

# Colonoscopy Quality: Impact on Outcomes

Great Plains Quality Innovation Network  
September 27, 2016

Durado Brooks, MD, MPH  
Managing Director, Cancer Control Intervention

THE OFFICIAL SPONSOR OF BIRTHDAYS.®





# 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

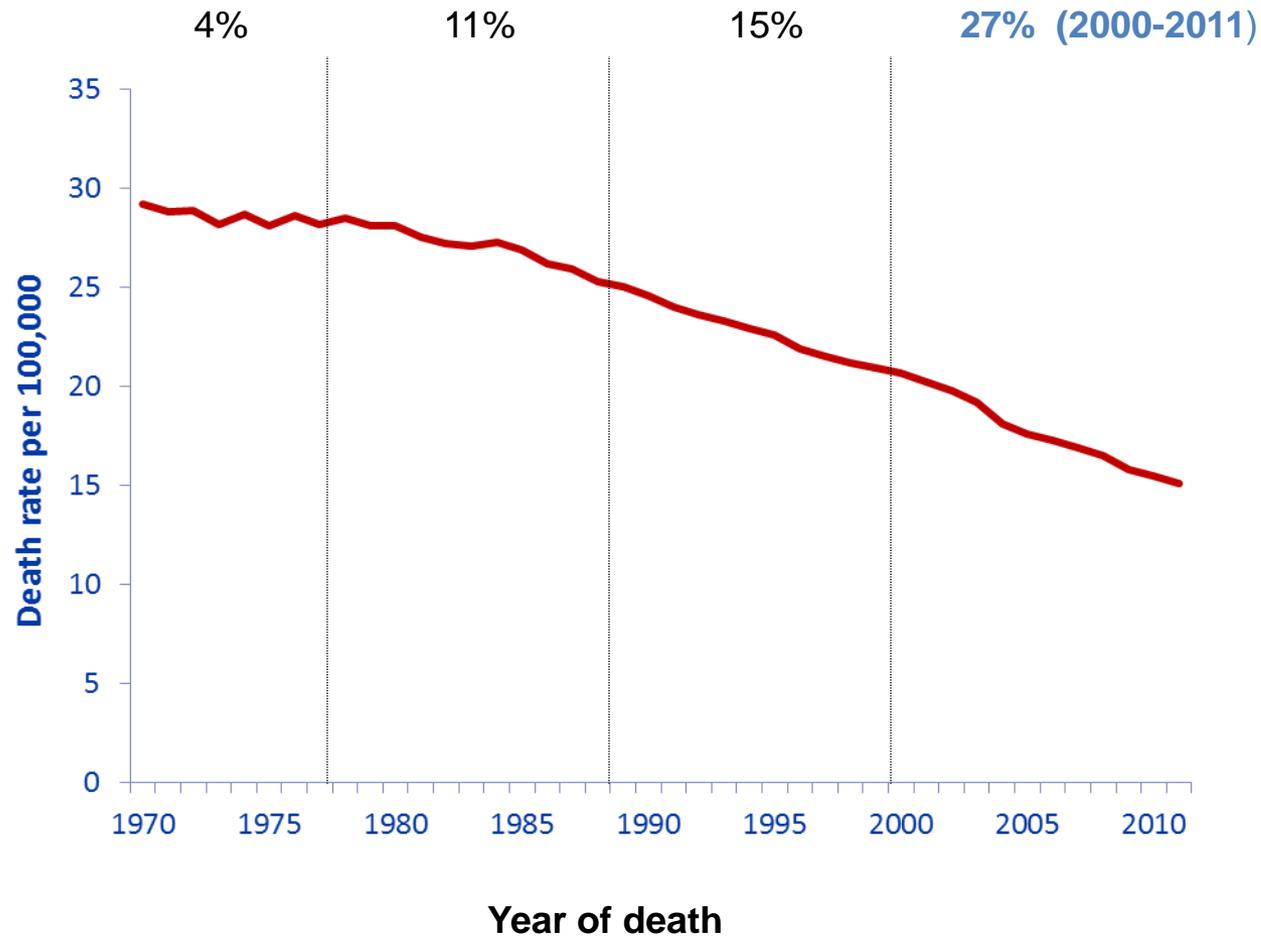


# Colorectal Cancer (CRC)

- 2<sup>nd</sup> 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

# Overall CRC death rate decline in the US

CRC mortality decline per decade:





# 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.

## Common Sense Colorectal Cancer Screening Recommendations<sup>1</sup> at a Glance

Risk Category	Age to Begin Screening	Recommendations
<p><b>Average risk</b> No risk factors</p> <p>No symptoms<sup>2</sup></p>	<p>&lt; Age 50</p> <p>≥ Age 50</p>	<p>No screening needed</p> <p>Screen with any one of the following options:</p> <p><i>Tests That Find Polyps and Cancer</i></p> <p>ES q 5 yrs*</p> <p>CS q 10 yrs</p> <p>DCBE q 5 yrs*</p> <p>CTC q 5 yrs*</p> <p>OR</p> <p><i>Tests That Primarily Find Cancer</i></p> <p>gFOBT q 1 yr*,**</p> <p>FIT q 1 yr*,**</p> <p>sDNA***</p>
<p><b>Increased risk</b> CRC or adenomatous polyp in a first-degree relative<sup>3</sup></p>	<p>Age 40 or 10 years younger than the earliest diagnosis in the family, whichever comes first</p>	<p>Colonoscopy<sup>4</sup></p>
<p><b>Highest risk</b> Personal history for &gt; 8 years of Crohn's disease or ulcerative colitis or a hereditary syndrome (HNPCC or, FAP, AFAP)</p>	<p>Any age</p>	<p>Needs specialty evaluation and colonoscopy</p>

**Table 4. Summary of proposed quality indicators for colonoscopy<sup>a</sup>**

Quality indicator	Grade of recommendation	Measure type	Performance target (%)
<i>Preprocedure</i>			
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	1C+	Process	>80
2. Frequency with which informed consent is obtained, including specific discussions of risks associated with colonoscopy, and fully documented	1C	Process	>98
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)	1A	Process	≥90
4. Frequency with which ulcerative colitis and Crohn's colitis surveillance is recommended within proper intervals	2C	Process	≥90
<i>Intraprocedure</i>			
5. Frequency with which the procedure note documents the quality of preparation	3	Process	>98
6. Frequency with which bowel preparation is adequate to allow the use of recommended surveillance or screening intervals	3	Process	≥85 of outpatient examinations
7. Frequency with which visualization of the cecum by notation of landmarks and photodocumentation of landmarks is documented in every procedure (priority indicator)	1C	Process	
Cecal intubation rate with photography (all examinations)			≥90
Cecal intubation rate with photography (screening)			≥95
8. Frequency with which adenomas are detected in asymptomatic average-risk individuals (screening) (priority indicator)	1C	Outcome	
Adenoma detection rate for male/female population			≥25
Adenoma detection rate for male patients			≥30
Adenoma detection rate for female patients			≥20
9a. Frequency with which withdrawal time is measured	2C	Process	>98
9b. Average withdrawal time in negative-result screening colonoscopies	2C	Process	≥6 min
10. Frequency with which biopsy specimens are obtained when colonoscopy is performed for an indication of chronic diarrhea	2C	Process	>98
11. Frequency of recommended tissue sampling when colonoscopy is performed for surveillance in ulcerative colitis and Crohn's colitis	1C	Process	>98
12. Frequency with which endoscopic removal of pedunculated polyps and sessile polyps <2 cm is attempted before surgical referral	3	Outcome	>98
<i>Postprocedure</i>			
13. Incidence of perforation by procedure type (all indications vs colorectal cancer screening/polyp surveillance) and post-polypectomy bleeding	1C	Outcome	
Incidence of perforation—all examinations			<1:500
Incidence of perforation—screening			<1:1000
Incidence of post-polypectomy bleeding			<1%
14. Frequency with which post-polypectomy bleeding is managed without surgery	1C	Outcome	≥90
15. Frequency with which appropriate recommendation for timing of repeat colonoscopy is documented and provided to the patient after histologic findings are reviewed	1A	Process	≥90



# Key Quality Indicators

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

*\*Can be viewed as a function of the other quality measures.*



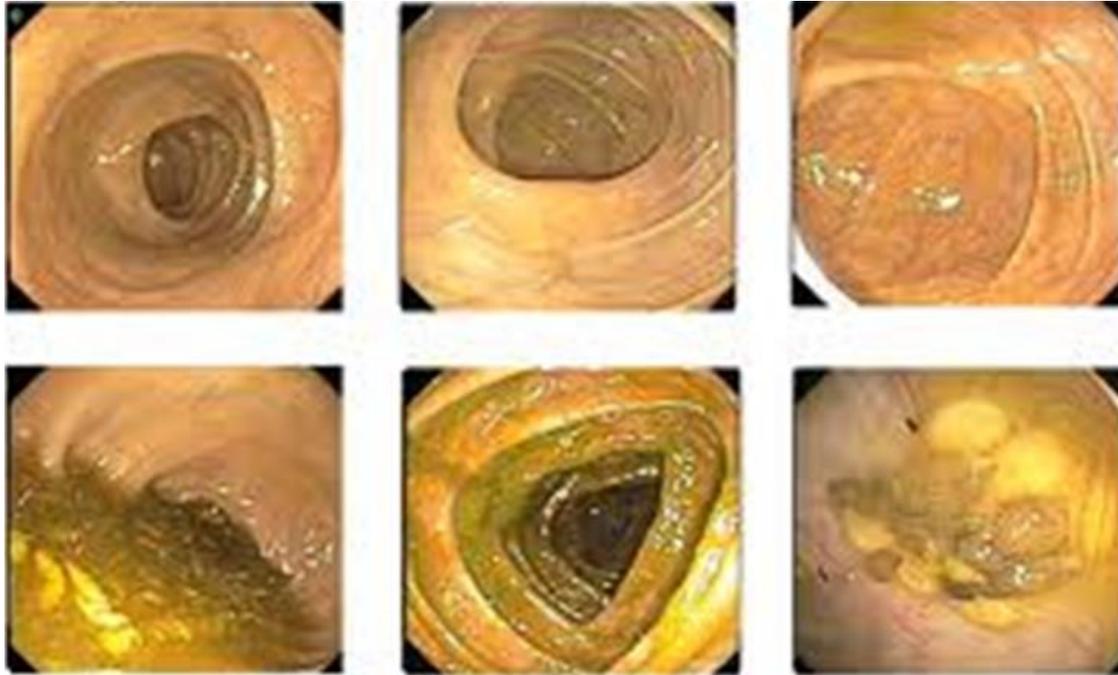
# Key Quality Indicators

## 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

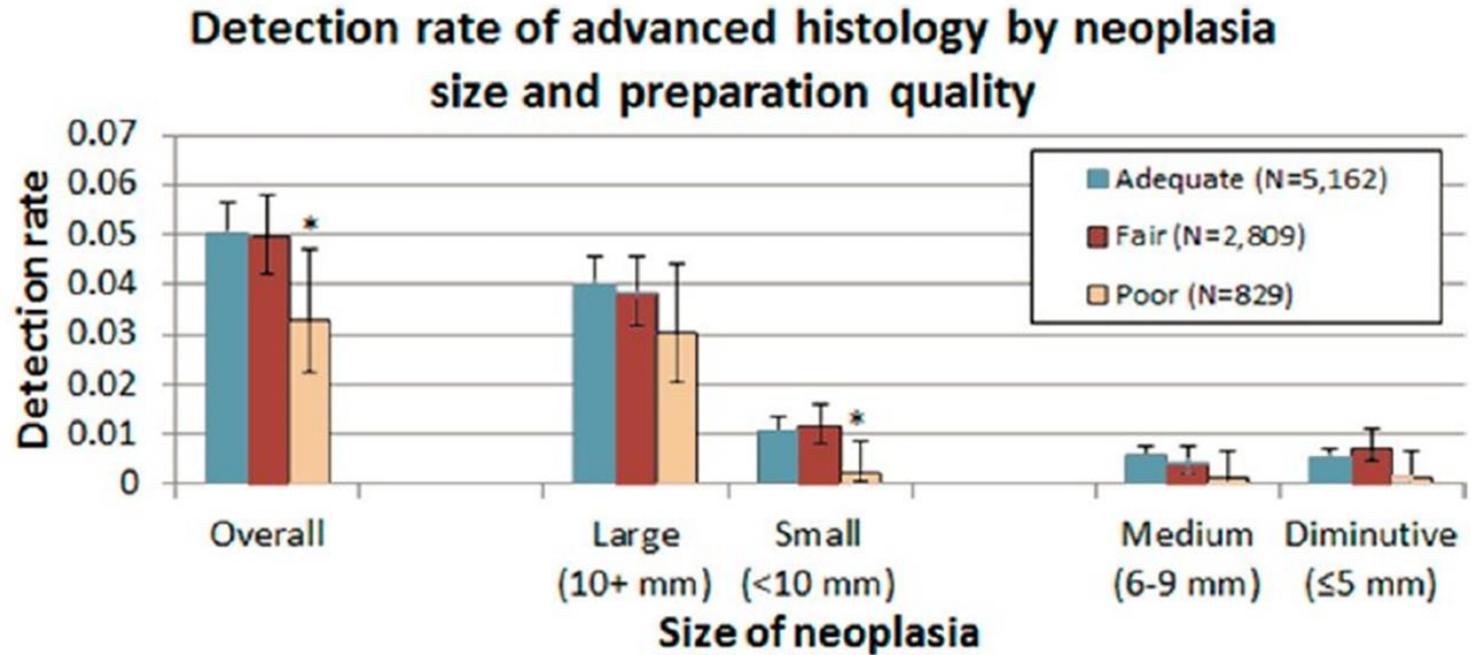


# Key Quality Indicators

## 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



Volume 75, No. 3 : 2012 Gastrointestinal Endoscopy



# Key Quality Indicators

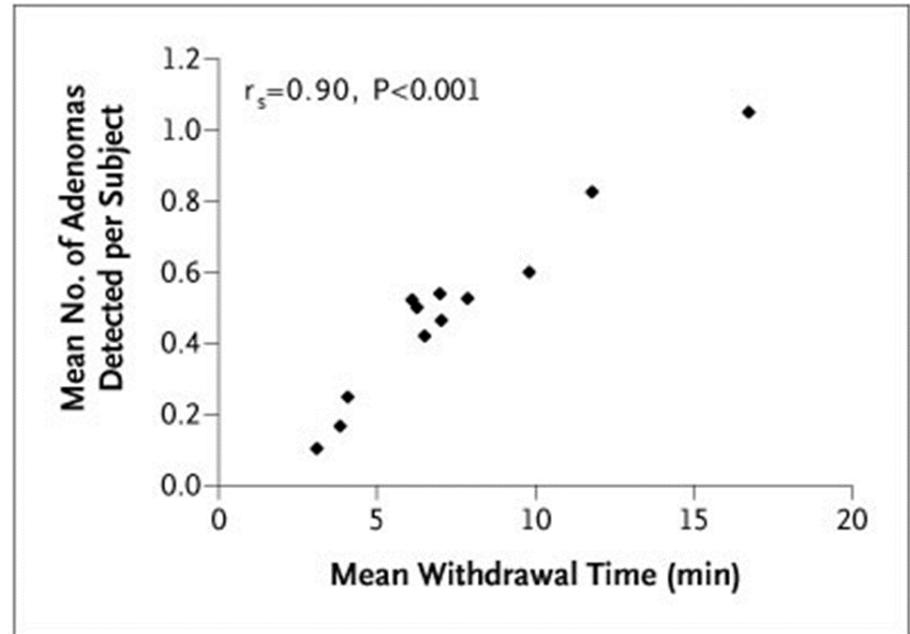
## Cecal Intubation Rate

- 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

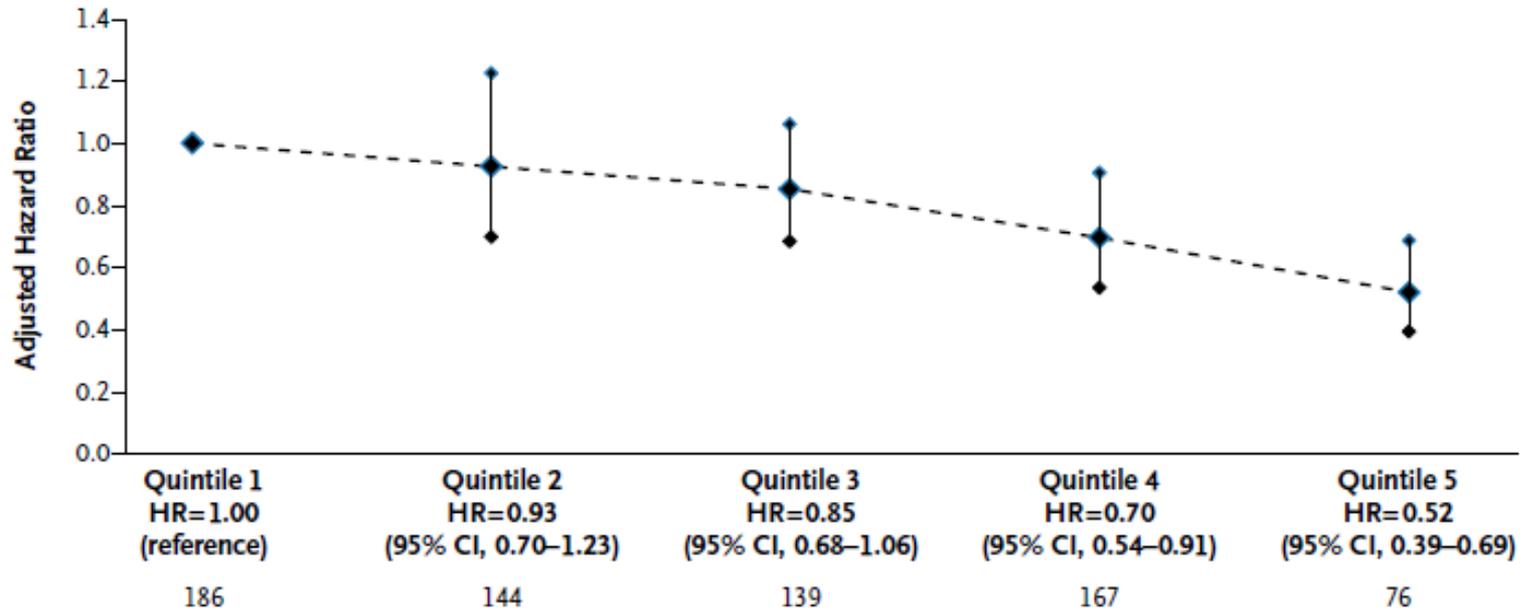


# ADR and Outcomes: Kaiser

- Data from 314,872 colonoscopies performed between January 1, 1998 and December 31, 2010
- 136 gastroenterologists
  - To be included GI had to have completed  $\geq 300$  colonoscopies and 75 or more screening examinations during the study period
- ADRs ranged from **7.4%** to **52.5%**.

# ADR and Risk of Interval Cancer

## A Risk of Interval CRC



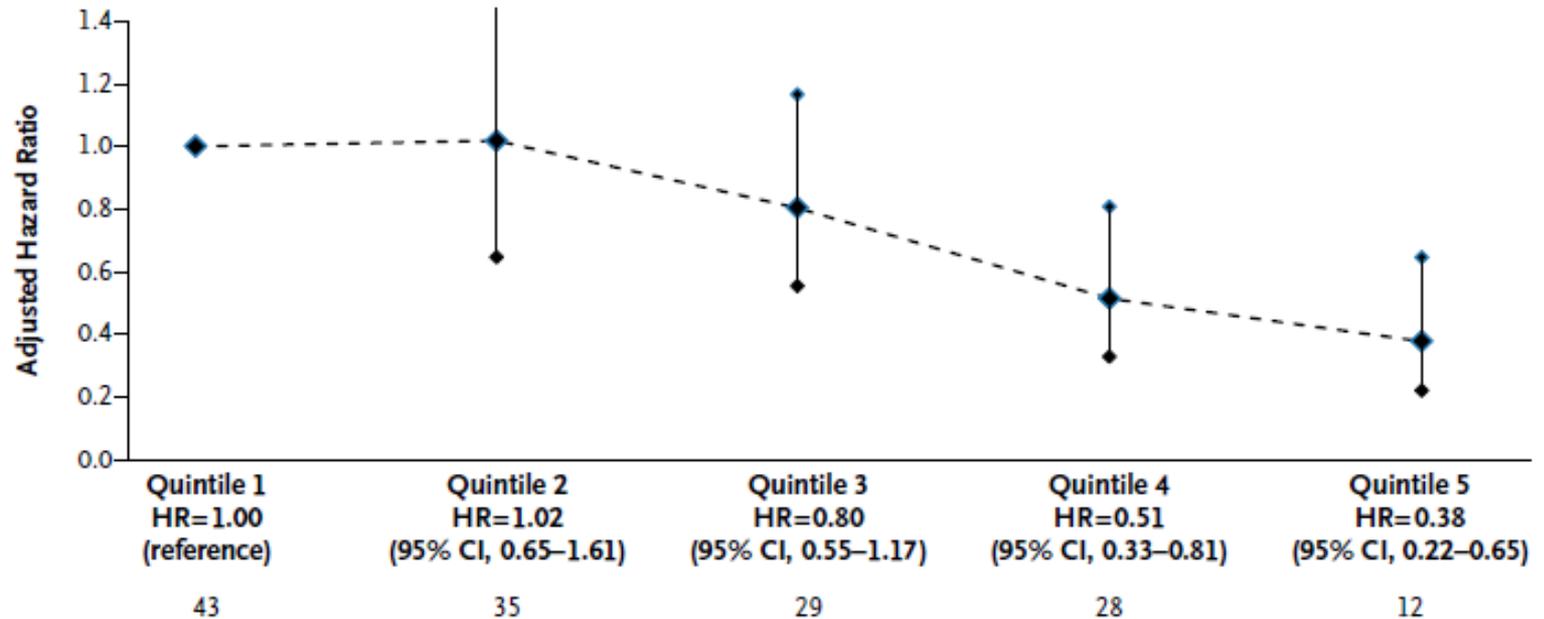
No. of CRCs

**Quintile 1 – ADR < 20%**

**Quintile 5 – ADR > 33%**

# ADR and Risk of Fatal Cancer

C Risk of Fatal CRC



Quintile 1 – ADR < 20%

Quintile 5 – ADR > 33%



# 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)

nature publishing group ORIGINAL CONTRIBUTIONS 219

**CME**

## An Endoscopic Quality Improvement Program Improves Detection of Colorectal Adenomas

Susan G. Coe, MD<sup>1</sup>, Julia E. Crook, PhD<sup>2</sup>, Nancy N. Diehl, BS<sup>2</sup> and Michael B. Wallace, MD, MPH<sup>1</sup>

**OBJECTIVES:** Adenoma detection rate (ADR) is a key measure of quality in colonoscopy. Low ADRs are associated with development of interval cancer after "negative" colonoscopy. Uncontrolled studies mandating longer withdrawal time, and other incentives, have not significantly improved ADR. We hypothesized that an endoscopist training program would increase ADRs.

**METHODS:** Our Endoscopic Quality Improvement Program (EQUIP) was an educational intervention for staff endoscopists. We measured ADRs for a baseline period, then randomly assigned half of the 15 endoscopists to undergo EQUIP training. We then examined baseline and post-training study ADRs 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.

**RESULTS:** Patient characteristics were similar between randomization groups and between study phases. The overall ADR in baseline phase was 36% for both groups of endoscopists. In the post-training phase, the group of endoscopists randomized to EQUIP training had an increase in ADR to 47%, whereas the ADR for the group of endoscopists who were not trained remained unchanged at 35%. The effect of training on the endoscopist-specific ADRs was estimated with an odds ratio of 1.73 (95% confidence interval 1.24–2.41,  $P=0.0013$ ).

**CONCLUSIONS:** Our results indicate that ADRs can be improved considerably through simple educational efforts. Ultimately, a trial involving a larger number of endoscopists is needed to validate the utility of our training methods and determine whether improvements in ADRs lead to reduced colorectal cancer.

**SUPPLEMENTARY MATERIAL** is linked to the online version of the paper at <http://www.nature.com/ng>

*Am J Gastroenterol* 2013; 108:219–226; doi:10.1038/ajg.2012.417; published online 9 January 2013

**INTRODUCTION**

Screening colonoscopy and other screening methods have been largely credited for the recent decline in the incidence and death rates of colorectal cancer (CRC). Despite this decline, CRC is projected to remain third among cancers for both men and women in 2011 (1).

Although colonoscopy remains an effective method of CRC screening and prevention (2), it is imperfect. Adenoma miss rates have been estimated to be as high as 24% in tandem colonoscopy studies (3,4). One large population study estimated the risk of a new CRC diagnosis within 3 years of negative screening colonoscopy to be as high as 6% (5). Right-sided lesions, flat polyps, and variability in endoscopist quality measures are all potential reasons why interval cancers develop (6–8). The adenoma detection rate

(ADR) is a validated predictor of development of interval CRC risk after screening colonoscopy (9). However, wide variability still exists between endoscopists in this important measure (10–12). Technical, patient, and provider related factors have all been explored to explain differences in adenoma detection. Adequacy of bowel preparation, withdrawal time, and time of day have all been associated with adenoma rates and their detection (13–16). The performing endoscopist, independent of patient-related factors, has recently been shown to strongly influence adenoma detection (17). Endoscopist behaviors, such as time spent on inspection, looking behind folds, cleansing, and distention of the colon, are also associated with higher adenoma detectors (18,19). Despite this knowledge, there remains little data on how to improve adenoma detection among individual endoscopists.

<sup>1</sup>Department of Gastroenterology, Mayo Clinic, Jacksonville, Florida, USA; <sup>2</sup>Section of Biostatistics, Mayo Clinic, Jacksonville, Florida, USA. Correspondence: Michael B. Wallace, MD, MPH, Department of Gastroenterology, Mayo Clinic, 4500 San Pablo Road South, Jacksonville, Florida 32224, USA. E-mail: wallace.michael@mayo.edu

This material in this manuscript was presented at the ACG Annual Scientific Meeting in Washington DC, in October 2011 as a Presidential Plenary oral presentation and won a 2011 AGA/ASGAP Colorectal Cancer prevention award.

Received 12 June 2012; accepted 21 August 2012

© 2013 by the American College of Gastroenterology The American Journal of GASTROENTEROLOGY

- 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

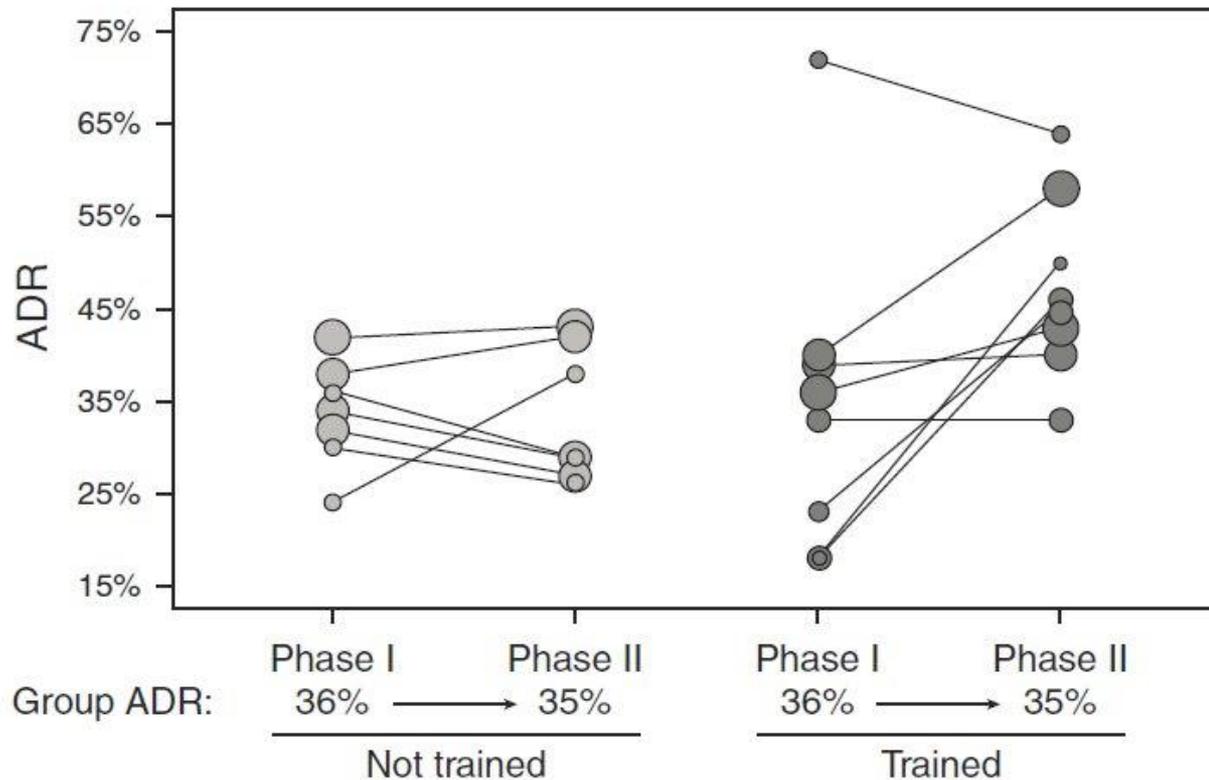


# Mayo “Endoscopic Quality Improvement Program (EQUIP study)”

- 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	10 years
Small hyperplastic polyps	10 years
1-2 small tubular adenomas	5-10 years
3-10 tubular adenomas	3 years
>10 adenomas	<3 years
Any adenoma >10 mm	3 years
Any adenoma with villous elements or hi-grade dysp	3 years



# Overutilization of colonoscopy

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

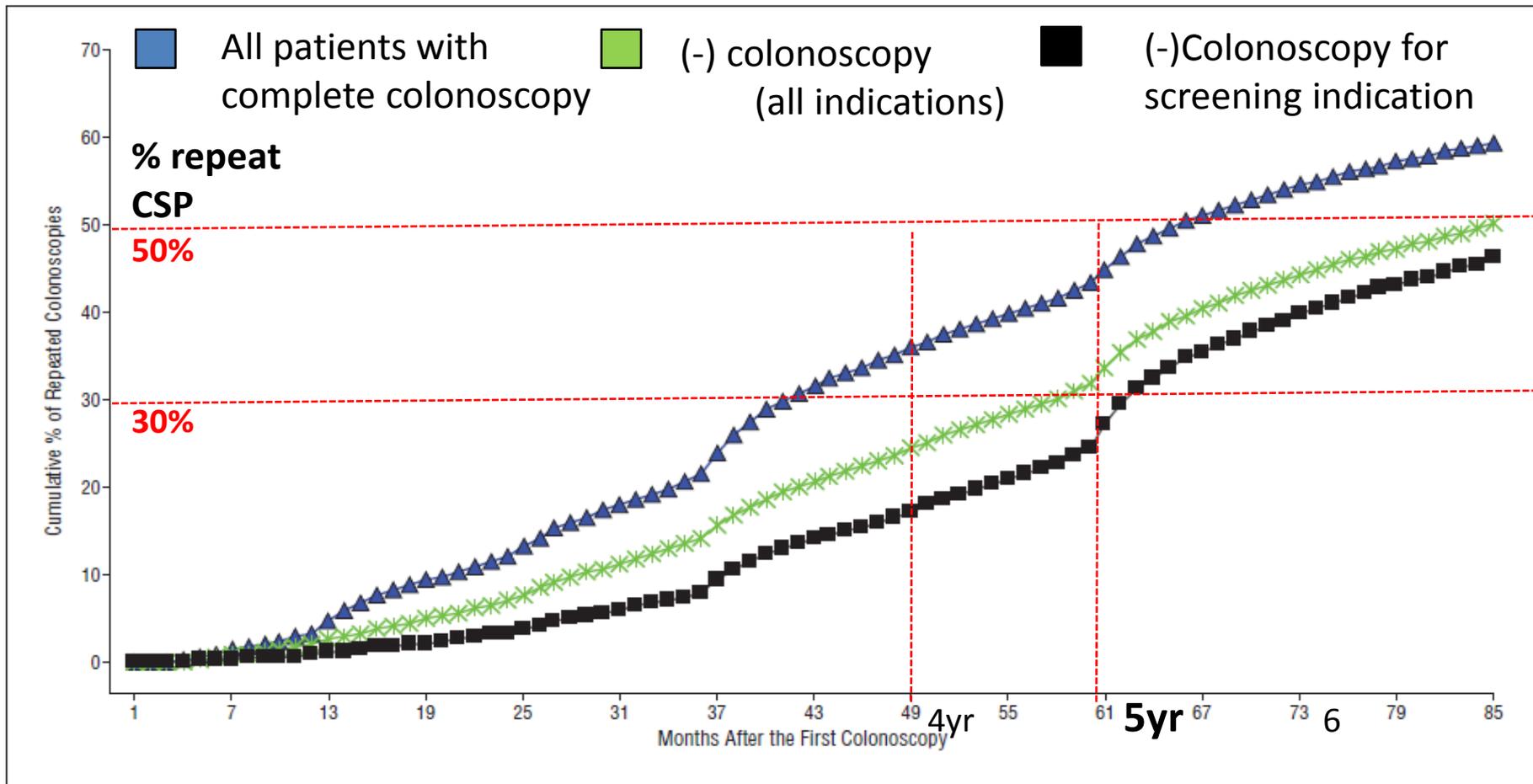
SCREENING	N (%)	Median Time (years)	IQR
<b>INCIDENT SCREENING COLONOSCOPY<sup>a</sup></b>	<b>Total = 1,429</b>		
No polyps	713 (50)	6.9	5.1-10.0
Hyperplastic polyp(s) only	338 (24)	5.7	4.9-9.7
1-2 small tubular adenoma(s)	257 (18)	5.1	3.3-6.3
3-10 adenomas, large adenoma, villous histology or high-grade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



# 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

- Cancer Facts and Figures. American Cancer Society 2015.
- Anderson JC, Butterly LF. Colonoscopy: Quality Indicators. Clin Transl Gastroenterol. 2015 Feb; 6(2): e77
- Rex DK, Schoenfeld PS, Cohen J, et al. Quality indicators for colonoscopy. Gastrointest Endosc. 2014;81:31–53
- Johnson et al. Optimizing Adequacy of Bowel Cleansing for Colonoscopy: Recommendations From the US Multi-Society Task Force on Colorectal Cancer. Gastroenterology 2014;147:903–924
- Corley et al. Adenoma detection rate and risk of colorectal cancer and death. N Engl J Med. 2014 Apr 3; 370(14):1298-306
- Coe et al. An endoscopic quality improvement program improves detection of colorectal adenomas. Am J Gastroenterol. 2013 Feb; 108(2):219-26
- Goodwin JS et al. Overuse of Screening Colonoscopy in the Medicare Population. Arch Intern Med 2011;171:1335-43