

# The Ins and Outs (well, mostly outs) of Bowel Preparation for Colonoscopy

Brian C. Jacobson, MD, MPH, AGAF, FASGE, FACG  
Massachusetts General Brigham and Harvard Medical School  
Boston, MA

# Disclosures

None



**20 Million Colonoscopies are  
Performed Globally each Year**



## MULTI-SOCIETY TASK FORCE

# Optimizing bowel preparation quality for colonoscopy: consensus recommendations by the US Multi-Society Task Force on Colorectal Cancer

**Brian C. Jacobson, MD, MPH,<sup>1,2,\*</sup> Joseph C. Anderson, MD,<sup>3,4,5,\*</sup> Carol A. Burke, MD,<sup>6</sup>  
Jason A. Dominitz, MD, MHS,<sup>7,8</sup> Seth A. Gross, MD,<sup>9</sup> Folasade P. May, MD, PhD, MPhil,<sup>10,11</sup>  
Swati G. Patel, MD, MS,<sup>12,13</sup> Aasma Shaukat, MD, MPH,<sup>14</sup> Douglas J. Robertson, MD, MPH<sup>3,4</sup>**

**Gastrointest Endosc 2025;101:702-32**



# Why is bowel preparation important?

Inadequate bowel cleanliness is associated with

- Prolonged procedure time
- Decreased cecal intubation rates
- Repeat procedures
- Increased costs
- Decreased patient/provider experience
- Reduced detection of adenomas

Reference: Jacobson et al. Optimizing Bowel Preparation Quality for Colonoscopy: Consensus Recommendations by the US Multi-Society Task Force on Colorectal Cancer. *Gastroenterology* 2025; 168:798–829.

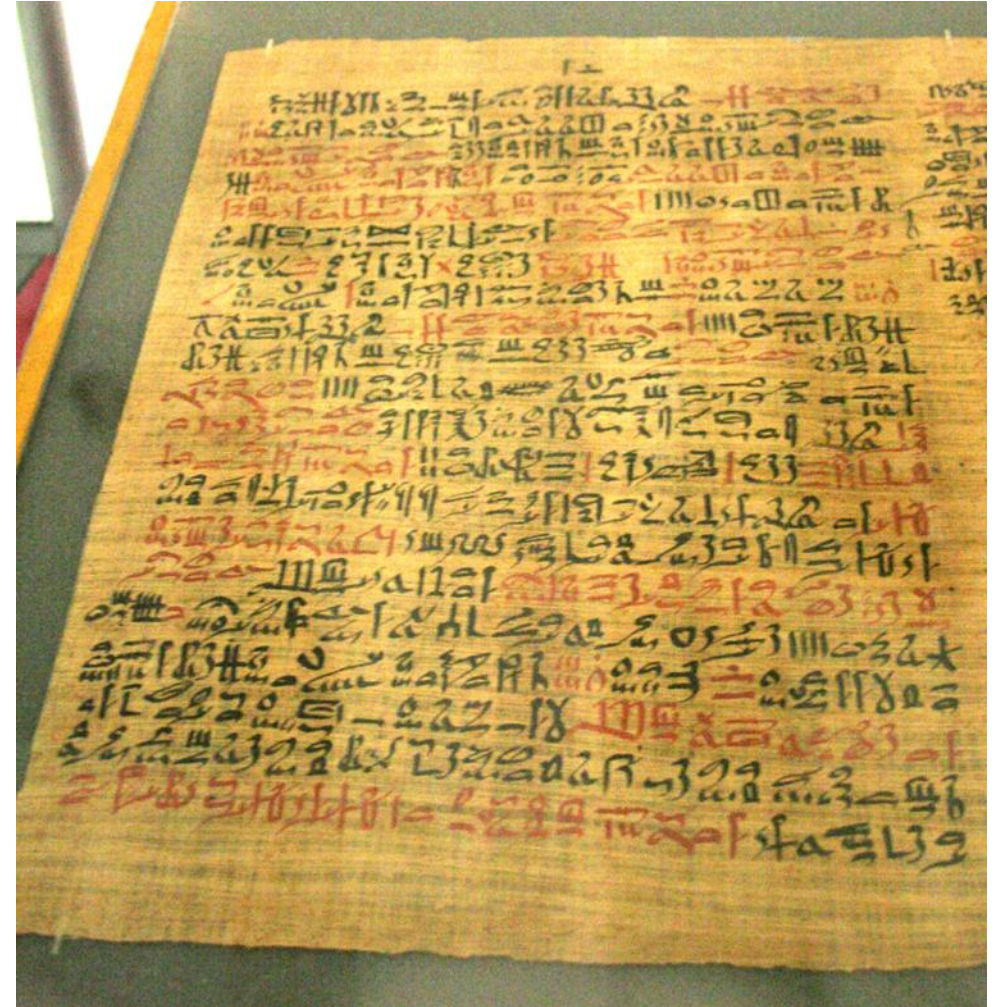


# Trying to optimize bowel preps is not new...

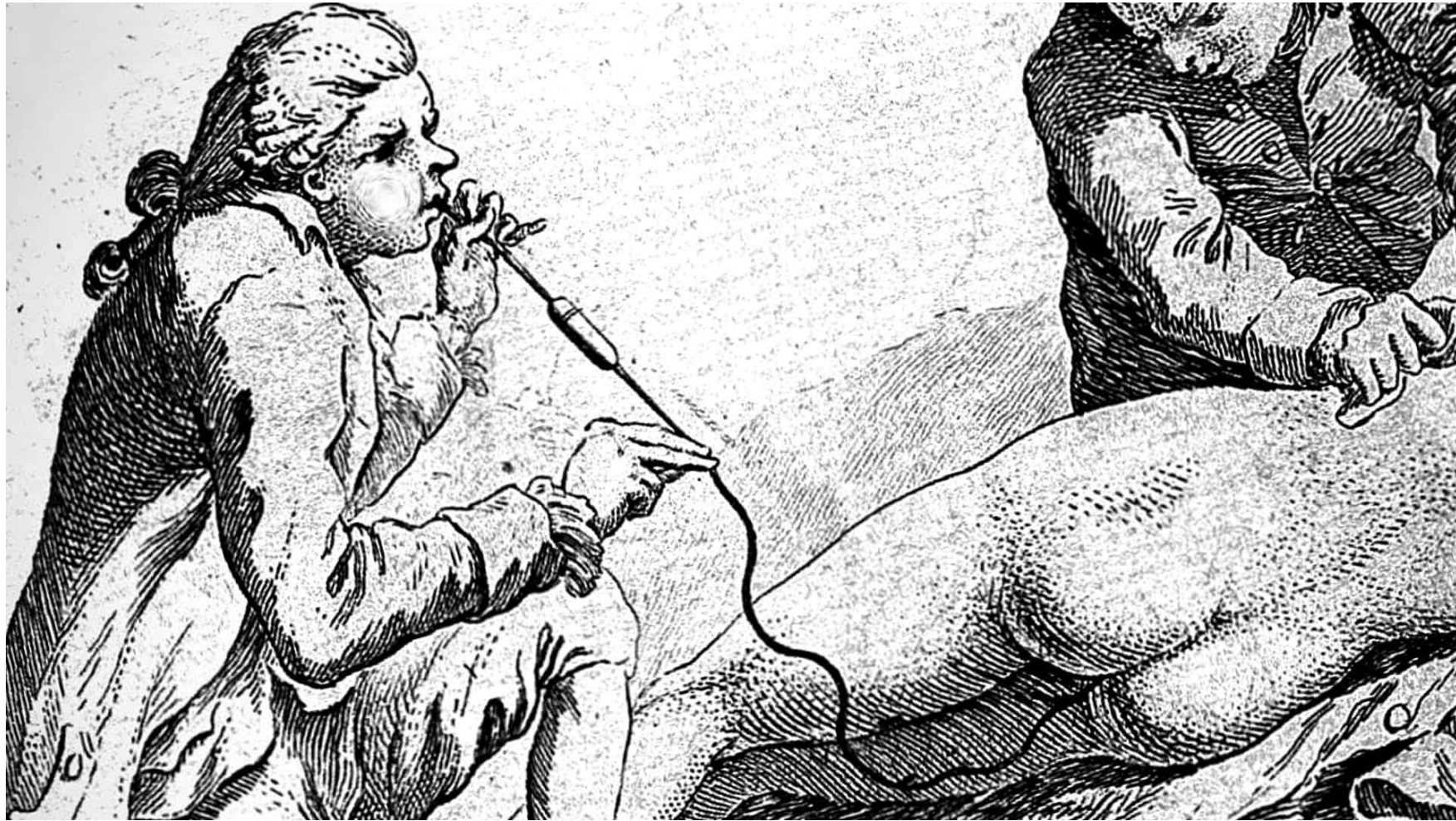


# The Ebers Papyrus: Egyptian medical papyrus of herbal knowledge dating to c. 1550 BCE

SIG: “Berries of castor oil tree, chew and swallow down with beer in order to clear out all that is in the body”



# Blowing smoke up... well, you know the expression



Source: Terynn Boulton – Gizmodo.com; May 20, 2014

# A word about nomenclature: “Bowel Preparation” can mean...

- Bowel preparation process = all the steps taken by a patient prior to colonoscopy including arranging for transportation
- Bowel preparation regimen = the purgative consumed with or without additional adjuncts to clean the colon
- Bowel preparation quality = the quality of bowel cleanliness

Reference: Jacobson and Calderwood. Measuring bowel preparation adequacy in colonoscopy-based research: review of key considerations. GIE 2020;91:248-26.



## A word about nomenclature: “Optimized Prep”

- Optimized prep = quality of bowel preparation is adequate
- So, what is adequate?
  - Standard screening or surveillance intervals can be assigned based on the findings of the colonoscopy

Reference: Jacobson et al. Optimizing Bowel Preparation Quality for Colonoscopy: Consensus Recommendations by the US Multi-Society Task Force on Colorectal Cancer. *Gastroenterology* 2025; 168:798–829.



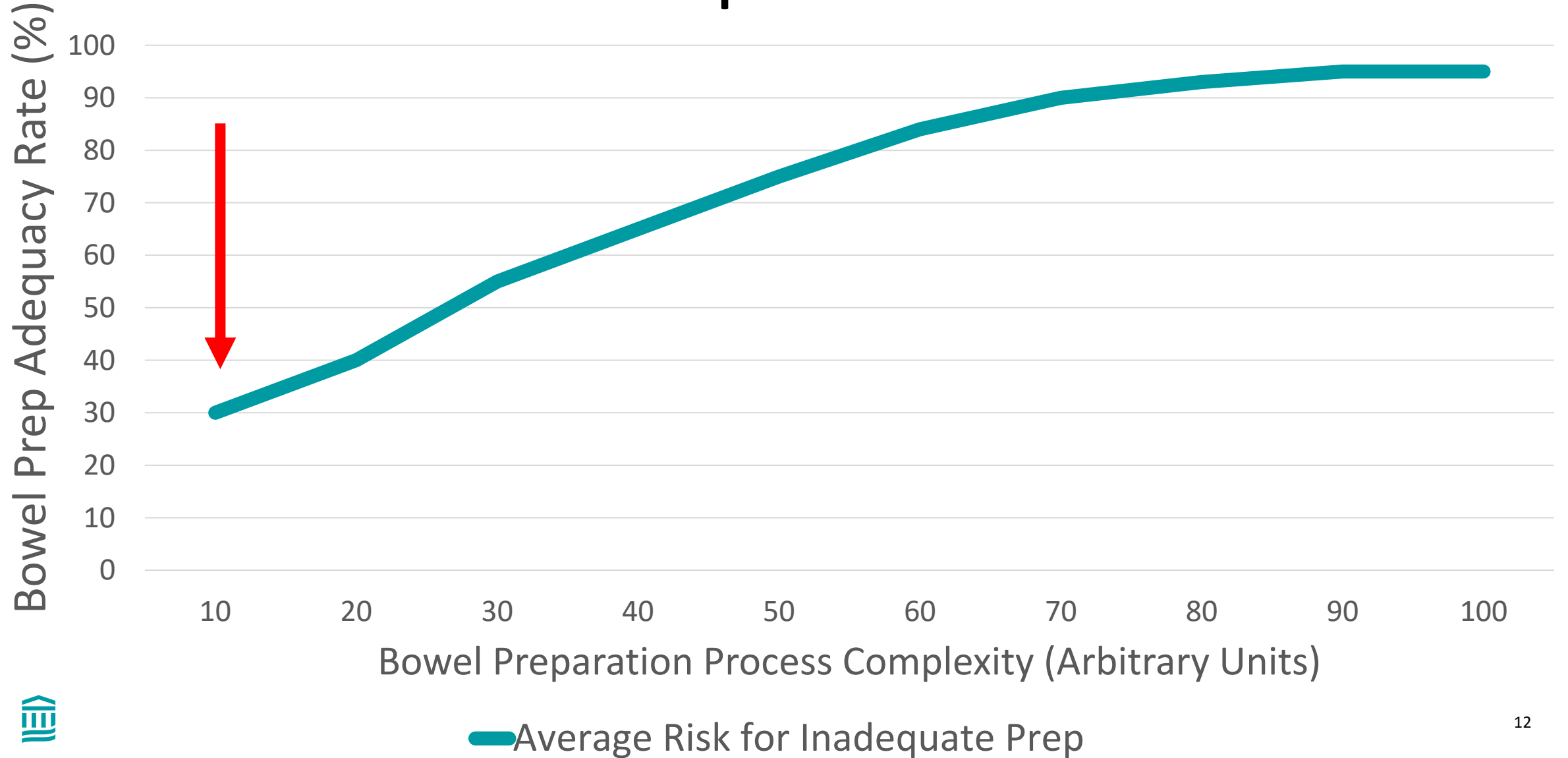
# What is a “bowel preparation process”?

- Diet changes
- Medication considerations (eg. stopping iron)
- Mental/physical preparation (i.e. what to expect, use of petroleum jelly)
- The purgative (both solution AND timing)

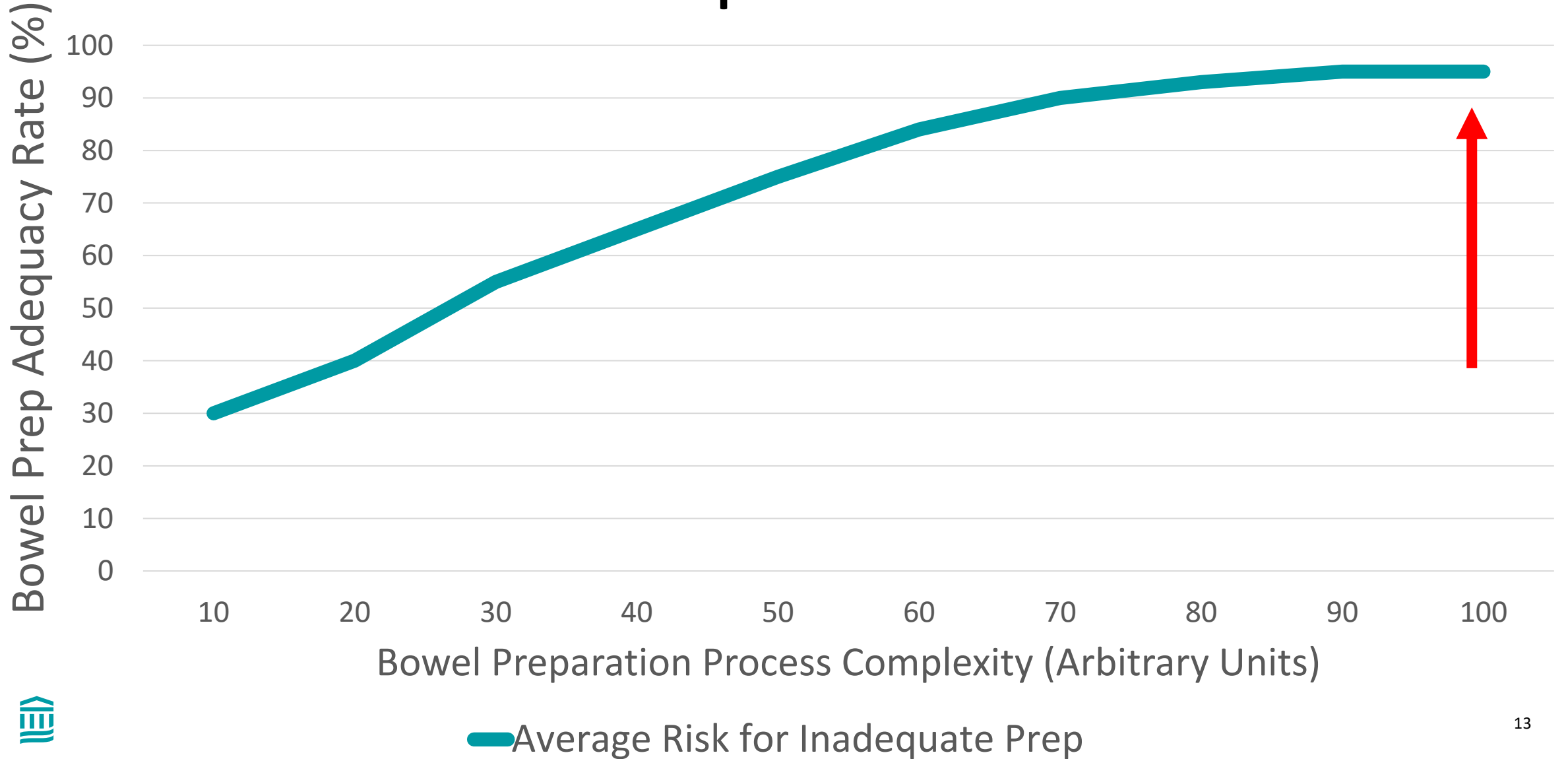
**If any of these breakdown, the bowel prep quality may not be adequate**



# Association Between Bowel Preparation Adequacy and the Preparation Process



# Association Between Bowel Preparation Adequacy Rate and the Preparation Process



The bowel preparation process is therefore a balance between patients' comfort and endoscopists' needs



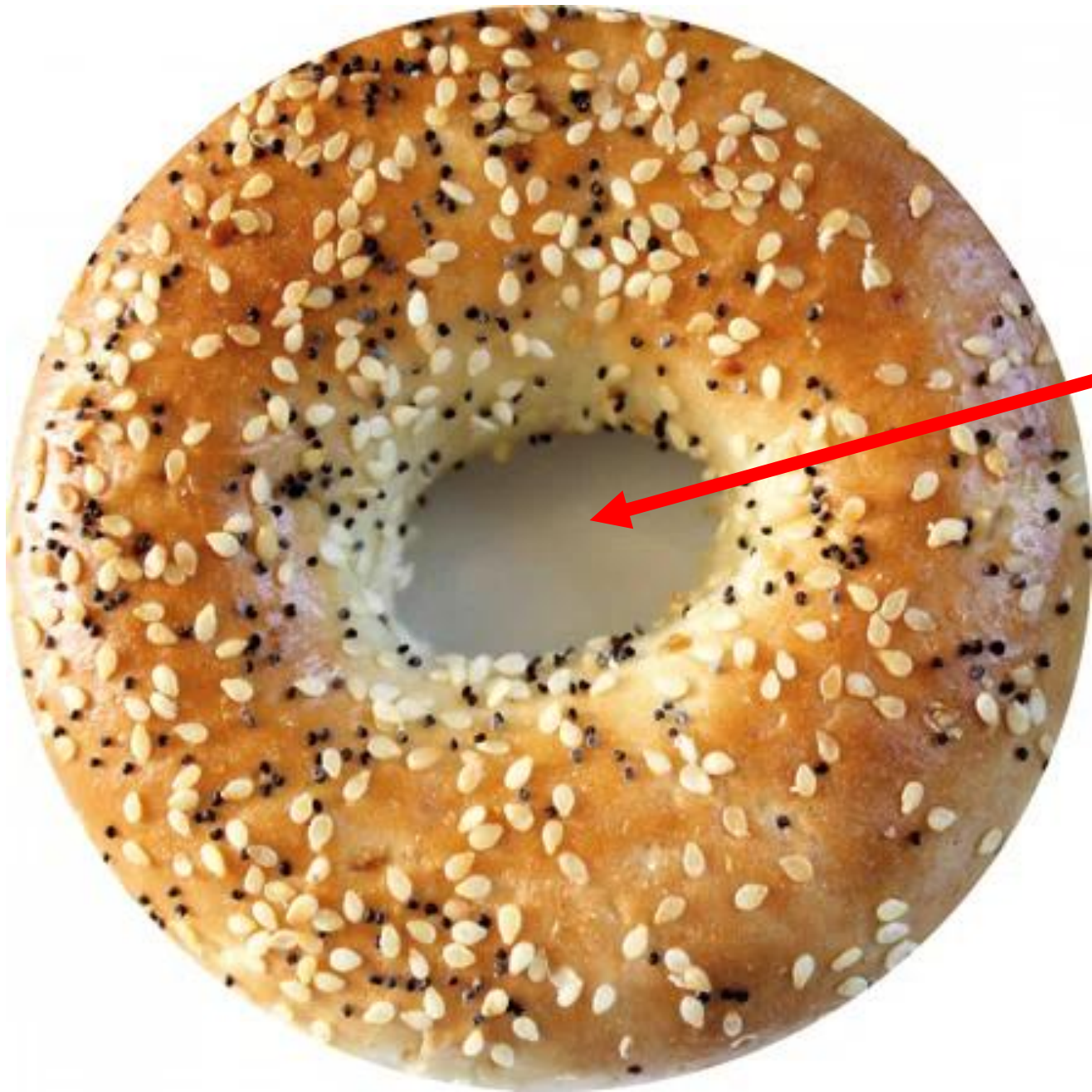
# Bowel preparation process for those at **average** risk for inadequate bowel preparation quality



**Source:** US Multi-Society Task Force on Colorectal Cancer

# Bowel preparation process for those at **average** risk for inadequate bowel preparation quality

- Recommend: Verbal and written patient education instructions for all components of the colonoscopy preparation
- Suggest: Some form of patient navigation, including telephonic or virtual navigation employing automated electronic messaging



“Well Doc, you told me I could only eat things I could see through”

# Dietary instructions are anything but standardized

- National survey of ASGE's Endoscopy Unit Recognition Program (EURP) participants
- Assessed instructions about diet changes in their prep instructions
- Instructions available from 201 of 411 (49%)
- 91% of practices restrict patients to clear liquids the day prior to colonoscopy



# Dietary instructions are anything but standardized

- Many units also recommended against the intake of specific foods
  - Nuts, seeds, pulp, and fiber (66 %)
  - Dairy products (84 %)
  - Alcohol (35 %)
  - Red, blue, green, and/or purple dyed foods (94 %)
  - Gelatin (3 %)
- Instructions on when to begin avoidance of nuts, seeds, pulp, and fiber ranged from 1 to 10 days (median 3 days) prior to the colonoscopy



# Bowel preparation diet for those at **average** risk for inadequate bowel preparation quality

- Recommend: Adjust diet only for the day prior to colonoscopy
- Recommend: Low-residue/low-fiber or full liquids the day prior to colonoscopy for breakfast and lunch



# Dietary restrictions: One day is probably fine

- Prospective study of 201 patients undergoing colonoscopy
- Detailed dietary analyses over 3 days prior to procedure
- BBPS total and segment scores compared to macronutrients and specific foods/quantities consumed



# Dietary restrictions: One day is probably fine

- Day -3 and -2 food and beverage intake had no impact on prep
- Day prior: meat, poultry and vegetable intake correlated with worse preps
- Gelatin and water intake correlated with better preps



# Dietary restrictions: What can they eat?

- Several meta-analyses and RCTs confirm bowel preparation adequacy is not inferior when comparing low residue diets to clear liquid diets prior to colonoscopy
- One meta-analysis included 20 randomized controlled trials with 4,323 patients

Low residue foods on the day prior don't seem to worsen prep  
– OR 0.96; 95% CI 0.72-1.29

Zhang X, et al. Low-Residual Diet versus Clear-Liquid Diet for Bowel Preparation before Colonoscopy: Meta-Analysis and Trial Sequential Analysis of Randomized Controlled Trials. *GIE* 2020;92:508-518.e3



# Dietary restrictions: What can they eat?

- Analysis of secondary endpoints found low residue diet:
  - Made no difference in adenoma and advanced adenoma detection
  - Patients more willing to repeat the preparation (71% versus 62%;  $p = 0.005$ )
  - Easier to comply with (52% versus 39%;  $p = .01$ )
  - Less hunger (25% versus 44%;  $p < 0.001$ ) and less nausea (18% versus 23%;  $p = 0.02$ )

Zhang X, et al. Low-Residual Diet versus Clear-Liquid Diet for Bowel Preparation before Colonoscopy: Meta-Analysis and Trial Sequential Analysis of Randomized Controlled Trials. *GIE* 2020;92:508-518.e3



# Breakfast options

- 2 eggs (fried, over easy, scrambled, or boiled) with or without condiments
- 2 white bread slices or 1 plain bagel with butter, jelly, or cream cheese
- 2/3 cup yogurt (no seeds, berries, nuts), 1 banana
- Chicken burrito: ½ portion of shredded chicken breast (40g), divided into two wheat tortillas. A glass of yogurt or a cup of milk.



Reference: Jacobson et al. Optimizing Bowel Preparation Quality for Colonoscopy: Consensus Recommendations by the US Multi-Society Task Force on Colorectal Cancer. *Gastroenterology* 2025; 168:798–829.

# Lunch options

- 1 plain chicken or turkey sandwich on white bread with condiments only: no lettuce or tomato
- 1 chicken breast (skinless) – pan fried or baked
- 1 cup macaroni and cheese
- 1 baked potato (no skin) with butter or sour cream



Reference: Jacobson et al. Optimizing Bowel Preparation Quality for Colonoscopy: Consensus Recommendations by the US Multi-Society Task Force on Colorectal Cancer. *Gastroenterology* 2025; 168:798–829.

## Bowel preparation process for those at **average** risk for inadequate bowel preparation quality

- No particular preparation purgative recommended
- Regardless of regimen used, administer as a split-dose
- Alternative to split dose: Same-day purgative for afternoon colonoscopy
- Same-day purgative likely inferior to split-dose for morning colonoscopy



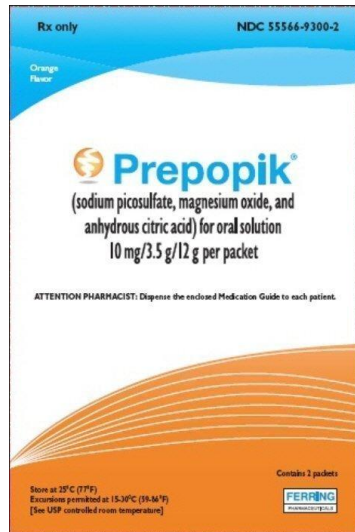
# Large volume preps may not be necessary



We suggest 2 L bowel preparation regimens instead of 4 L regimens for ambulatory patients **at low risk for inadequate bowel preparation** (weak recommendation, moderate-quality evidence).



# So many options, so many studies...



# Food and Drug Administration-approved low-volume preparation purgatives

- 2L PEG-ELS (Golytely, CoLyte, NuLytely, TriLyte)
- 2L PEG-ELS + ascorbate (MoviPrep)
- Oral sodium sulfate (Tablets: SUTAB; Liquid: SUPREP)
- Sodium picosulfate, magnesium oxide, anhydrous citric acid (CLENPIQ)
- 1L PEG + ascorbate (PLENVU)



# Meta-analysis of 17 studies comparing 2L vs 4L split-dose regimens

- Both low- and high-volume regimens were similar in efficacy of cleaning
- Tolerability was superior for the low volume groups
- Findings were similar for the PEG and non-PEG based regimens
- The investigators excluded non-FDA approved regimens like PEG-3350 with sports drink

Reference: Spadaccini, et al. Efficacy and Tolerability of High- vs Low-Volume Split-Dose Bowel Cleansing Regimens for Colonoscopy: A Systematic Review and Meta-analysis. Clin Gastroenterol Hepatol 2020;18:1454-1465.



# Bowel preparation process for those at average risk for inadequate bowel preparation quality

- Drink second half of split-dose 4-6 hours before the time of colonoscopy finishing at least 2 hours before the procedure start
- Only adjunct to consider is simethicone
  - 320mg PO taken at some point during the consumption of the purgative



# Power wash during colonoscopy



# I mean, irrigation pumps



**What about those at higher risk of an inadequate bowel preparation quality?**



# Risk Factors for Inadequate Prep with Odds Ratio $\leq 1.5$

- Age >65
- Male sex
- Body mass index >30kg/m<sup>2</sup>
- Lower level of education
- Inpatient status
- Medicare or Medicaid vs private insurance
- Hypertension
- Tobacco use
- Constipation

References: Clin Gastroenterol Hepatol 2013;11:1478-1485; Clin Gastroenterol Hepatol 2009;7:670-675; J Hosp Med 2019;14:278-283; Clin Gastroenterol Hepatol 2012;10:501-506; Clin Gastroenterol Hepatol 2018;16:357-369.e10.



# Risk Factors for Inadequate Prep with Odds Ratio >1.5

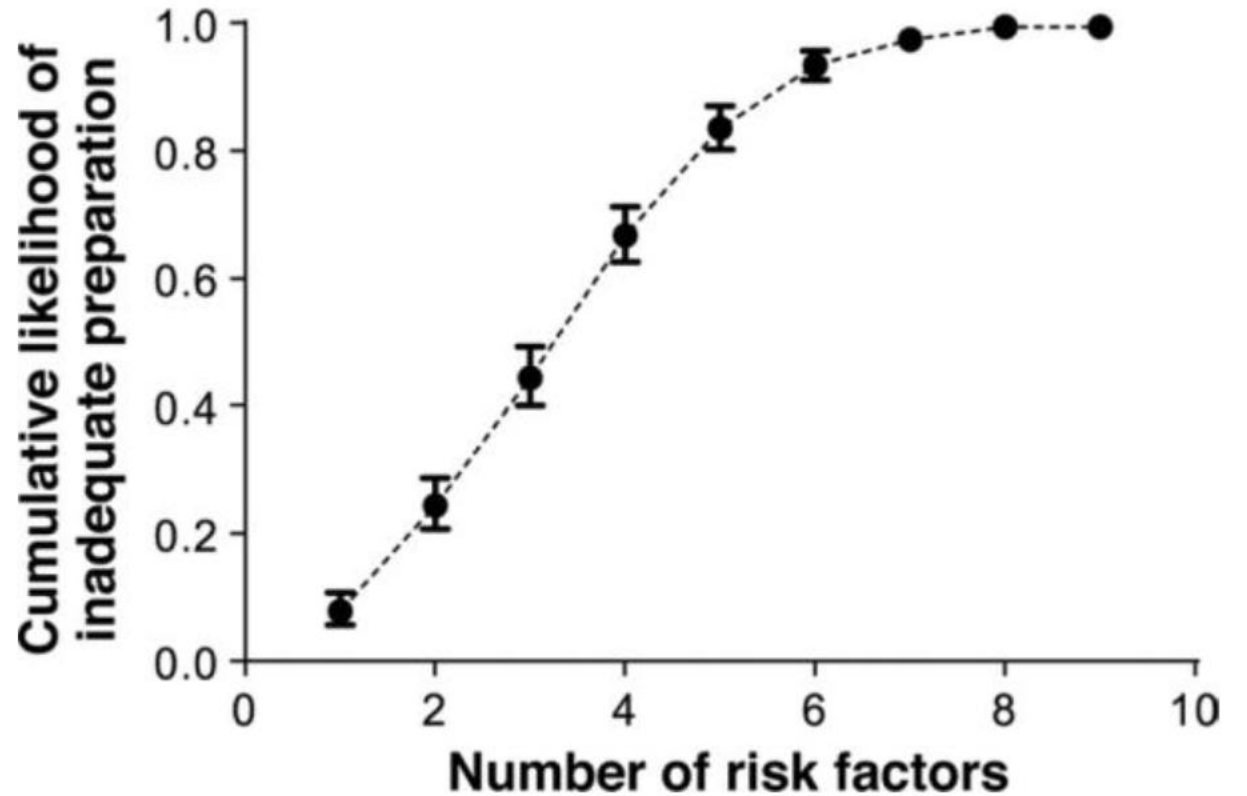
- Cirrhosis: OR 3.4 (1.5–7.9)
- Parkinson's: OR 3.2 (1.2–9.3)
- Dementia: OR 3.0 (1.2–7.5)
- Tricyclics: OR 2.0 (1.4–2.9)
- Diabetes OR 1.8 (1.5–2.1)
- Opioid use: OR 1.7 (1.4–2.1)
- Gastroparesis: OR 1.6 (1.2-2.3)
- Colorectal surgery: 1.6 (1.2–2.2)

References: Clin Gastroenterol Hepatol 2013;11:1478-1485; Clin Gastroenterol Hepatol 2009;7:670-675; J Hosp Med 2019;14:278-283; Clin Gastroenterol Hepatol 2012;10:501-506; Clin Gastroenterol Hepatol 2018;16:357-369.e10.



# Risks are cumulative

In a study of 1,588 ambulatory colonoscopies, the risk of inadequate bowel preparation increased linearly with the number of risk factors present, plateauing at 98% likelihood once 7 risk factors were present.



# Bowel preparation process for those at **increased** risk for inadequate bowel preparation quality

USMSTF suggests the following bowel preparation regimen:

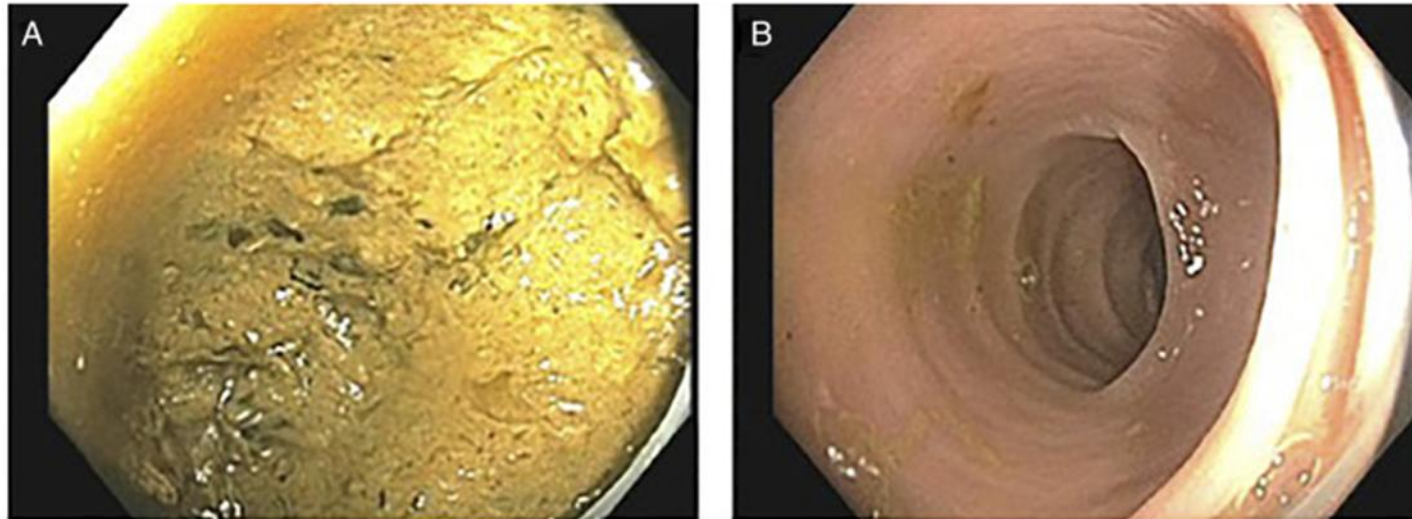
- Split dose 4L PEG-ELS + 15mg bisacodyl the afternoon prior to the colonoscopy
- Low residue diet 3 and 2 days prior to colonoscopy, changing to clear liquid diet the day prior to colonoscopy
- Weak recommendation, low quality evidence

References: US Multi-Society Task Force on Colorectal Cancer; Gimeno-García, et al. Am J Gastroenterol 2017;112:951-958; Sey et al. Clin Gastroenterol Hepatol 2022;20:e1283-e1291.



## When and how to measure prep adequacy?

- If pt reports incomplete adherence to prep regimen or brown bowel effluent, insert colonoscope to sigmoid to confirm inadequacy before cancelling
- Assess prep quality only after washing and suctioning



# When and how to measure prep adequacy?

- Use reliably understood descriptors that communicate prep adequacy
- Examples: “Excellent/Good”, “Adequate”, Boston Bowel Preparation Scale (BBPS)

**Key Concept: The term “fair” should be accompanied by a statement of bowel preparation adequacy (i.e., whether or not standard screening or surveillance intervals can be assigned based on the findings of the colonoscopy)**

# Modified Aronchick Scoring System

**Table 1 | Quality of colon cleansing scoring system\***

1 = Excellent	Greater than 90% of mucosa seen, Mostly liquid stool Minimal suctioning
2 = Good	Greater than 90% of mucosa seen, Mostly liquid stool Significant suctioning
3 = Fair	Greater than 90% of mucosa seen, Mixture of liquid and semisolid stool Stool could be suctioned and/or washed
4 = Poor	Less than 90% of mucosa seen, Mixture semisolid and solid stool Stool could not be suctioned or washed

\* Modified from Aronchick *et al.*<sup>7</sup>



# The Boston Bowel Preparation Scale (BBPS)

“The BBPS is the most thoroughly validated scale and should be used in a clinical setting”

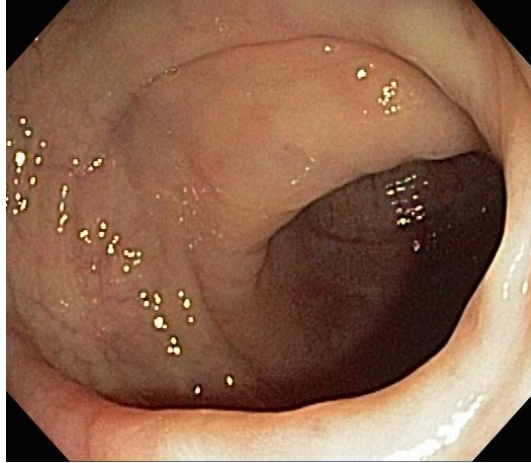


Reference: Parmar, et al. Validated scales for colon cleansing: A systematic review. Am J Gastroenterol 2016;111:197-204.

# Boston Bowel Prep Scoring (BBPS) Definitions

## Score of 3:

- Entire mucosa of colon segment seen well
- No residual staining, small fragments of stool or opaque liquid

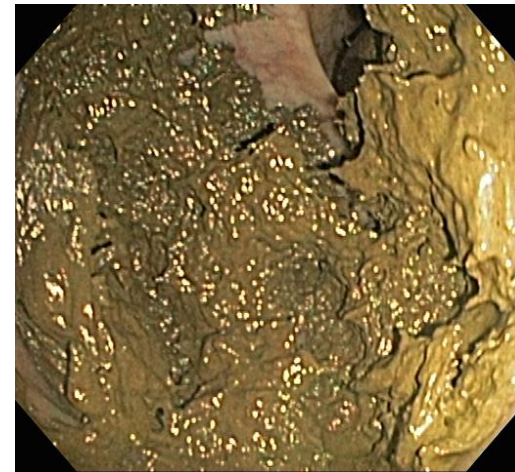
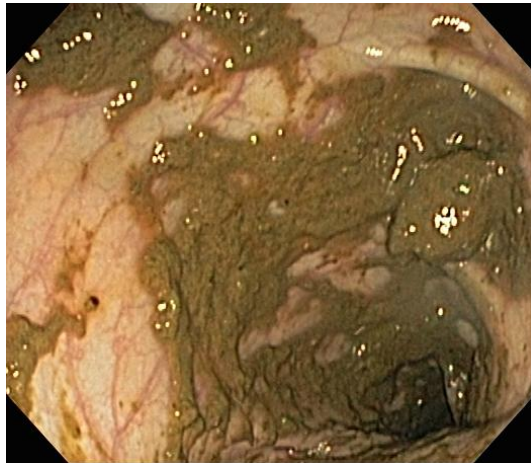


## Score of 2:

- Most of the mucosa of colon segment seen well
- Minor amount of residual staining, small fragments of stool and/or opaque liquid

## Score of 1:

- Portion of mucosa of the colon segment seen
- Other areas not well seen due to staining, residual stool and/or opaque liquid



## Score of 0:

- Unprepared colon segment with mucosa not seen due to solid stool that cannot be cleared
- Any non-visualized segment



References: Lai, et al...Jacobson. The BBPS: a valid and reliable instrument for colonoscopy-oriented research. GIE 2009;69:620-25; Calderwood, et al...Jacobson. Comprehensive validation of the BBPS. GIE 2010;72:686-

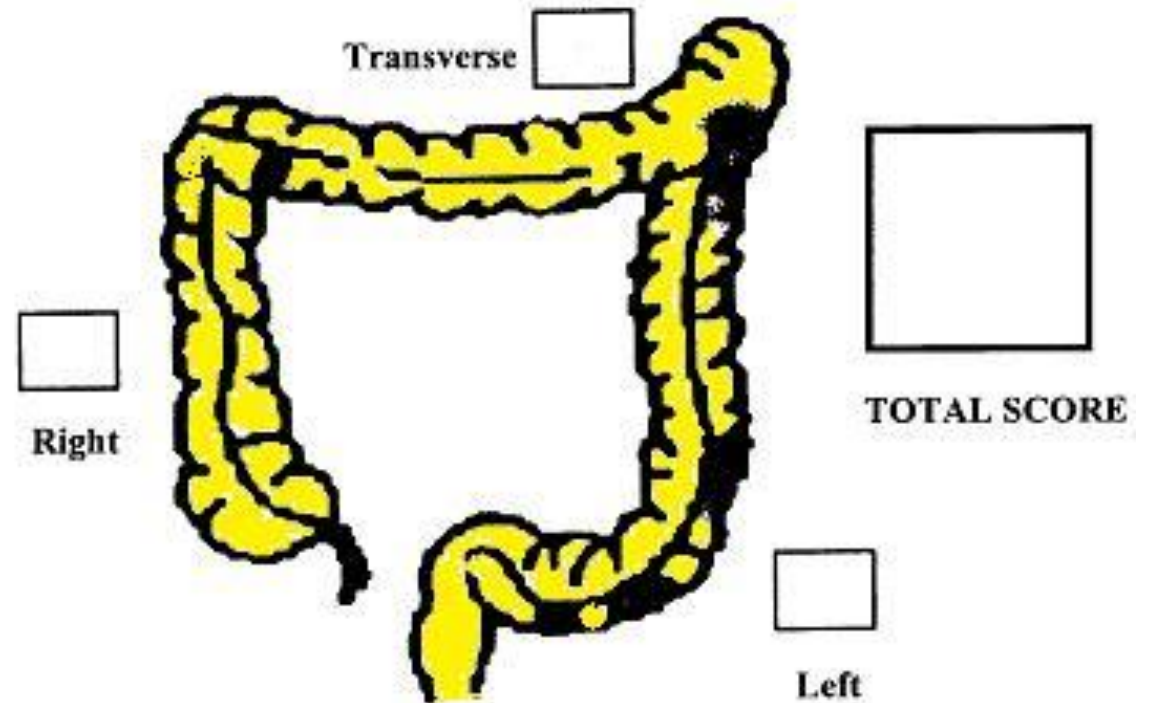
# BBPS Scoring

Segment score of 0-3 given to each of the 3 segments of the colon

Three segment scores are summed for a total 10-point BBPS score (0-9)

0 = unprepared

9 = completely clean



References: Lai, et al...Jacobson. The BBPS: a valid and reliable instrument for colonoscopy-oriented research. GIE 2009;69:620-25; Calderwood, et al...Jacobson. Comprehensive validation of the BBPS. GIE 2010;72:686-92.

# Validating the BBPS

- During 633 screening colonoscopies, the mean (SD) BBPS score was 6.0 (1.6)
- Higher BBPS scores ( $\geq 5$  vs  $< 5$ ) associated with higher polyp-detection rate (40% vs 24%,  $P < 0.02$ )
- BBPS scores inversely correlated with colonoscope insertion ( $r = -0.16$ ,  $P < 0.003$ ) and withdrawal ( $r = -0.23$ ,  $P < 0.001$ ) times

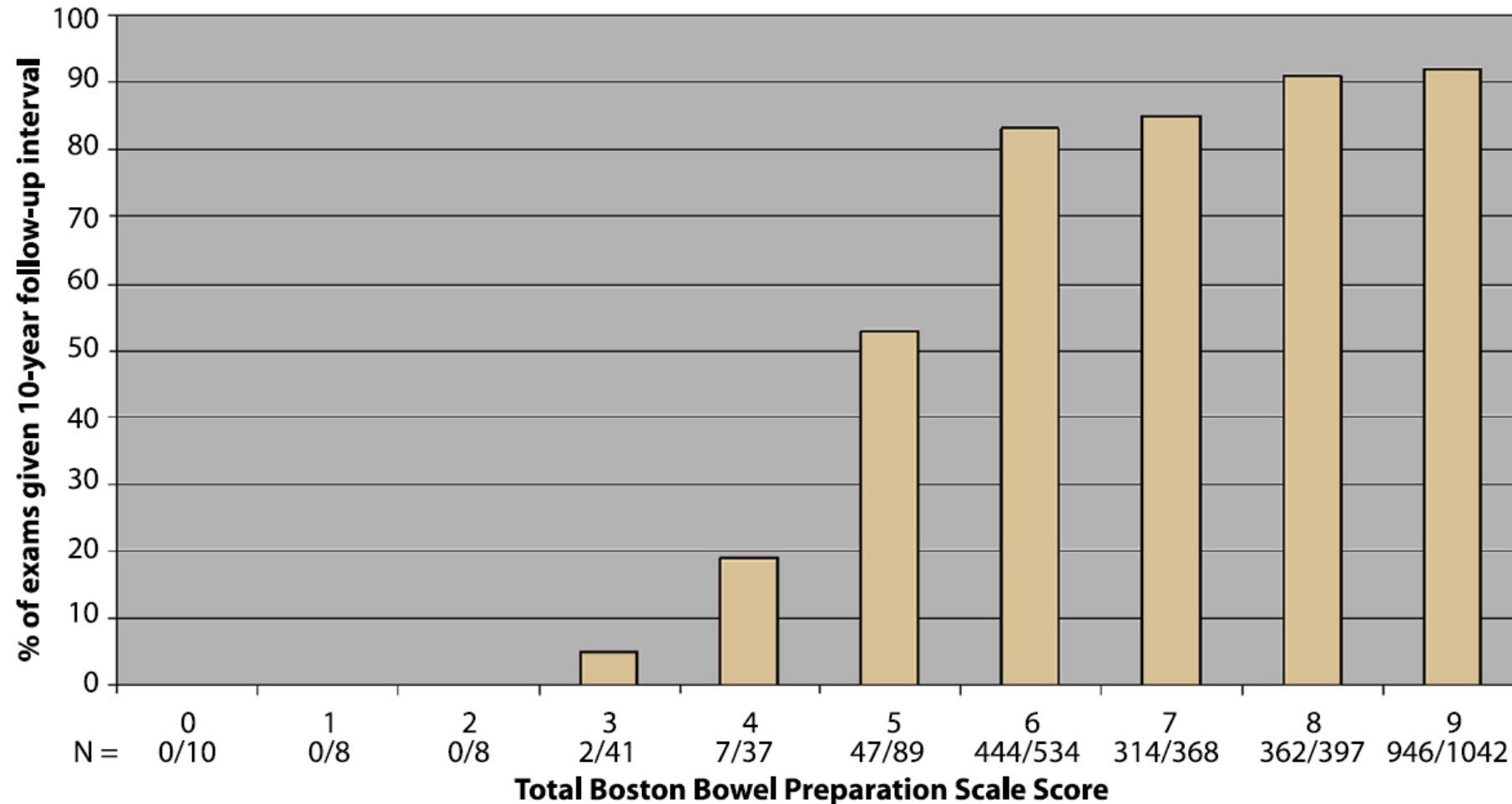


# BBPS scores to define “adequate bowel prep quality”

- CORI: Clinical Outcomes Research Initiative
  - Consortium of 61 adult GI practices (~500 physicians in 18 states)
- Specialized EHR to create endoscopy reports
- 2,516 screening colonoscopies w/o polyps by 76 endoscopists in 36 states where BBPS were recorded – what interval was recommended?



# BBPS scores to define “adequate bowel prep quality”



Reference: Calderwood, et al...Jacobson. BBPS scores provide a standardized definition of adequate for describing bowel cleanliness. GIE 2014;80:269-76.

# BBPS scores to define “adequate bowel prep quality”

**TABLE 1. Impact of Boston Bowel Preparation Scale segment scores on follow-up recommendations**

	No.	Follow-up recommended, y, median (IQR)	P value
All total scores			< .0001
All segments $\geq 2$	2295	10 (10-10)	
Any segment 1	221	5 (1-10)	
Any segment 0	49	0.25 (0-1)	
Total scores 6 and 7			< .001
All segments $\geq 2$	874	10 (10-10)	
Any segment $\leq 1$	28	5 (3-10)	

IQR, Interquartile range.



Reference: Calderwood, et al...Jacobson. BBPS scores provide a standardized definition of adequate for describing bowel cleanliness. GIE 2014;80:269-76.

## BBPS scores to define “adequate bowel prep quality”

- Clark, et al. collected data from 438 men at West Haven VA (CT) who underwent screening or surveillance colonoscopies plus repeat colonoscopy within 60 days by a different blinded endoscopist (1161 colon segments total)
- Missed polyps: detected on 2<sup>nd</sup> colonoscopy limited to segments with BBPS scores of 3
- Primary outcome: proportion of colon segments with adenomas larger than 5 mm that were missed in the first examination



# BBPS scores to define “adequate bowel prep quality”

- Hypothesis: miss rate noninferior for segments with BBPS scores of 2 vs 3 (noninferiority margin, <5%)
- Hypotheses: miss rates higher with scores of 1 vs 2 or 3

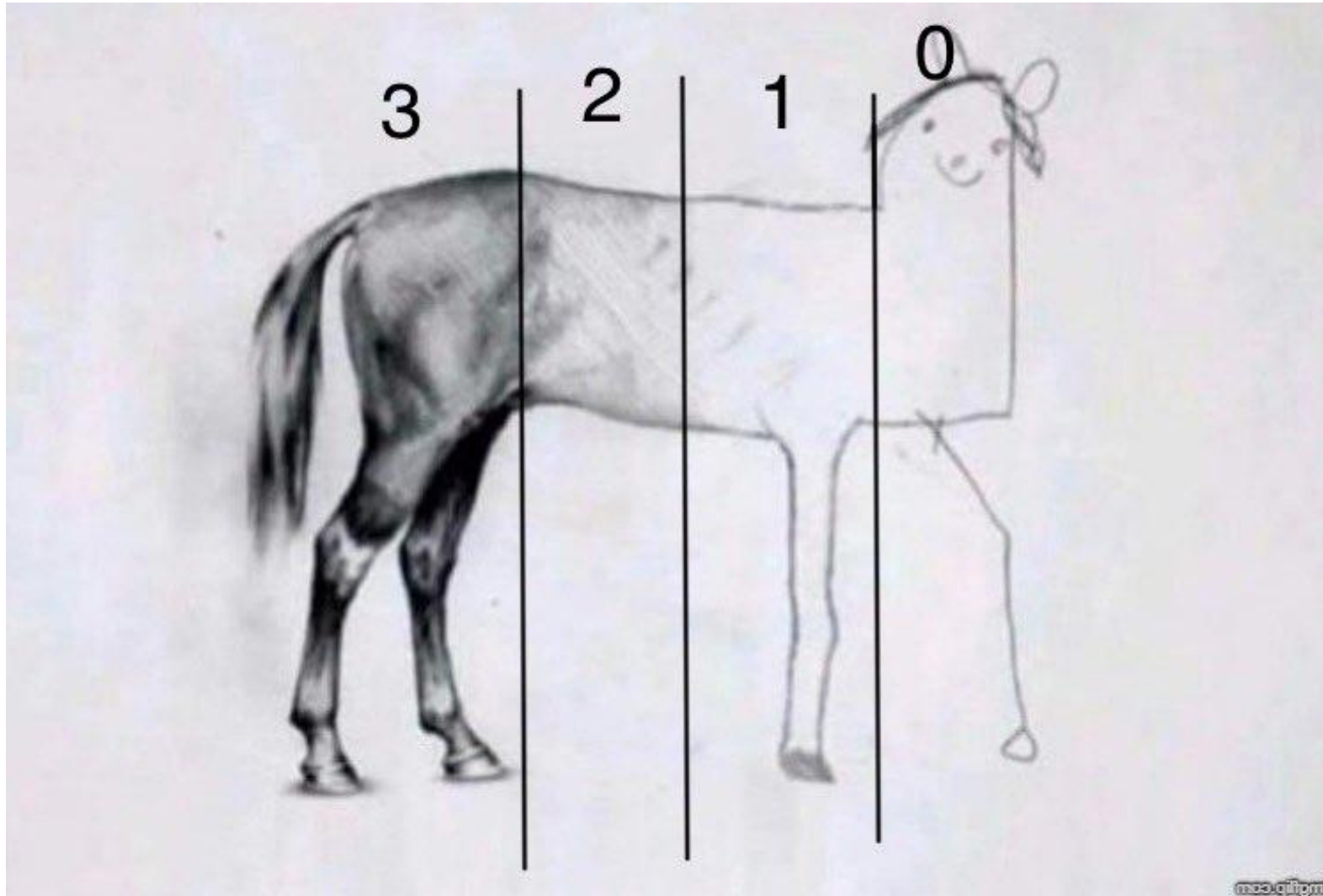


# BBPS scores to define “adequate bowel prep quality”

- Missed adenomas >5 mm was noninferior for segments with BBPS scores of 2 (5.2%) vs 3 (5.6%) (diff = -0.4%; 95% CI, -2.9% to 2.2%)
- 15.9% of BBPS 1 segments had missed adenomas larger than 5 mm compared with 5.6% or 5.2% with 3 or 2 respectively
- Conclusions: Patients with BBPS scores of 2 or 3 for all colon segments have adequate bowel preparation for the detection of adenomas larger than 5 mm and those with any segment with score of 1 have a significantly higher rate of missed adenomas larger than 5 mm



# To summarize: the BBPS in one picture



# A Cautionary Tale... Maybe BBPS 9 is too clean?

- Cross-sectional study with over 9,000 colonoscopies at 42 sites and 104 endoscopists
- Higher polyp and advanced adenoma detection with BBPS 6, 7 and 8 compared to 9
- The PDR associated with total BBPS scores of 6-8 were higher than those associated with a BBPS score of 9
  - BMC: BBPS 6, 51%; BBPS 7, 53%; BBPS 8, 52% vs BBPS 9, 46%;  $P < 0.002$
  - CORI: BBPS 6, 51%; BBPS 7, 48%; BBPS 8, 45% vs BBPS 9, 40%;  $P < 0.001$



# A Cautionary Tale... Maybe BBPS 9 is too clean?

- This trend persisted after we adjusted for age, sex, and race and/or ethnicity
- Observed for ADR and advanced ADR
- PDR was higher among “good” compared with “excellent” bowel preparation quality:
  - BMC: OR 1.3; 95% CI, 1.0-1.5
  - CORI: OR 4.7; 95% CI, 3.1-7.1



## A Cautionary Tale... Maybe BBPS 9 is too clean?

- Overconfidence?
- Too little time inspecting (too much time washing)?
- Mucus cap 'chromoendoscopy'?



## “Adequate for indication” – non screening/surveillance



- Preparation quality description should communicate this distinction to ensure appropriate screening or surveillance intervals are followed.

# Bowel preparation adequacy rate as a quality metric

- USMSTF recommends tracking the rate of adequate bowel preparations at the level of **individual endoscopists** and at the level of the **endoscopy unit**

Both rates should be >90%



# What if canceled for PRESUMED inadequate prep quality?

**Key Concept: include when calculating both endoscopy unit and endoscopist-level bowel preparation adequacy rates**



# Why measure provider-level rates of inadequate bowel prep?

**Key Concept:** Significant endoscopist variability in adequacy rates in a practice with a shared preparation processes suggests variability in cleaning/washing efforts or assessment of adequacy



## Key takeaways for those at average risk for inadequate prep quality

- Dietary changes can be liberalized
  - Limited to day-prior
  - Low residue/full liquids for breakfast and lunch
- 2L prep regimens can be used in a split-dose fashion
- Same day preps can be used for afternoon colonoscopies
- Consider oral simethicone as an adjunct



## Key takeaways for those at **increased** risk for inadequate prep quality

- Dietary changes should start 3 or 2 days prior with limiting vegetables and legumes and then CLD day prior
- Large volume prep regimens should be used in a split-dose fashion
- Consider motility agents as an adjunct





Become A Member. Get The Paper.

America's Finest News Source

Friday, April 11, 2025 42°

News Local Politics Entertainment Sports Opinion More ▾

Share



Local

## Mom Won't Stop Talking About How Doctor Praised Her Colonoscopy Preparation



# Thank you

Questions?

[bcjacobson@mgh.harvard.edu](mailto:bcjacobson@mgh.harvard.edu)

