Quality Indicators for Colonoscopy

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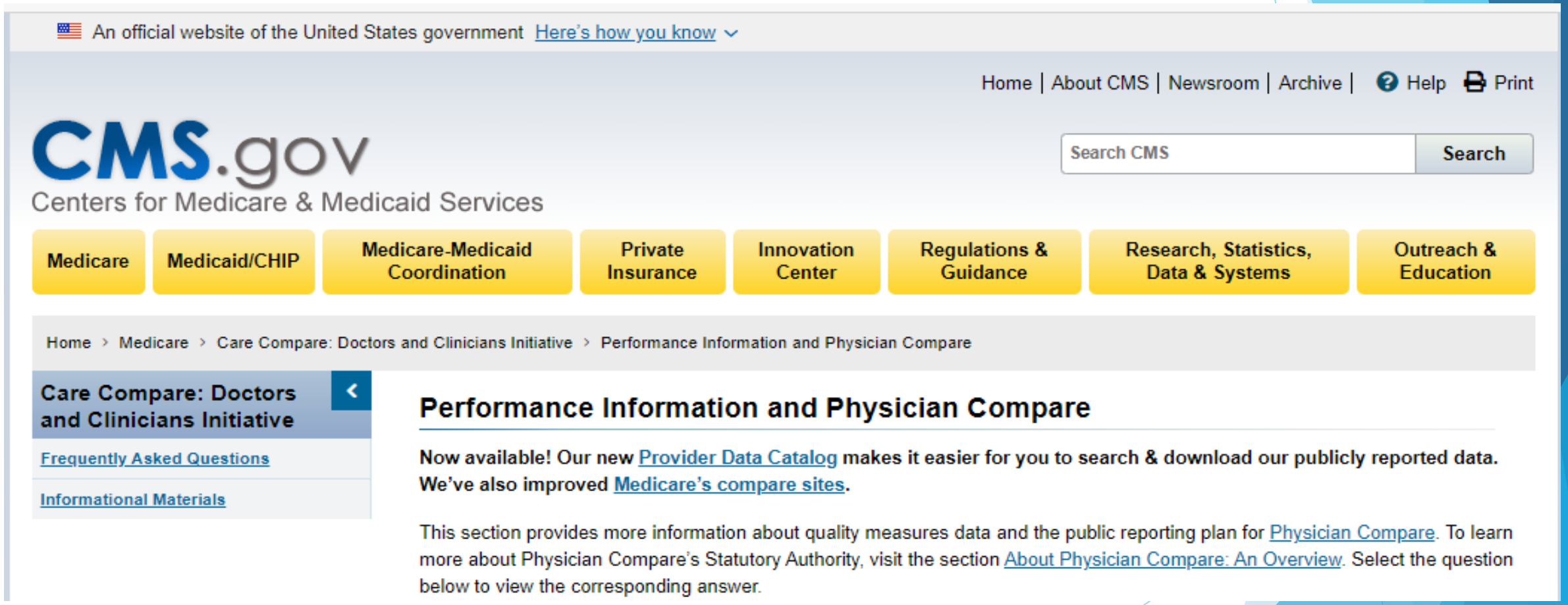
Objectives

- Review Quality indicators for colonoscopy
- Review ADR with lowering of screening age
- Update the association of quality indicators and risk of neoplasia
- Discuss novel quality indicators including artificial intelligence
- Take home points

Why you should care about quality

- Effective
  - Detection and prevention of CRC
  - Reduce missed CRC
- Safe
  - Reducing complications
- Reimbursement
  - MIPS and APMs
  - High value practice
- Patient satisfaction

Why you should care about quality



Quality Metric and Benchmarks

Pre-Procedure	Target
Appropriate indication documented	>80%
Informed Consent	>98%
Appropriate Surveillance Interval	>=90%

Intraprocedure	Target
Bowel Prep Quality (Adequate)	≥85%
Cecal Intubation	≥90% all, ≥95% screening
Adenoma Detection Rate	≥25% All ≥30% (M) ≥ 20% (F)
Withdrawal Time (>=6min)	>98%
Attempted endoscopic removal of polyps before surgery referral	>98%

Post-Procedure	Target
Perforation rate	<1:500 all, <1:1000 screening
Post-Polypectomy Bleeding incidence	<1%
Surveillance interval recommendation	≥ 90%

ASGE practice guideline: Measuring the Quality of Endoscopy. Gastrointest Endosc 2006;58:S1-S38;

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

May, F and Shaukat A. State of the Science on Quality Indicators for Colonoscopy and How to Achieve Them. American Journal of Gastroenterology 2020; 115(8):1183-1190

Adenoma detection rate

- ADR during screening colonoscopies in average risk men and women over age 50

  $$\frac{\text{\# of COL where at least 1 adenoma is found}}{\text{Total \# of COL performed}}$$

  In a given time period per endoscopist
- Higher ADR= higher quality exam = fewer missed cancers
- Goal is **25%**
  - ≥ 30% for men ≥50 yrs
  - ≥ 20% for women ≥50 yrs
- Does NOT include SSA/SSL

Rex DK et al. Quality in the technical performance of colonoscopy and the continuous quality improvement process for colonoscopy: recommendations of the U.S. Multi-Society Task Force on Colorectal Cancer. Am J Gastroenterol 2002;97:1296-308.

ASGE practice guideline: Measuring the Quality of Endoscopy. Gastrointest Endosc 2006;58:S1-S38 Gastrointest Endosc 2006;58:S1-S38

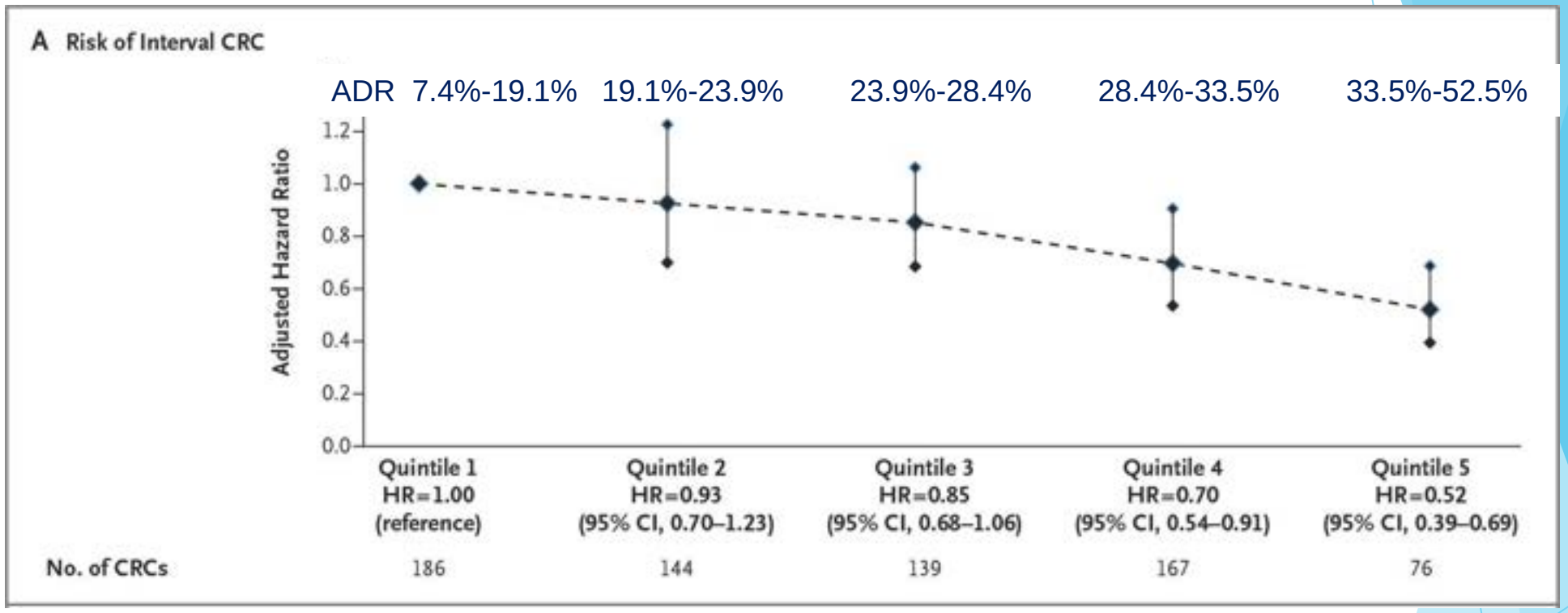
Rex DK et al. GIE 2015; 81: 31-53

ADR and interval CRC

- Kaiser Permanente Northern California health plan members
- COL for any indication 1998-2010
- Follow-up: 10 yrs, another COL, CRC diagnosis, Jan 2011, termination of membership
- 139 Gastroenterologists (min>300 COL, >75 screening COL)

Corley D et al. NEJM 2014;370:2539-41

ADR and Risk of Interval Cancer

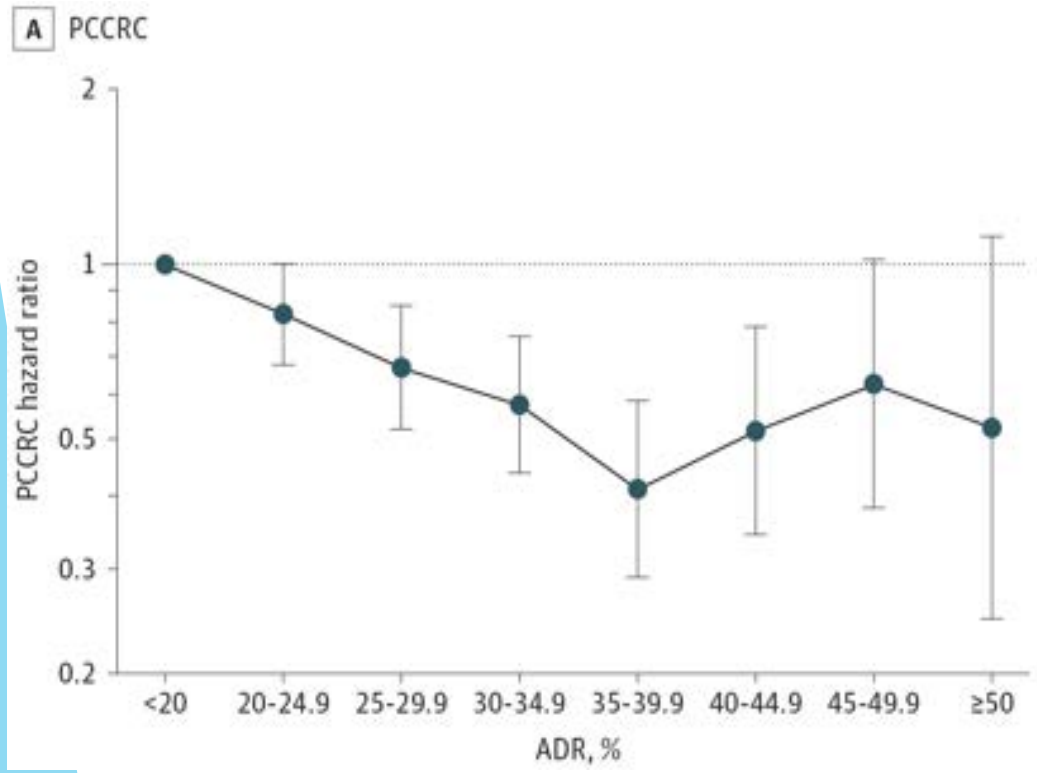


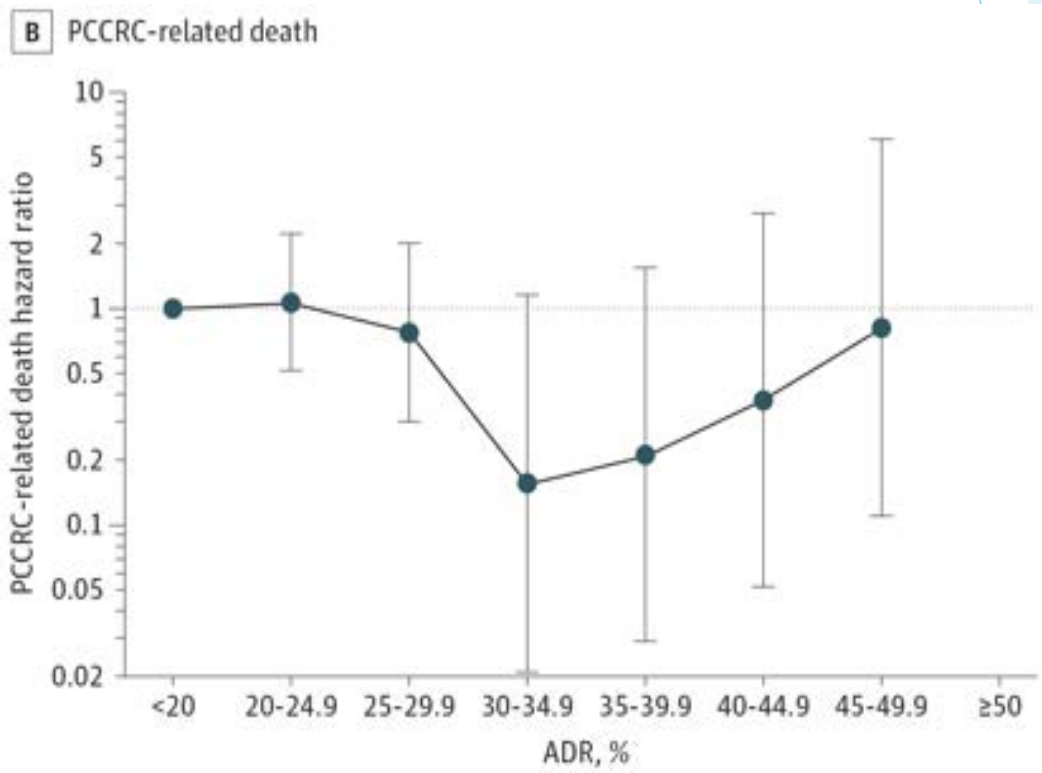
Each 1% increase in ADR is associated with 3% decrease in risk of CRC

No threshold effect above which increases in ADR were without benefit

ADR and Risk of Interval Cancer

- Kaiser Permanente Northern California, Kaiser Permanente Southern California, and Kaiser Permanente Washington
- 43 endoscopy centers, 383 eligible physicians, and 735 396 patients 50-75 w negative COL between January 2011 and June 2017, follow-up through December 2017
- ADR above median of 28% associated with lower risk of PCCRC (1.79 vs 3.10 cases per 10 000 person-years)
- Lower risk of PCCRC death (0.05 vs 0.22 cases per 10 000 person-years)





Schottinger JE, et al. *JAMA*. 2022;327(21):2114-2122

USPSTF Recommendations 2021

Recommendation	GRADE	
Screen average risk men and women 50-75	A	High certainty of substantial net benefit
Screen average risk men and women starting at age 45	B	Moderate certainty of moderate net benefit
Individualize decision to screen 76-85	C	Moderate certainty of small net benefit

- What will happen to endoscopist ADRs with lowering of screening age?

US Preventive Services Task Force. Screening for Colorectal Cancer: US Preventive Services Task Force Recommendation Statement. *JAMA.* 2021;325(19):1965–1977

Adenoma detection rates by age groups:

- Multiple endoscopy centers in MN
- 223,572 average risk screening colonoscopies
- 99 Endoscopists
- 2014-2019

	45-49 year old n=4841	50-54 year old n=58,914	p-value (compared to 45-49)	50-75 year old N=159,817	p-value (compared to 45-49
Overall ADR	28.4% (27.1%, 29.6%)	31.1% (30.7%, 31.4%)	<0.001	35.6% (35.4%, 35.8%)	<0.001
ADR in men	34.8% (32.9, 36.8)	38.3% (37.7, 38.9)	<0.001	43.0% (42.6, 43.3)	<0.001
ADR in women	22.6% (21.0, 22.4)	24.4% (23.9, 24.9)	0.001	29.0% (28.7, 29.3)	<0.001
APC	0.44 (0.41, 0.46)	0.49 (0.48, 0.49)	<0.001	0.59 (0.58, 0.59)	<0.001
AN detection rate	3.28% (2.58, 3.97)	3.43% (3.23, 3.64)	0.68	3.5%, (3.3, 3.6)	0.56
CRC detected	3	32	0.91	110	0.81

Shaukat A et al. Adenoma detection Rates for 45-49 year old screening population. Gastroenterology 2022;162:957-959

ADRs by age groups:

- Modelled the effect of proportion of 45-49 yr olds that constitute the total screening colonoscopy population

45-49 year old as proportion of total (%)	Overall ADR (%)
5%	35.2%
10%	34.9%
25%	33.8%
50%	32.0%
75%	30.1%

Shaukat A et al. Adenoma detection Rates for 45-49 year old screening population. Gastroenterology 2022;162:957-959

ADRs by age groups:

- GIQuIC registry US
- 45-75 yr olds Screening Colonoscopy
- 2014-2020
- >2 million exams
- 814 Endoscopists

	45-49 years	50-54 years	50-75 years
Overall Mean (SD) ADR	28.63 (10.34)	31.87 (9.34)	36.32 (9.78)
Endoscopist n	814	814	814
Total procedures	47,213	1,014,193	2,759,326
Mean (SD) ADR in men	32.91 (10.74)	36.98 (9.96)	41.50 (9.89)
Endoscopist n	219	219	219
Total procedures	9,928	470,146	1,270,382
Mean (SD) ADR in women	22.84 (9.87)	25.57 (8.48)	30.10 (9.18)
Endoscopist n	321	321	321
Total procedures	16,372	529,084	1,477,418

Bilal M and Shaukat A et al. Adenoma detection Rates for 45-49 year old screening population. Am J Gastroenterol. 2022 Feb 15. Epub ahead of print.

What interventions improve ADR?

Step 1

- **Measure Quality indicators**
- **Provide Report cards**
  - Individual physicians
  - Group average
  - Individuals deidentified
  - Individuals identified
  - Post them on the ASC wall
  - Publish online

Sample Report card

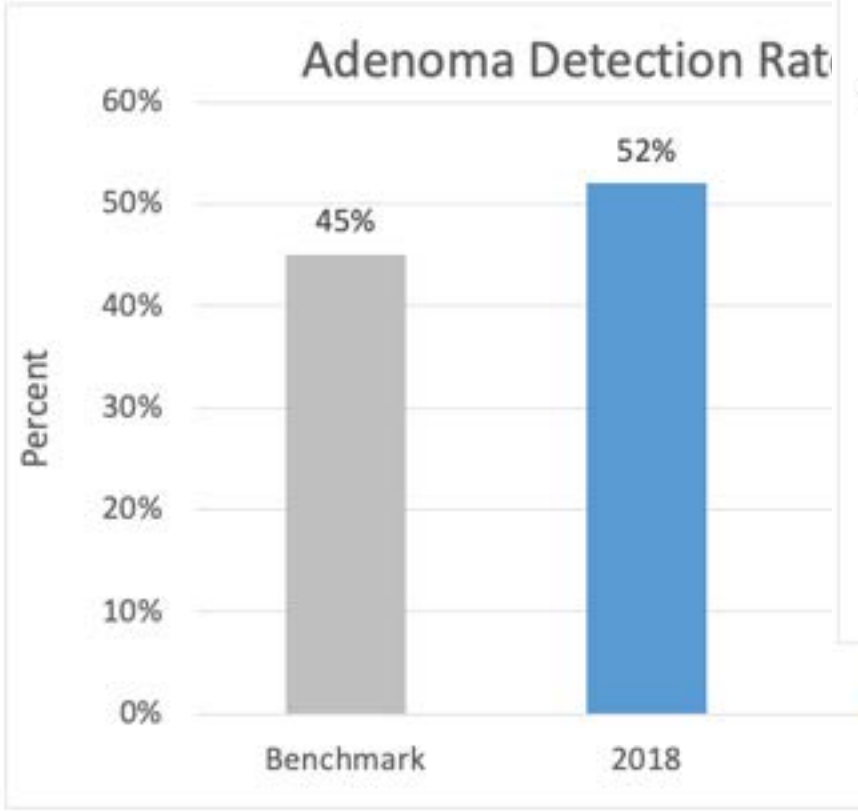
Endoscopist ID: 21314566	Time period: Q1 2021
Total number of colonoscopies performed	300
Total number of screening colonoscopies performed	100
Complete Colonoscopies (excluding cases due to poor prep)	295 (98%)
ADR (for screening colonoscopy)	31%
Withdrawal time (procedures where no polypectomy or biopsies performed)	8.2 min± 1.15 min
Number of Colonoscopies with inadequate bowel prep	5 (2%)

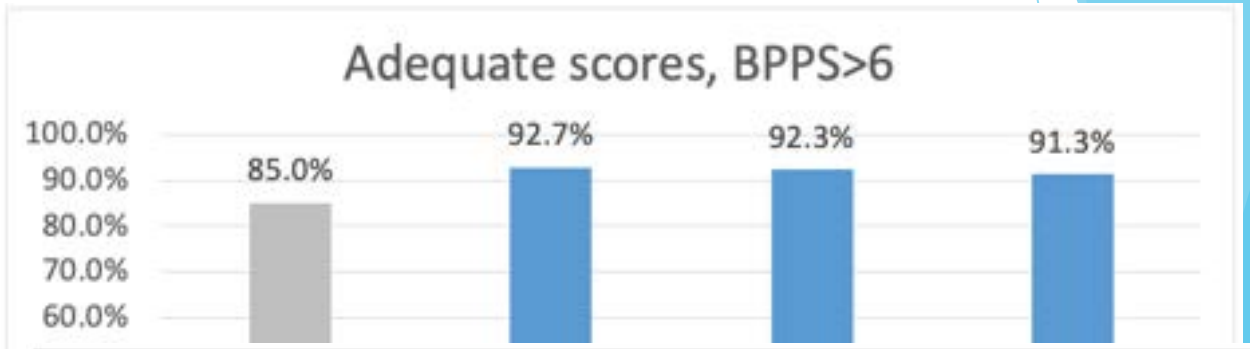
Measure and report

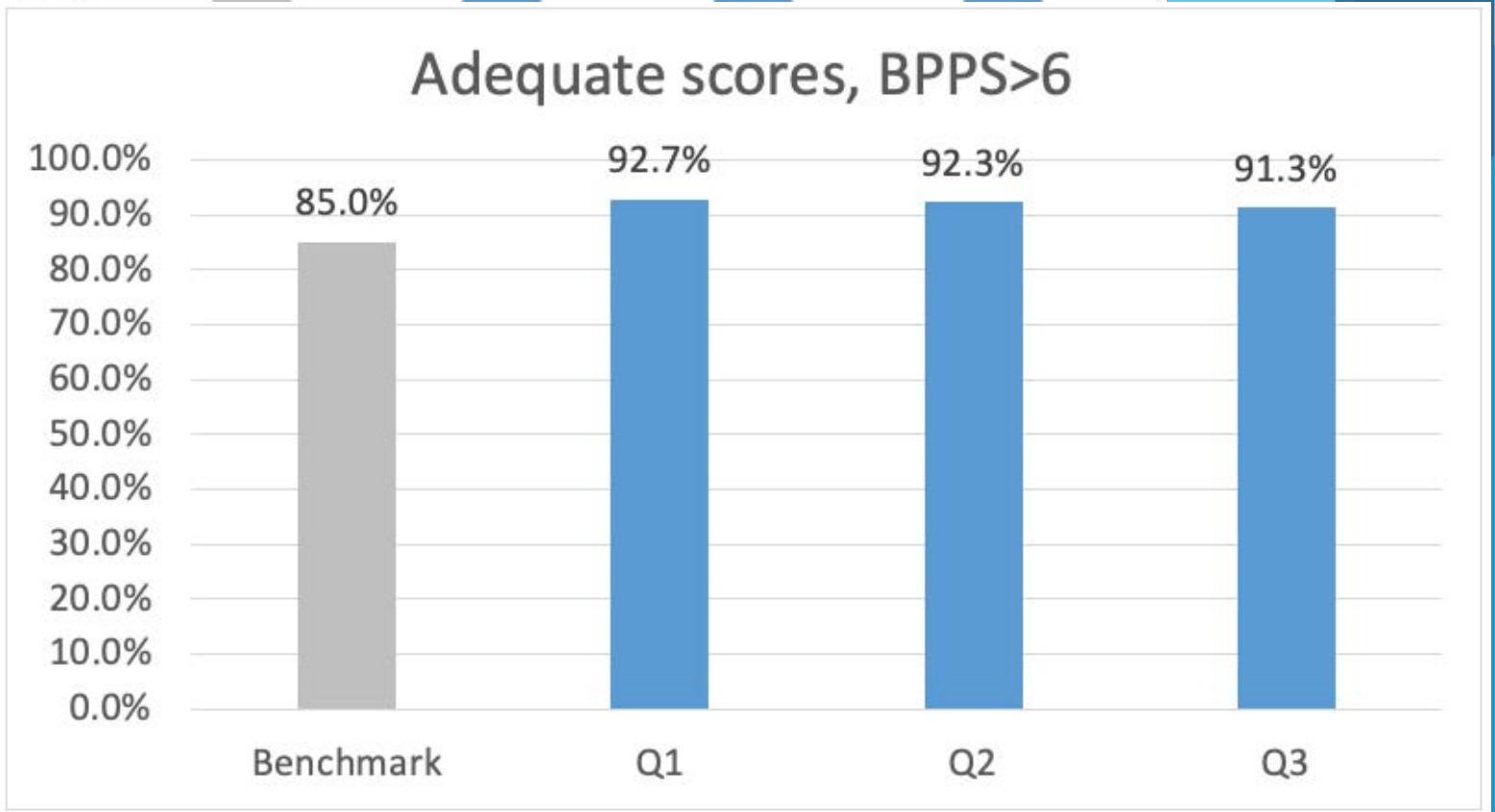
- Patients are encouraged to ask the endoscopist their ADR

Rex DK et al. Colorectal Cancer Screening: Recommendations for Physicians and Patients from the U.S. Multi-Society Task Force on Colorectal Cancer. Am J Gastroenterol. 2017 Jul;112(7):1016-1030

Public ‘Report Cards’







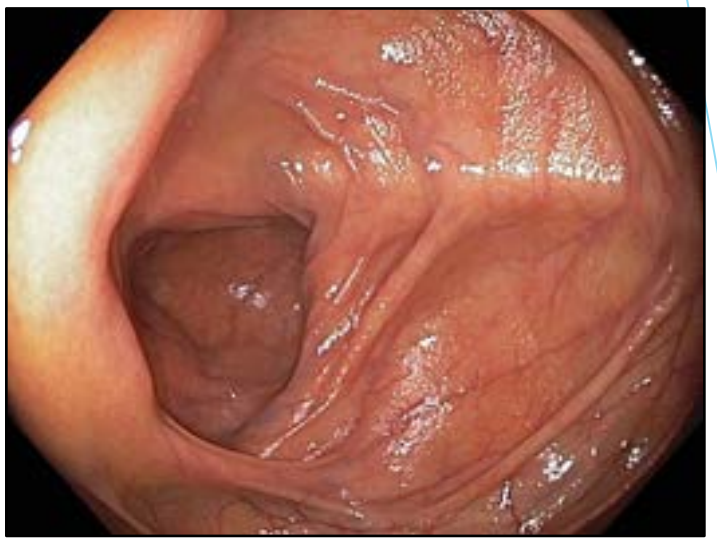
Endoscopist report card

- 6 Endoscopists
- Quarterly report card on quality measures starting 2009
- Compared ADR and cecal intubation rate before and after intervention

	Before (95%CI)	After (95% CI)	P-value
ADR	44.7% (39.1%-50.4%)	53.9% (49.7%-58.1%)	0.013
Cecal intubation rate	95.6% (92.5%-97.5%)	98.1% (96.7%-99.0%)	0.027

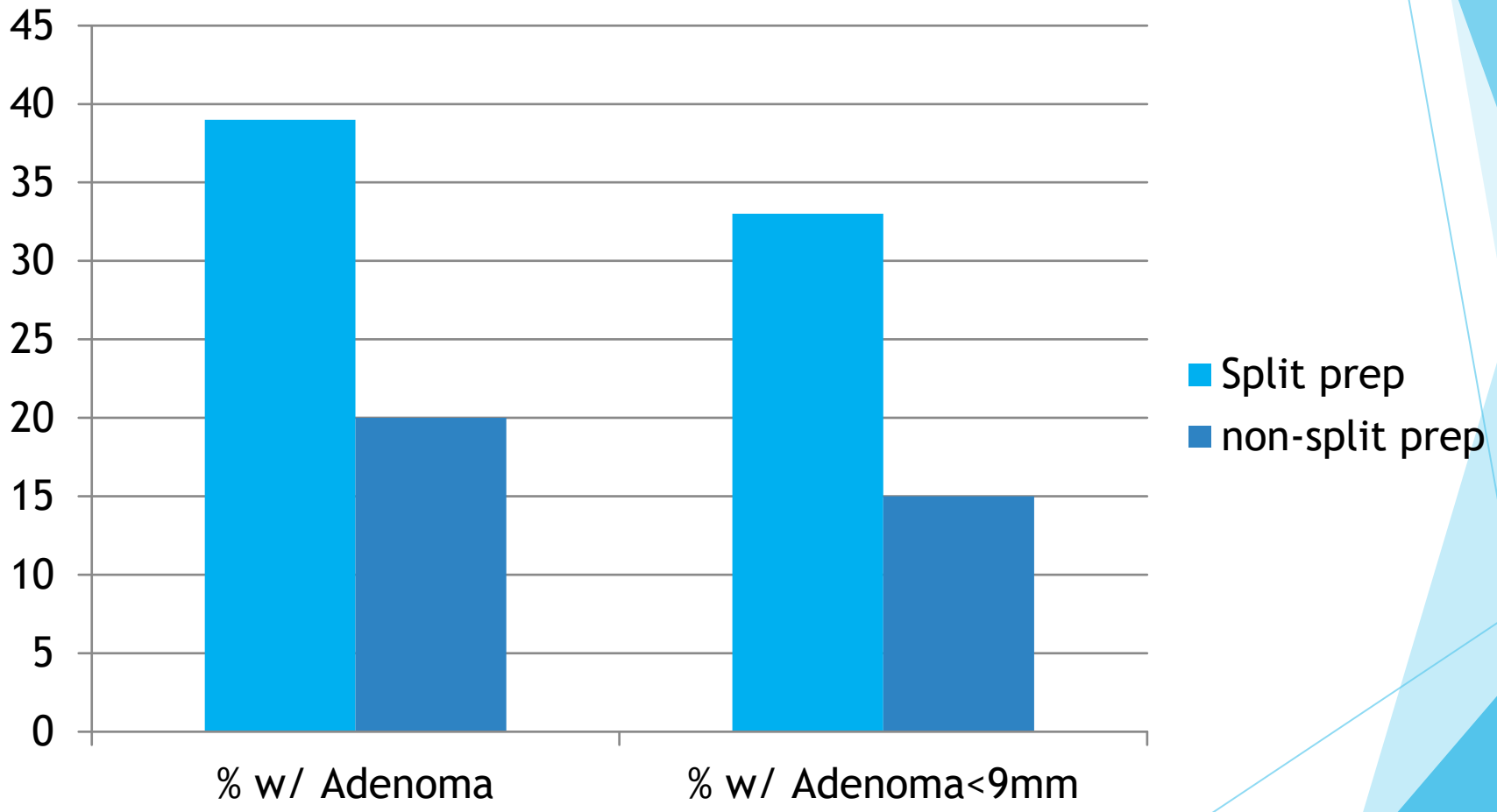
Kahi CJ et al. Impact of a quarterly report card on colonoscopy quality measures. GIE 2013 Jun;77(6):925-31.

Step 2. Improve Prep



- Use split dose or same day prep
- Begin second dose 4-6 hours prior to colonoscopy
  - Finish prep at least 2 hours prior to colonoscopy
- Judge prep after all washing has been done
- Adequate prep should be achieved in at least 85% of cases
- If inadequate prep, repeat within 1 year

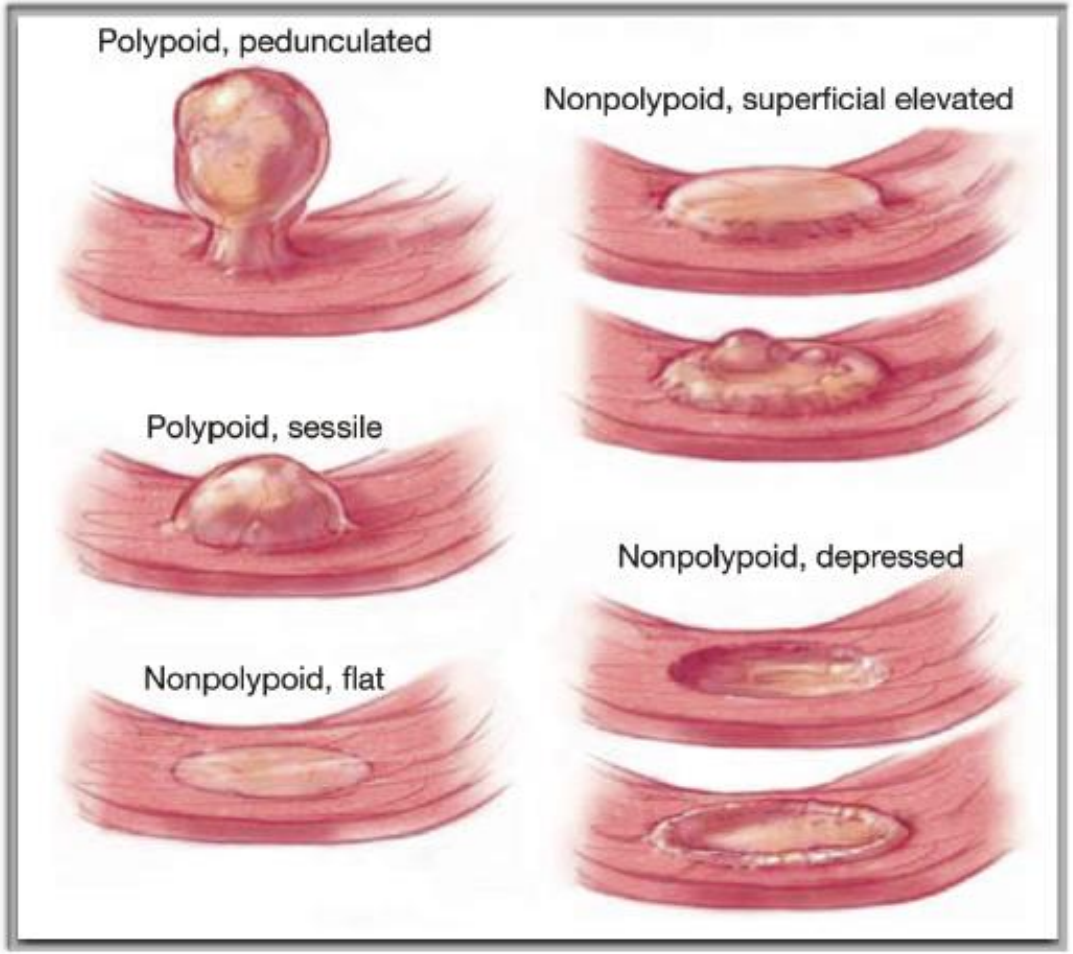
Split prep = Higher ADR



Cohen LB et al. Clinical trial: 2-L polyethylene glycol-based lavage solutions for colonoscopy preparation - a randomized, single-blind study of two formulations.Aliment Pharmacol Ther 2010; 32: 637-44

Step 3. Know what to look for and resect completely!

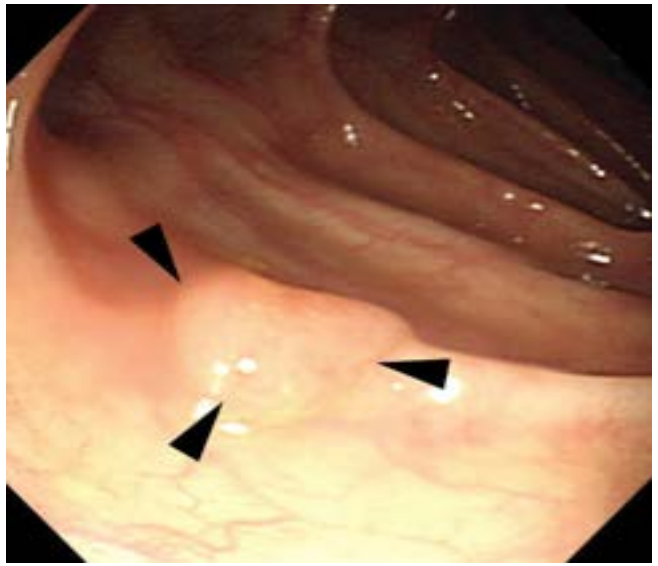
Polyp Recognition is important!

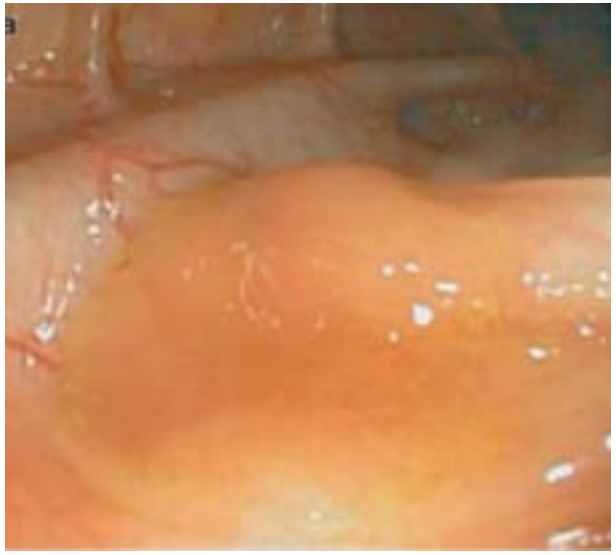


Soetikno, Kaltenbach, Rouse et al. JAMA 2008.

Polyp Recognition

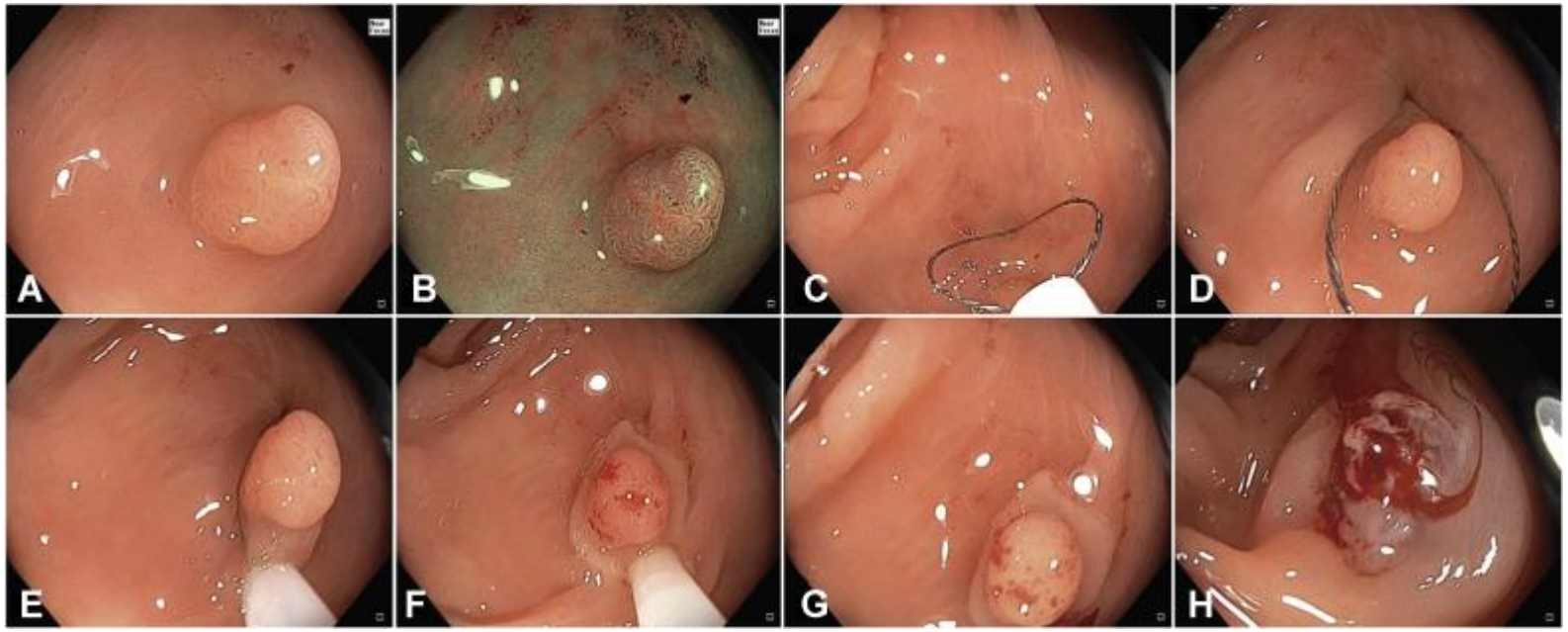
- Endoscopic Features of easily missed polyps:
  - Right sided
  - Flat/sessile
  - Irregular borders
  - Covered by mucus

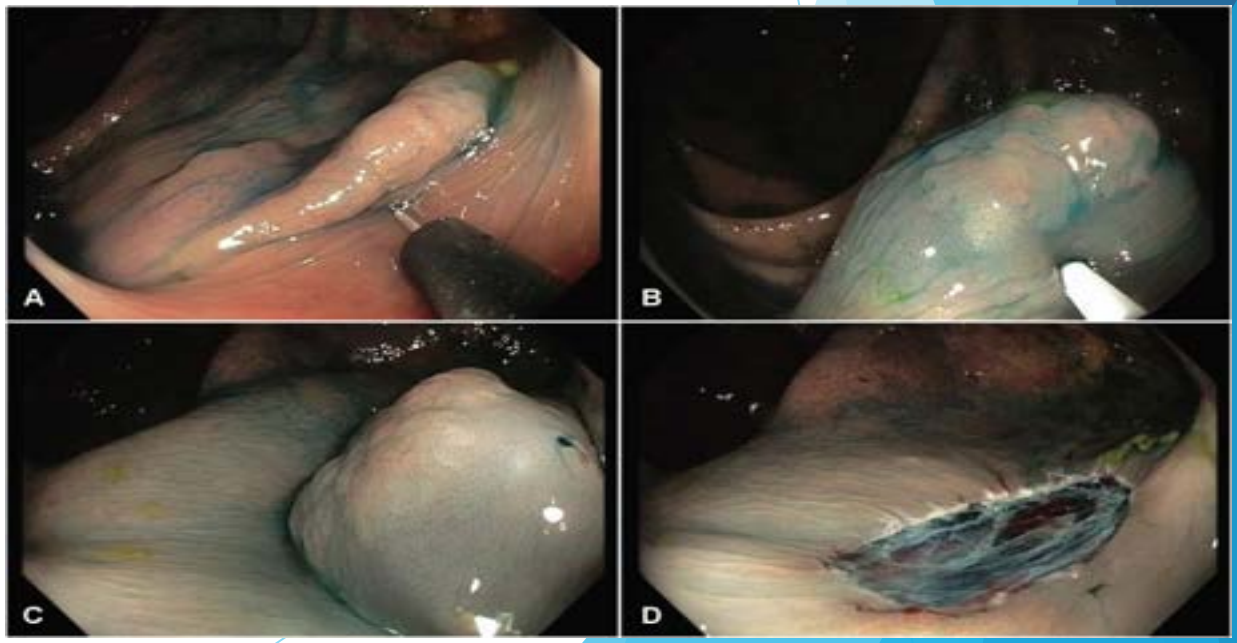




Huang CS et al.AJG 2011;106:229-40

Complete Resection is imperative!





Shaukat A et al. Gastrointest Endosc. 2020 ;92(5):997-1015
Kaltenbach T, et al. Gastrointest Endosc 2020;91(3):486-519

Step 4. Think of interventions in the following categories:

Technique

Technology

Education

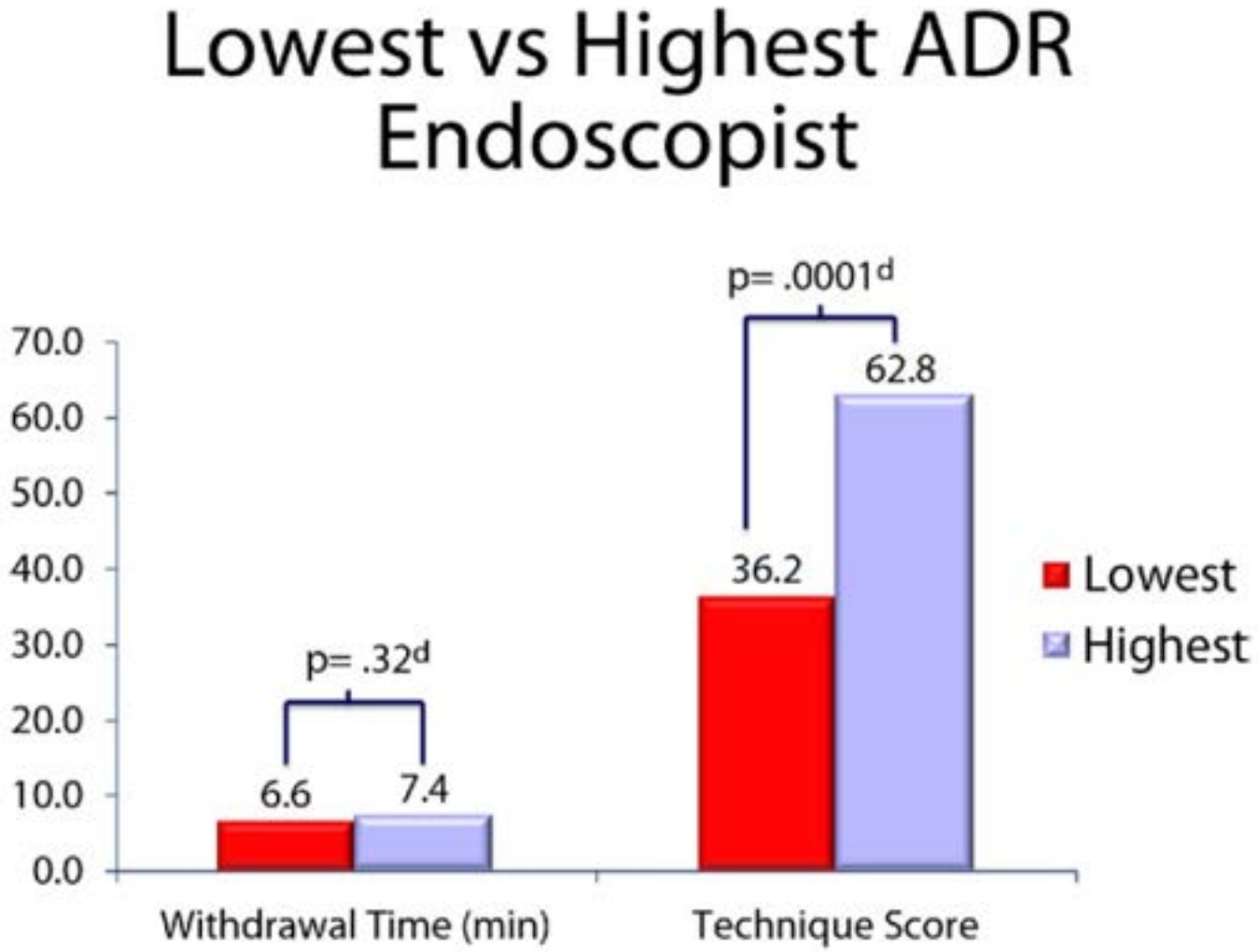
Technique: Withdrawal time

- Withdrawal time:
- Should be at least 6 minutes in colonoscopies without biopsy or polypectomy

- Withdrawal technique:
  - Adequate distention
  - Washing and clean up
  - Looking behind folds
  - Segmental inspection and subjective timing

ASGE practice guideline: Measuring the Quality of Endoscopy. Gastrointest Endosc 2006;58:S1-S38
Rex DK. Colonoscopic Withdrawal technique is associated with adenoma miss rate. Gastrointest Endosc 2000;51:33-6

Time alone isn't enough: Technique matters



Lee GIE 2011;74:128-34

Segmental withdrawal time plus enhanced inspection technique

- Setting:
  - 12 GI, community-based practice setting, Rockford, IL
- Intervention:
  - Adopted an 8-min withdrawal time (2 min per colonic segment) using an audible timer
  - Reviewed inspection techniques
- Results: ADR improved from 23.5% to 34.7%

(*P =.0001)*

Barclay RL, et al. Effect of a time-dependent colonoscopic withdrawal protocol on adenoma detection during screening colonoscopy. Clin Gastroenterol Hepatol 2008;6:1091-8.

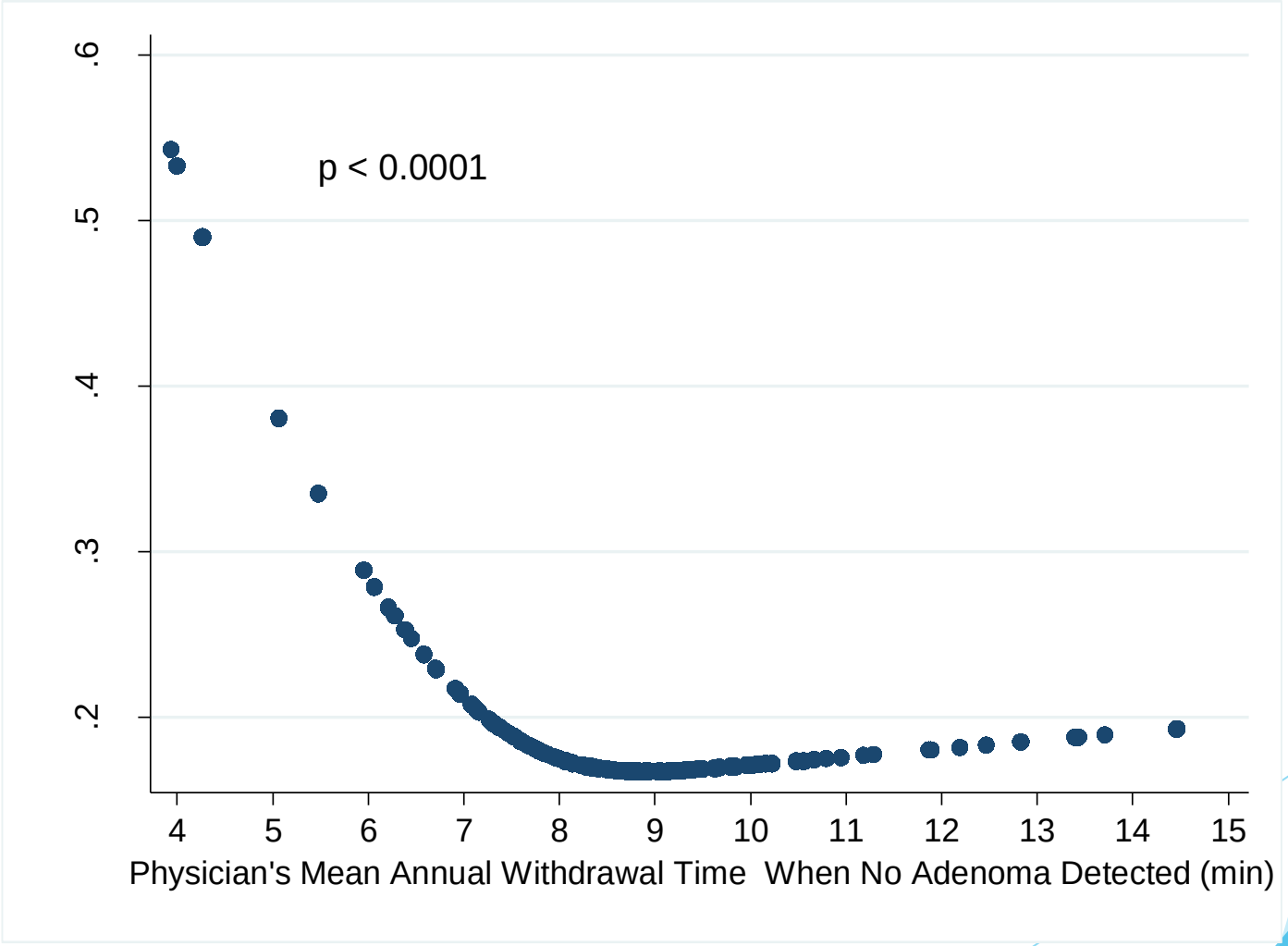
ADR, WT and Interval CRC

- Community based practice in Minneapolis/St.Paul
- 51 GI
- 76,810 Screening colonoscopies over 6 years
- Linked records with State cancer registry for incident cancers within 5 years of colonoscopy
- Average annual ADRs: 26% ± 9%; WT: 8.6±1.7 min
- 56 interval cancers over 249,261 person-years of follow-up

Shaukat A et al. Longer withdrawal time is associated with a reduced incidence of interval cancer after screening colonoscopy. Gastroenterology. 2015 Oct;149(4):952-7

WT and Interval cancer

Physicians' average annual withdrawal times were inversely associated with interval cancers ($p < 0.0001$)



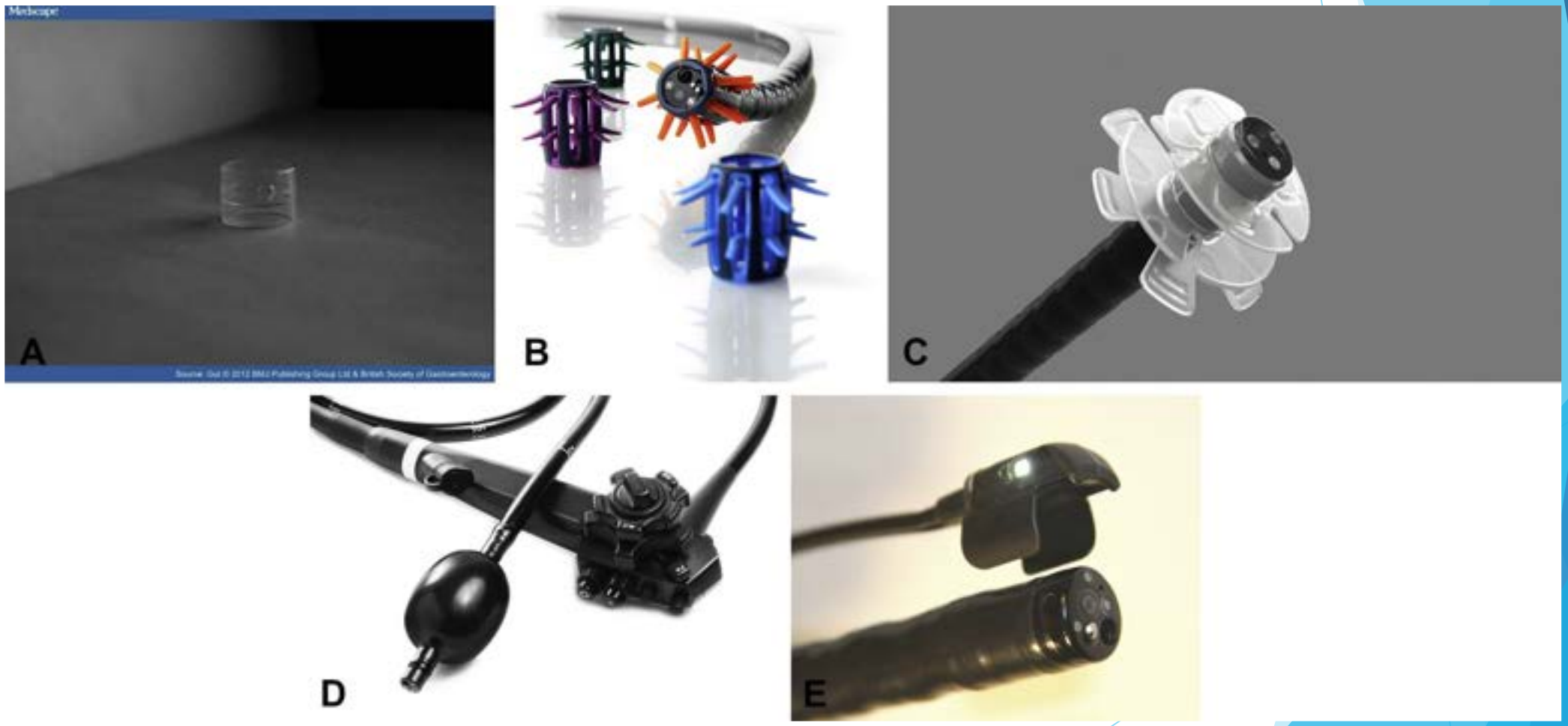
Other Techniques

- Retroflexion in the cecum versus re-examining right colon during withdrawal
- Left versus right lateral decubitus position during withdrawal
- Changing patient position during withdrawal
- 2nd observer looking at the screen (Tech or Nurse)
- Water immersion and water exchange

- **Mixed Results**
  - Seem to benefit low performers

Lee Sw et al. Am J Gastroenterol. 2016 Jan;111(1):63-9
Ball AJ et al. Gastrointest Endosc. 2015;82(3):488-94
Kushnir VM et al. Am J Gastroenterol 2015;110:415-22

Accessory Devices



ASGE. Endoscopes and devices to improve colon polyp detection. GIE 2015;81:1122-29

Comparing technique, devices and endoscopes

	OR for ⬆ADR (vs. High def colonoscopy)	95% CI
Technique (WE, 2nd observer, position changes)	1.29	1.09-1.35
Enhanced imaging techniques (chromoendoscopy, narrow-band imaging, flexible spectral imaging color enhancement, blue laser imaging)	1.21	1.07-1.29
New scopes (full-spectrum endoscopy, extra-wide-angle-view colonoscopy, dual focus)	0.98	0.79-1.21

- No specific technology for increasing ADR was superior to others
- No difference in detection of advanced ADR, polyp detection rate, or mean number of adenomas/patient

Facciorusso A, et al. Compared Abilities of Endoscopic Techniques to Increase Colon Adenoma Detection Rates: A Network Meta-analysis. Clin Gastroenterol Hepatol. 2018 Dec pii: S1542-3565(18)31335-1. doi: 10.1016/j.cgh.2018.11.058

AI-enabled program for CADe FDA approved

- 685 patients, 3 centers in Italy
- All indications
- Randomized to CADe vs standard COL
- ADR: 40.4%standard COL vs. 54.8% CADe
- Adenoma per Colonoscopy higher e CADe: 1.07 vs. 0.71
- No difference in WT, non-neoplastic rates

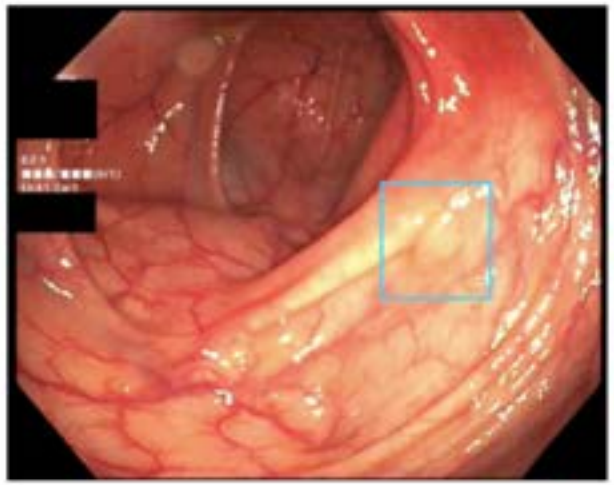
- Pooled two trials:
- 660 patients, 10 endoscopists
- Italy, all indications
- ADR 44.5% vs. 53.3%
- CADe, indication associated with ADR improvement, but not endoscopist experience

Repici A. Efficacy of Real-Time Computer-Aided Detection of Colorectal Neoplasia in a Randomized Trial. Gastroenterology. 2020 Aug;159(2):512-520.Repici A et al. Artificial intelligence and colonoscopy experience: lessons from two randomised trials. Gut. 2022 Apr;71(4):757-765.

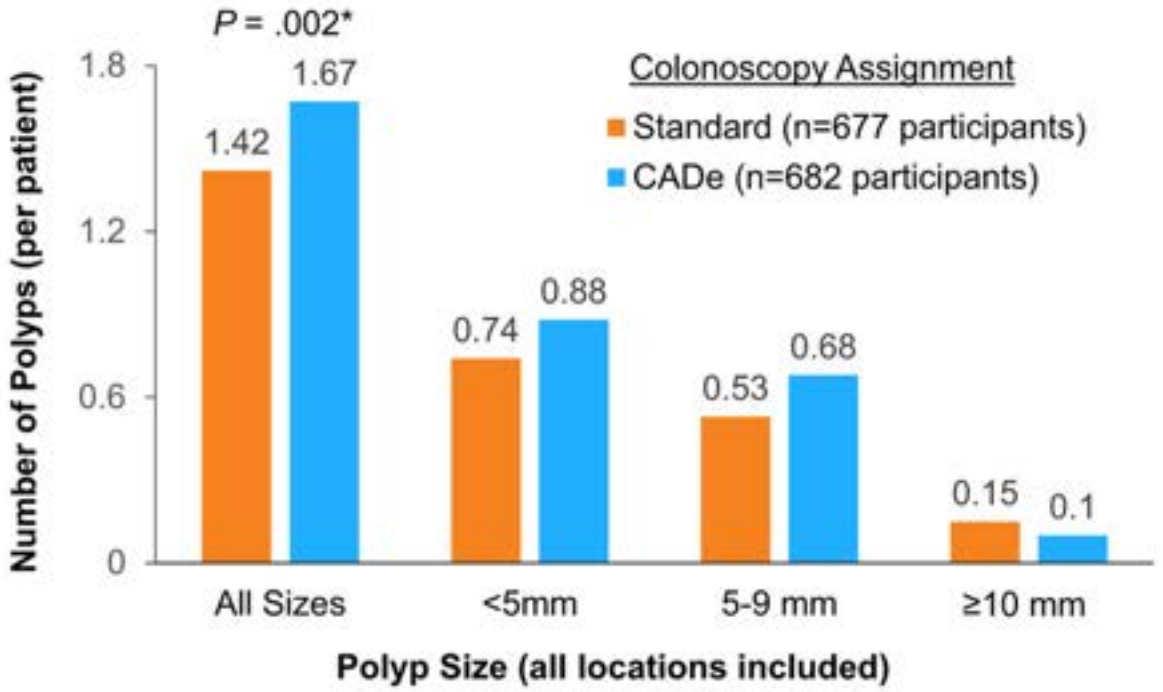
CADe improves APC

Improvement in Adenomas per Colonoscopy Using a Computer-Aided Detection Device

Randomized trial, standard vs. CADe colonoscopy	1359 screening and surveillance participants	5 U.S.-based academic and community centers	22 experienced endoscopists	↑ 27% in adenomas per colonoscopy

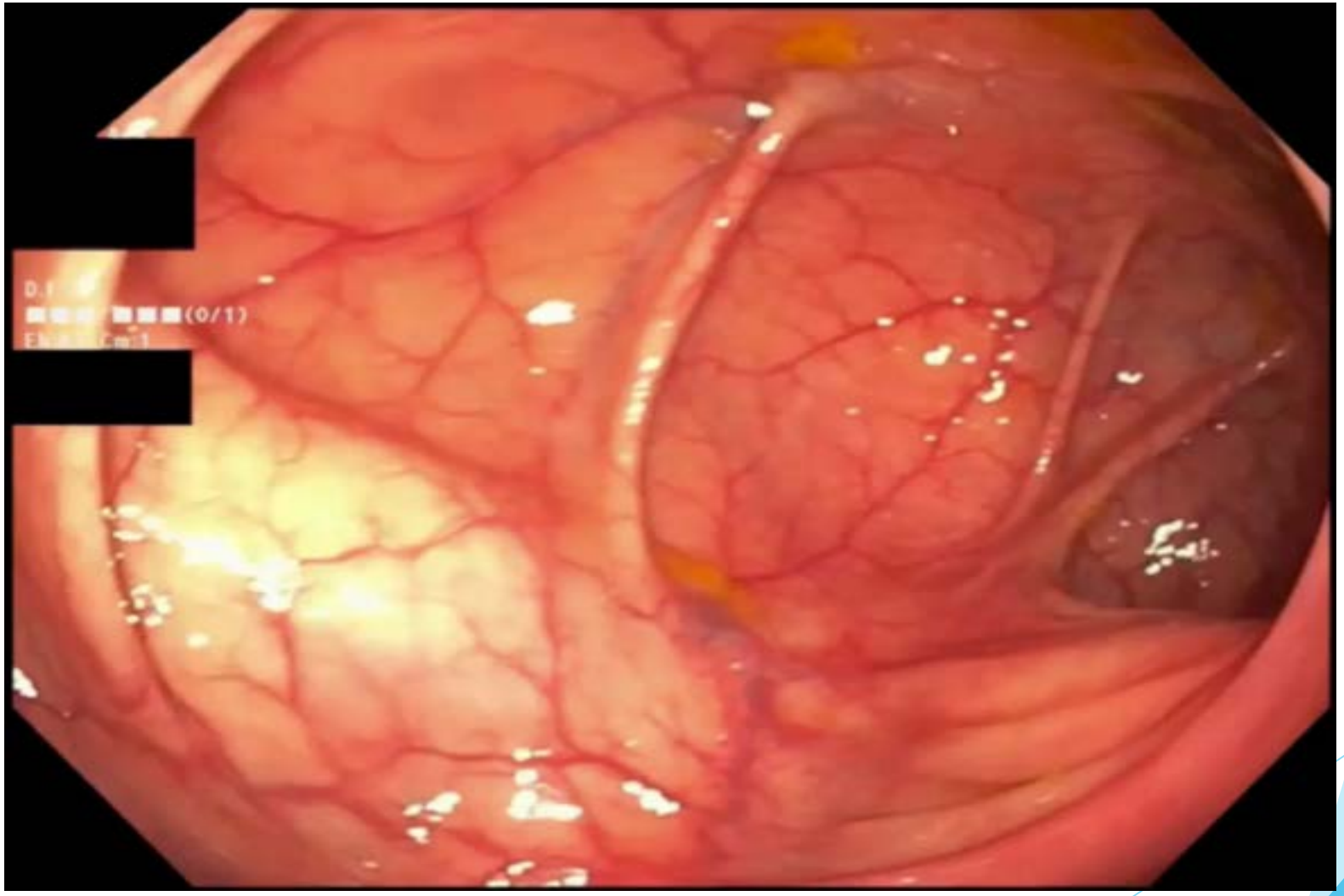


Detection of a 4-mm adenoma in the hepatic flexure by the computer-aided detection (CADe) device



Shaukat A et al. Computer-Aided Detection Improves Adenomas per Colonoscopy for Screening and Surveillance Colonoscopy: A Randomized Trial. Gastroenterology 2022;163: 732-41

Polyp Detection



Real World Performance of CADe in Colonoscopy

- No effect on Polyp detection or ADR
- Ladabaum U, Shepard J, Weng Y, Desai M, Singer SJ, Mannalithara A. Computer-aided Detection of Polyps Does Not Improve Colonoscopist Performance in a Pragmatic Implementation Trial. Gastroenterology. 2023;164(3):481-483

- No effect on APC or ADR
- Wei MT, Shankar U, Parvin R, Hasan Abbas S, Chaudhary S, Friedlander Y, Friedland S. Evaluation of computer aided detection during colonoscopy in the community (AI-SEE): a multicenter randomized clinical trial. Am J Gastroenterol. 2023. doi: 10.14309/ajg.0000000000002239

Multifaceted interventions are needed

Educational interventions

Technique

Report cards and feedback

High-quality colonoscopy

Technology

Video recording / feedback

AI

May, F and Shaukat A. State of the Science on Quality Indicators for Colonoscopy and How to Achieve Them. American Journal of Gastroenterology 2020; 115(8):1183-1190,

Interventions to improve adenoma detection rates for colonoscopy

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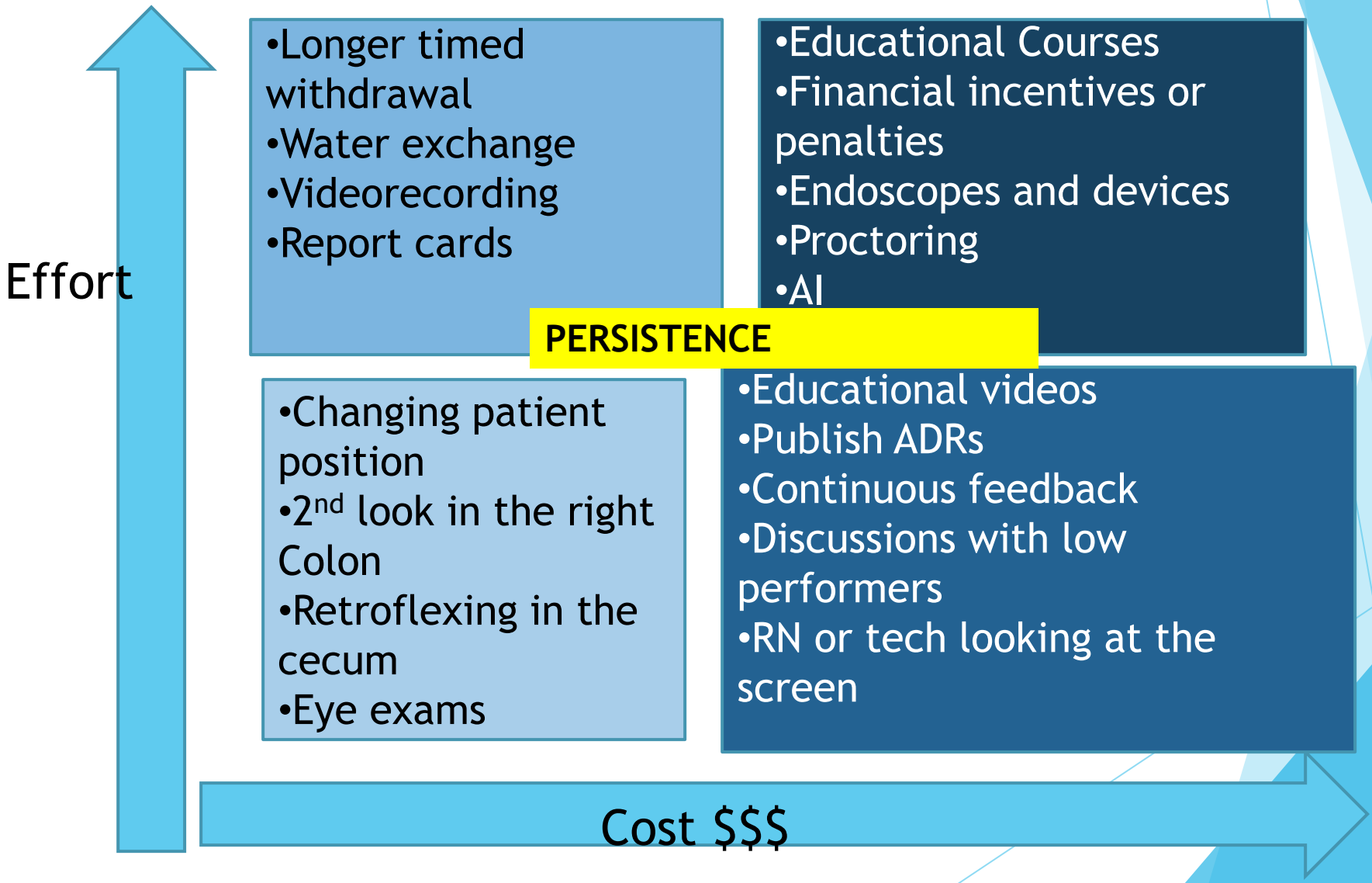
GIE 2022;96:171-188

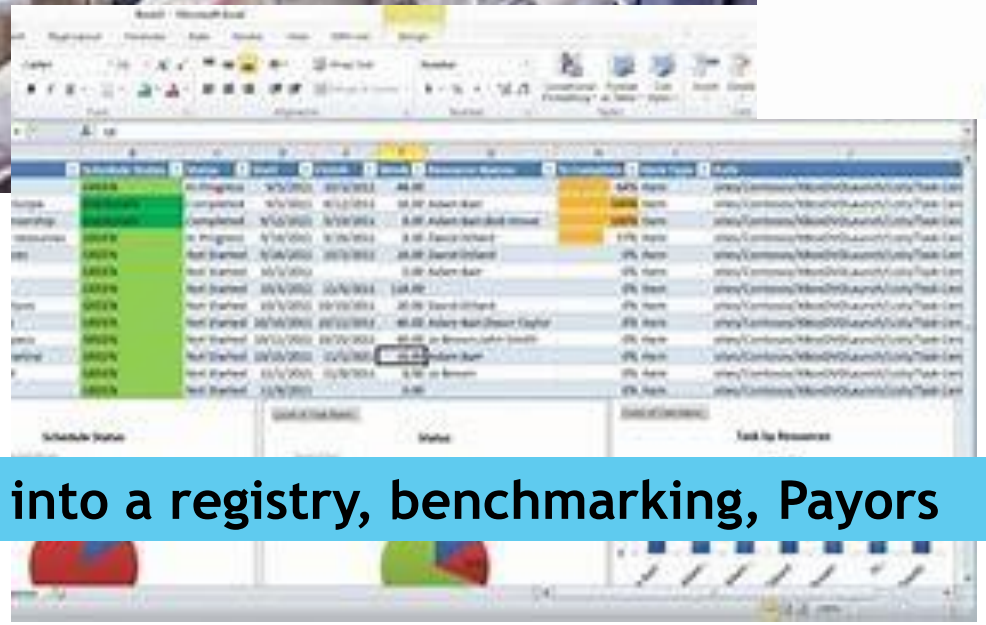
TABLE 1. Summary on interventions to improve ADR

Intervention	Compared with	Absolute increase in adenoma detection	Comments
Technique			
Water assistance	CO_2/air insufflation	6% water immersion 10% for water exchange	Water exchange increases insertion time but withdrawal time same as other techniques
Lengthening withdrawal time	<6 min	9% for 9-min WT compared with 6 min	Evidence supports emphasizing training in withdrawal technique rather than time
Retroflexion in cecum	No retroflexion	17% for right-sided adenomas	Overall success rate 91%, adverse vents .03%
Second look, either retroflexion in the cecum or second forward look in the proximal colon	Single forward look	10% for all adenomas, 5% for right-sided adenomas	Second forward look improves adenoma detection; no difference in retroflexed or straightforward second look
Dynamic change in patient position	No change in position	7%	Adequate distention during position changes is key, particularly with excellent preparation
Technology			
Distal attachment devices	Standard colonoscopy	5%-11%	May reduce procedure time
Enhanced imaging technology (narrow-band imaging, i-SCAN, linked-color imaging, blue-laser imaging, chromoendoscopy, and Methylene Blue-MMX (Cosmo Pharmaceuticals, Dublin, Ireland))	Standard or high definition white-light colonoscopy	5% to 18% absolute improvement in adenoma detection	Narrow-band imaging with 190 colonoscopes is superior to white-light colonoscopy
Computer aided detection technologies	Standard colonoscopy	10%-12% in adenoma, .2 in adenoma per colonoscopy	Added benefit of polyp histology recognition

Tools to improve ADRs



Future of Colonoscopy practice



Entry into a registry, benchmarking, Payors

Summary

- Colonoscopy Quality is key to effectiveness
- ADR is a validated quality indicator
- ADRs for 45-49 lower than that for 50-55 and 50-75 year olds (AR 3%-7%)
- Monitor Colonoscopy Quality and ADRs
- Many available tools to improve Quality

Thank you!

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