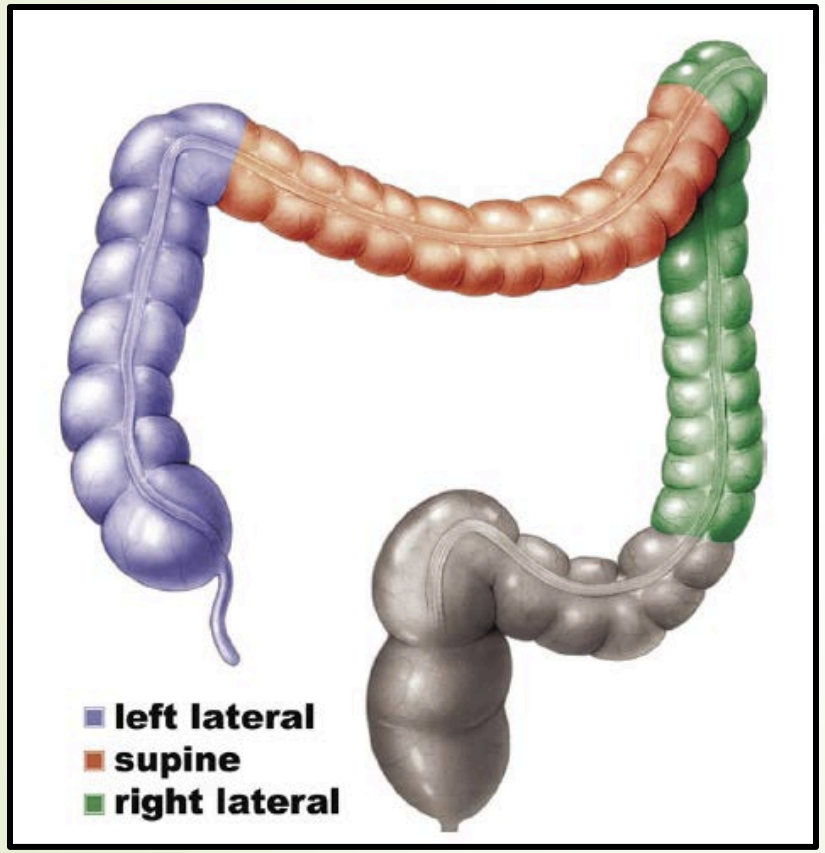


Figure 4. Scores for fold examination, adequacy of distension, and cleansing among ADR groups. *ADR*, adenoma detection rate.
[a]*P* value, analysis of variance.
[b]Adjusted *P* value, Tukey honestly significant difference test.

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

Endoscopic technique: Changing position



- RCT, 6 hospitals, 17 endoscopists, Korea

	Position change (*n*=536)	Left lateral (*n*=536)	*P* value
ADR	42.4% (*n*=227)	33.0% (*n*=177)	0.002[a]
Advanced ADR	8.0% (*n*=43)	6.5% (*n*=35)	0.347

ADR, adenoma detection rate.
[a]Statistically significant.

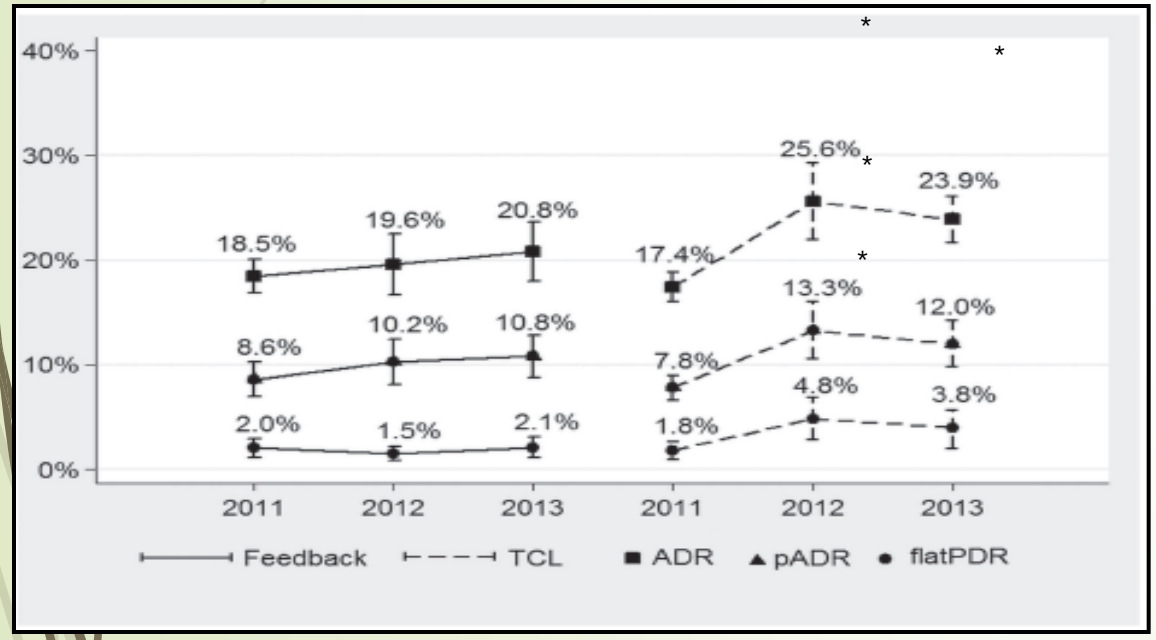
- Most benefit:
  - Transverse and left colon
  - Low baseline ADR

East et al., GIE 2011;73:456-63
Lee et al., Am J Gastroenterol 2016; 111:63–69

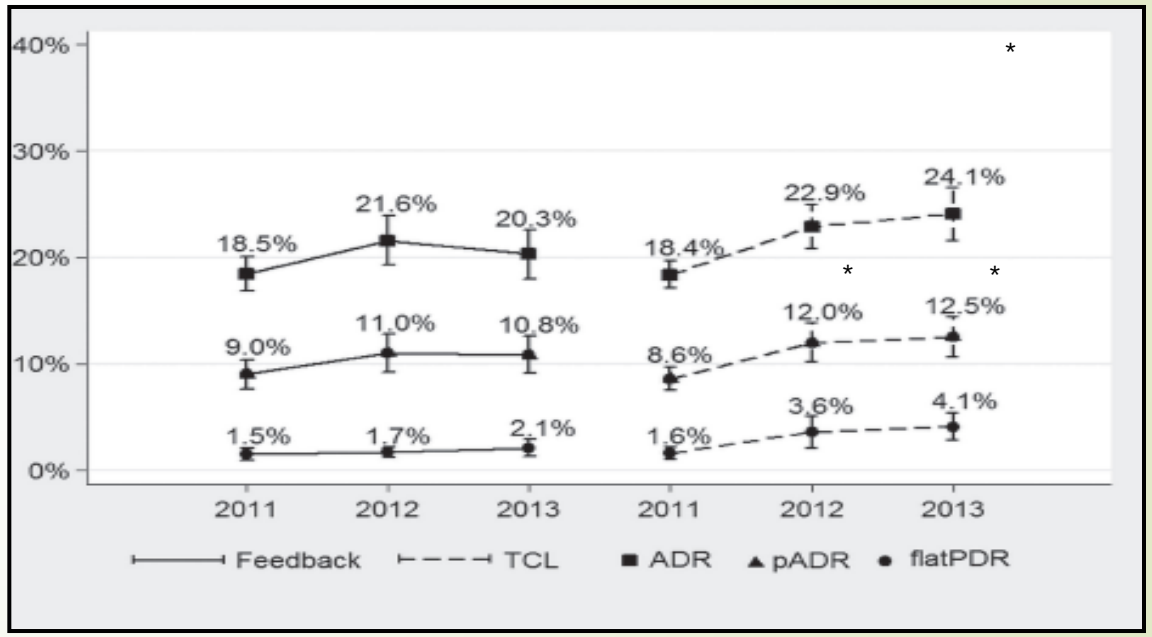
Upskilling: “Train the colonoscopy leader”

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

Leaders (n=38)



Endoscopists at centres (n=138)



Kaminski MF et al., Gut 2015;0:1–9

“Behaviours” associated with worse ADR

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

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.

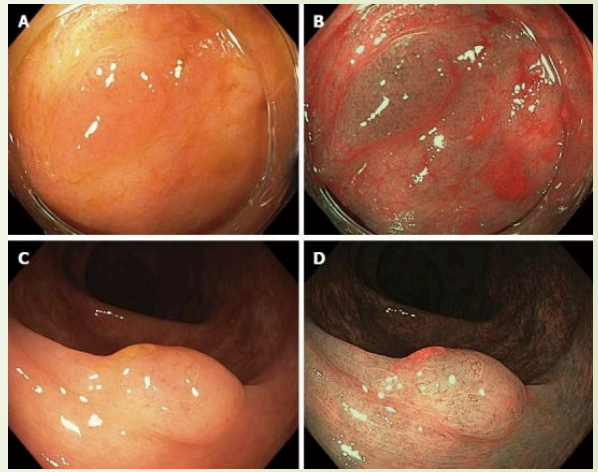
Medical Literature shows variable results:

Dinesen et al. Gastrointest Endosc. 2012

#adenomas: 0.645 vs. 0.59, P=0.105

Leung et al. Am J Gastroenterol. 2014.

ADR: 48.3% vs. 34.4%, *P*=0.01



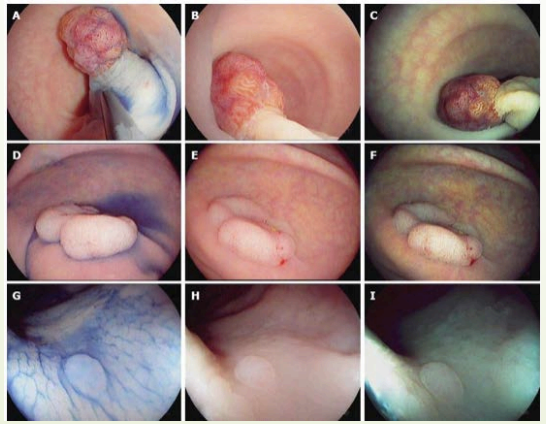
Other Image Enhancement

FICE: Flexible spectral Imaging Colour Enhancement

- digitally transforms the endoscopic image.

i-SCAN

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



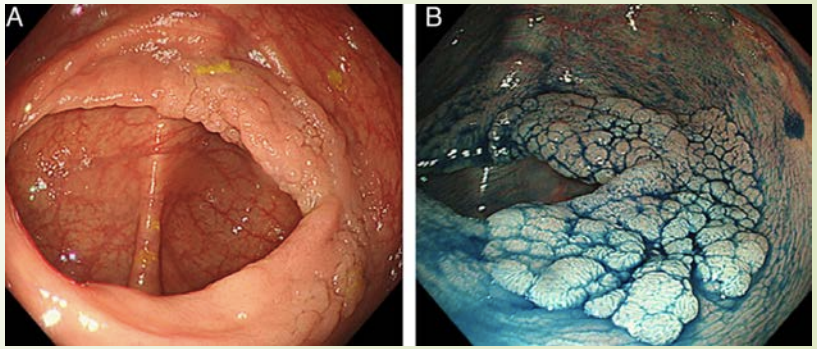
Chromoendoscopy

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

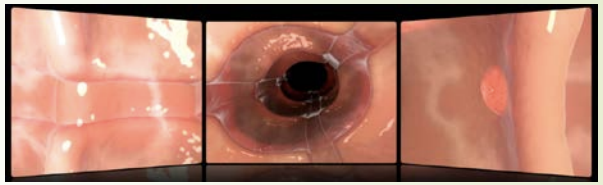
- Plastic cuff with rows of flexible, hinged, wings.
- Small increase in ADR.

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)



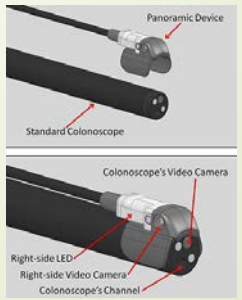
- a 330º viewing angle
- side lenses
- Decreased AMR *Gralnek, Lancet Oncol. 2014*

Retroscope

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

Panoramic Third Eye

- External side by side camera
- 330º 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.