AGEC & DFPM Webinar

12/01/2021

Constipation in Older Adults

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Disclosures

- No Disclosures

Outline

Definitions	Epidemiology	Etiology	Pathophysiology	Evaluation	Management
And if time permits…	Part II	CRC Screening in Older Adults	Review USPSTF Guidelines	Modelling in Older Adults	Questions

Definition

- Not well defined
- Means different things to different people
- Healthcare Providers
  - Stool frequency less than 3 BMs per week
- Patients
  - Difficult defecation
    - Straining
    - Hard stool
    - Feeling of incomplete evacuation
    - Non-productive urge
- Need for uniform definition – Rome criteria

Rome III criteria

- At least three months
- (1)Two or more of the following
  - Straining during ≥25% of defecations
  - Lumpy or hard stools in ≥25% of defecations
  - Sensation of incomplete evacuation for ≥25% of defecations
  - Sensation of anorectal obstruction for ≥25% of defecations
  - Manual maneuvers to facilitate ≥25% of defecations
  - Fewer than 3 defecations per week
- (2) Loose Stools are rarely present without laxative use
- (3) Insufficient criteria for IBS

Gastroenterology. 2006;130(5):1480

Epidemiology

- Prevalence of 12 – 19% in most studies
- Prevalence increases with age
- More common in women, non-whites and age >60yrs
- More common in patients with
  - Sedentary lifestyle
  - Low income
  - Poor education
  - Decreased caloric intake

Am J Gastroenterol. 2011;106(9):1582
Am J Gastroenterol. 2004;99(4):750

Effect on Quality of Life

- Constipation associated with lower Health-Related QOL
- Improvement in HR-QOL with treatment of constipation
- Treatment associated with
  - Fewer urinary symptoms
  - Better sexual function
  - Improved mood and depression
- Cost
  - Ranked among top 5 diagnoses for GI outpatient visits
  - >821 million dollars spent on over-the-counter laxatives in 2000

Gastroenterol Clin North Am. 2007;36(3):687,711; *J Gerontol*. 1992;47(4):M116–M121; *Scand J Gastroenterol*. 1997;32(11):1083–1089; *Gerontology*. 200;47(2):72–76.

Mechanism of Defecation

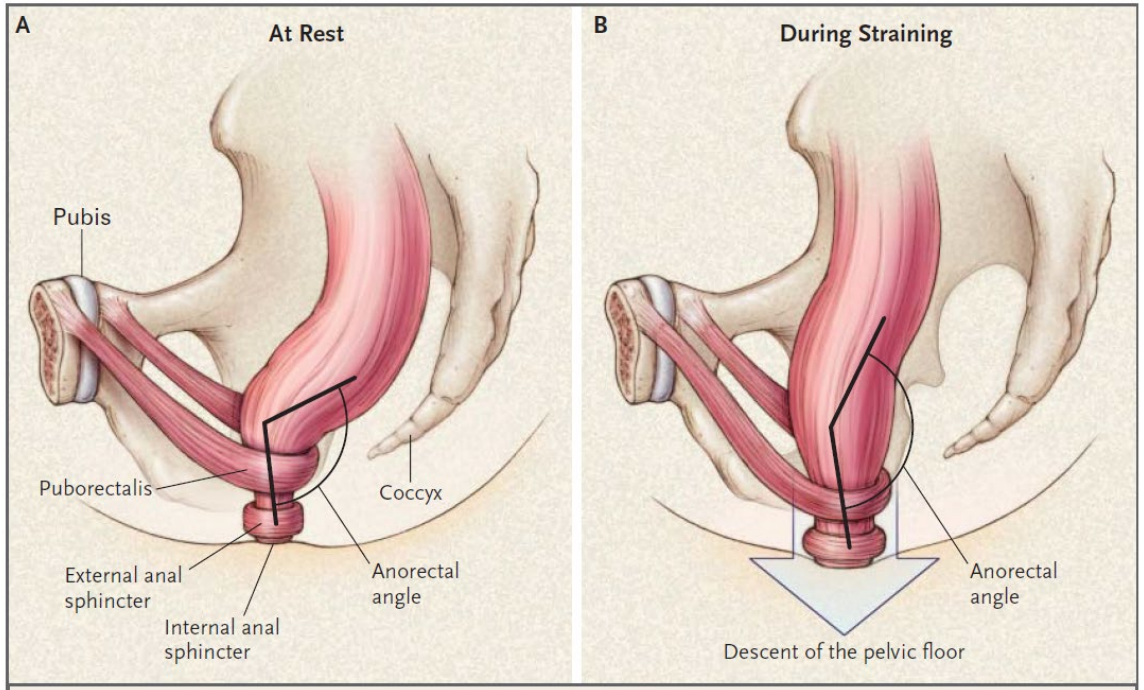
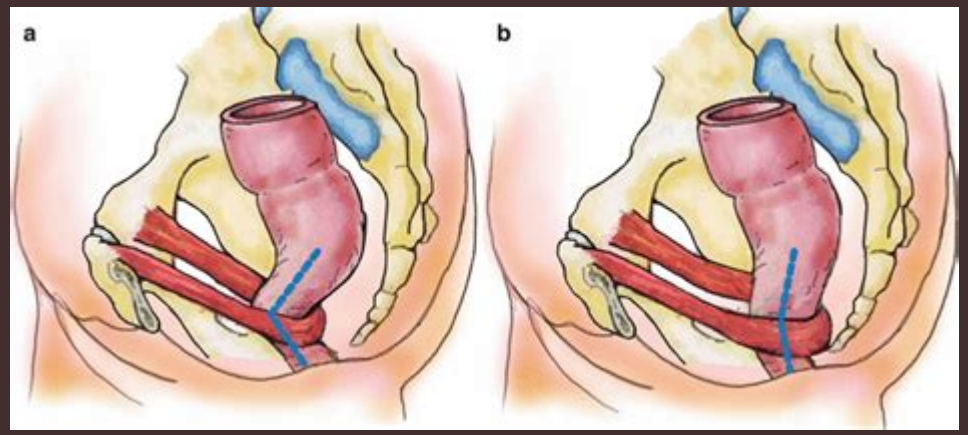
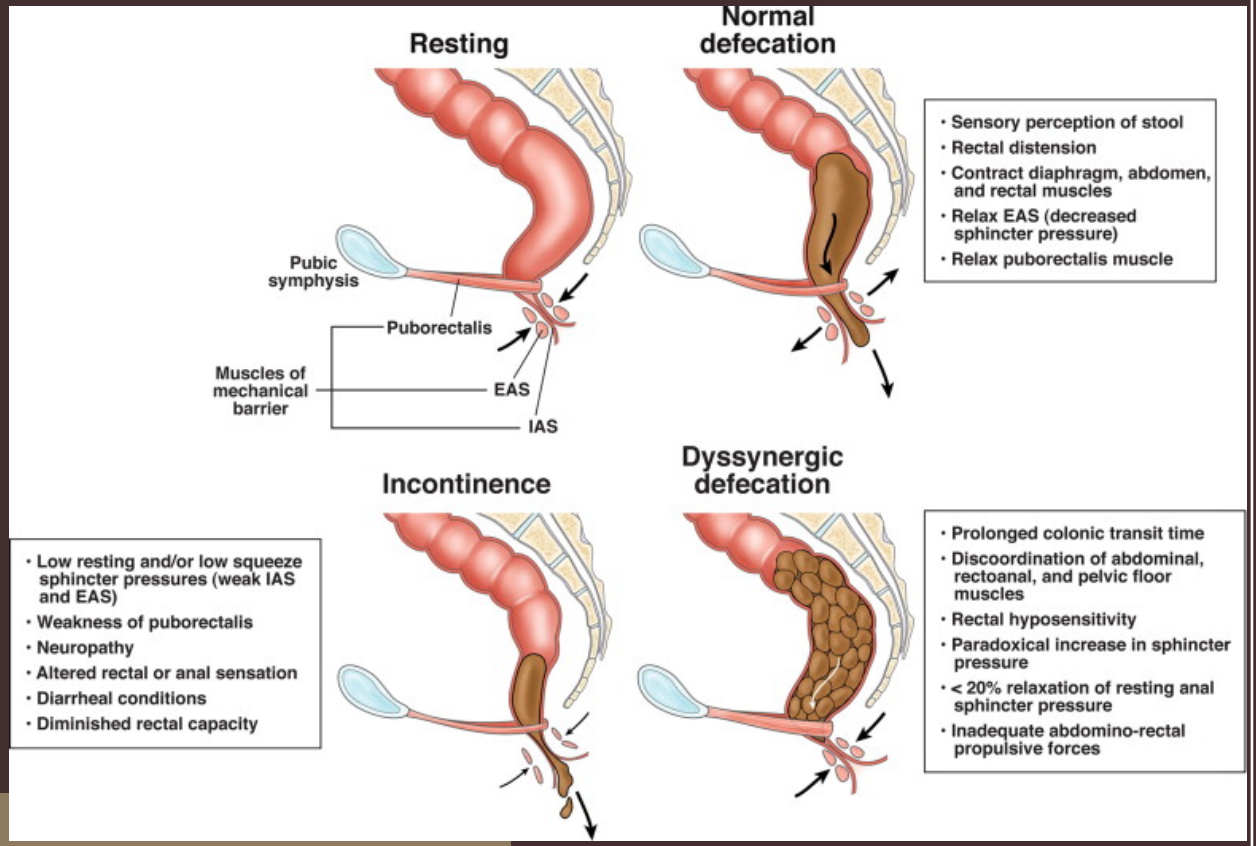


Figure 1. Sagittal View of the Anorectum at Rest (Panel A) and during Straining to Defecate (Panel B).

Continence is maintained by normal rectal sensation and tonic contraction of the internal anal sphincter and the puborectalis muscle, which wraps around the anorectum, maintaining an anorectal angle between 80 and 110 degrees. During defecation, the pelvic-floor muscles (including the puborectalis) relax, allowing the anorectal angle to straighten by at least 15 degrees, and the perineum descends by 1.0 to 3.5 cm. The external anal sphincter also relaxes and reduces pressure on the anal canal.

Mech of Defecation





Etiology

- Primary Colorectal dysfunction
  - Normal Transit
    - Slow Transit (Colonic Inertia)
    - Dyssnerygic Defecation (Outlet Delay)
    - Irritable Bowel Syndrome
- Secondary Causes
  - Endocrine/Metabolic Disorders
  - Neurologic Disorders
  - Myopathic Disorders
  - Medications
  - Obstruction
- Chronic Idiopathic Constipation (CIC)

Etiology

Table 1 Common causes of constipation in the elderly

Medications

- Analgesics (opiates, tramadol, NSAIDs)
- Tricyclic antidepressants
- Anticholinergic agents
- Calcium channel blockers
- Anti-parkinsonian drugs (dopaminergic agents)
- Antipsychotics (phenothiazine derivatives)
- Antacids (calcium and aluminum)
- Calcium supplements
- Bile acid resins
- Iron supplements
- Antihistamines
- Diuretics (furosemide, hydrochlorothiazide)
- Anticonvulsants

Endocrine and metabolic diseases

- Diabetes mellitus
- Hypothyroidism
- Hyperparathyroidism
- Chronic renal disease

Neurologic disorders

- Cerebrovascular disease and stroke
- Parkinson's disease
- Multiple sclerosis
- Autonomic neuropathy
- Spinal cord lesions
- Dementia

Myopathic disorders

- Amyloidosis
- Scleroderma

Others

- Depression
- General disability
- Poor mobility

Clinical Interventions in Aging 2010:5

Causes of chronic constipation

Neurogenic disorders
Peripheral
Diabetes mellitus
Autonomic neuropathy
Hirschsprung disease
Chagas disease
Intestinal pseudoobstruction
Central
Multiple sclerosis
Spinal cord injury
Parkinson disease
Irritable bowel syndrome
Drugs
See separate table

Non-neurogenic disorders
Hypothyroidism
Hypokalemia
Anorexia nervosa
Pregnancy
Panhypopituitarism
Systemic sclerosis
Myotonic dystrophy
Idiopathic constipation
Normal colonic transit
Slow transit constipation
Dyssynergic defecation

Pathophysiology

- Disordered transit through the colon and anorectum
- Colonic transit coordinated by enteric and autonomic nervous system
  - S2, S3 nerves control anal sphincter and anorectal function
  - Spinal cord transection or injury leads to constipation
- MS and Parkinson's – lack of physical activity or meds
- Hirschsprung's due to absence of ganglion cells of the submucosal and myenteric plexus
- Colonic transit usually normal in most patients

Slow Transit Constipation

- Aka Colonic Inertia
- Little or no increase in motor activity after meals or administration of dulcolax and a blunted response to cholinergic agents
- Decreased volume of interstitial cells of Cajal
- May be due to
  - Hypomotility
  - Retropulsion

IBS with Constipation

- Chronic or recurrent abdominal pain
- Discomfort associated with altered bowel habits
- At least 25% of stools hard or lumpy
- May co-exist with Dyssynergic Defecation or Colonic Inertia
- This is rare in the elderly

Gastroenterol Clin North Am. 2007;36(3):665–685

Obstructed Defecation Syndrome

- Excessive straining
- Incomplete rectal evacuation
- Use of enemas/ laxatives
- Vaginal-anal-perineal maneuvers
  - (needing to press in the back wall of the vagina or on the perineum to aid defecation)
- Abdominal discomfort and/or pain
- May or may not be associated with constipation

The Australian and New Zealand journal of surgery **65** (2): 87–92

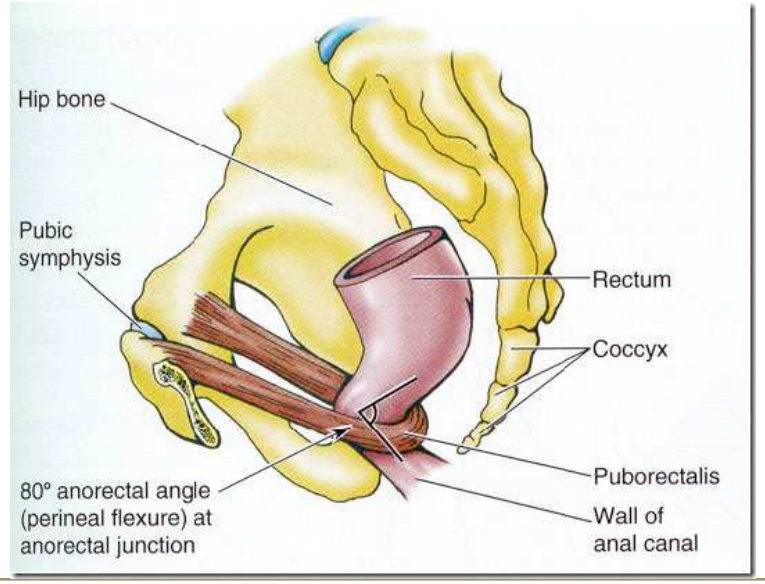
Obstructed Defecation Syndrome

- Functional Outlet Obstruction
  - Short segment Hirschsprung's, Chagas
- Inefficient relaxation of pelvic floor muscles
  - Anismus, MS, Spinal cord lesions,
- Mechanical Obstruction
  - Internal intussusception, enterocele,
- Dissipation of Force Vector
  - Rectocele, descending perineum, rectal prolapse
- Impaired Rectal Sensitivity
  - Megarectum, hyposensivity

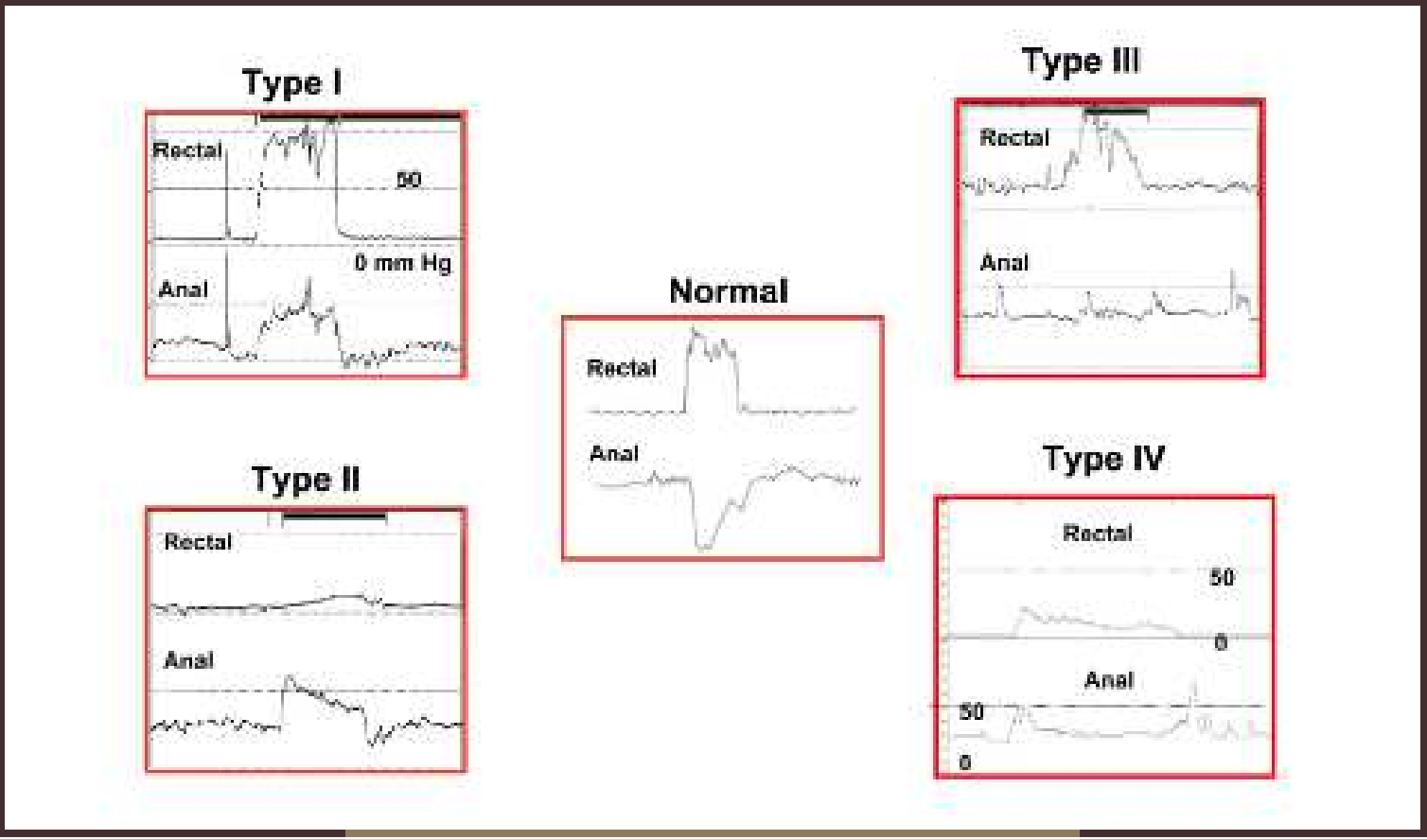
The Australian and New Zealand journal of surgery **65** (2): 87–92

Dyssynergic Defecation

- = Anismus
- Characterized by difficulty in evacuating stool
- Caused by failure of recto-anal coordination
- Puborectalis muscle and external sphincter muscle
  - Failure to relax
  - Inappropriate contraction
  - Narrowing of anorectal angle
  - Increased anal canal pressure
  - Changes in rectal sensitivity
- Results in ineffective evacuation



Dyssynergic Defecation



Gastroenterol Clin North Am. 2008 September ; 37(3): 569–586

Alarm Symptoms

Table 2.5.2. Alarm Symptoms/Signs in Patients with Chronic Constipation

1. Hematochezia
2. Family history of colon cancer
3. Family history of inflammatory bowel disease
4. Anemia
5. Positive fecal occult blood test
6. Weight loss $\geq$ 10 pounds
7. Severe, persistent constipation that is unresponsive to treatment
8. New onset constipation in elderly patient without any evidence of a possible primary cause of constipation

Evaluation

- History
  - Drug history
  - Underlying comorbidities
  - Associated symptoms
  - Dietary history
- Physical Exam
  - Rectal exam
  - Anoscopic/Proctoscopic exam
- Labs
  - CBC, BMP, TSH
- Ancillary Tests
  - Endoscopy
  - Radiography
  - Barium enema
  - Sitzmark study
  - Wireless motility capsule
  - Defecography
  - Motility Studies
  - Anorectal manometry

Evaluation - History

- Stool frequency
- Consistency
- Size
- Degree of straining during defecation
- Dietary history – fiber and fluid
- Drug history
- Underlying comorbidities
- Associated symptoms
- Laxative use
- Activity level

Evaluation – Physical Exam

- Full physical exam
- Thorough anorectal digital exam
- Anal wink reflex
- Valsalva maneuver
  - Relaxation of external anal sphincter
  - Perineal descent
- Anoscopy/Proctoscopy

Evaluation – Labs and ancillary tests

- Labs
  - CBC
  - CMP
  - Thyroid function
- Endoscopy
  - Flexible sigmoidoscopy
  - Colonoscopy
- Anorectal manometry/

Balloon expulsion test

- **Ancillary Tests**
  - Motility studies
    - Wireless motility capsule
  - **Radiologic**
    - Barium enema
    - Sitzmark study
  - **Defecography**
    - Cine defecography
    - MRI defecography

Management

- Lifestyle modification
- Diet and fiber
- Laxatives
- Other agents
- Surgery

Lifestyle Modification

- Increased fluid intake
  - At least 6-8 glasses per day
- Exercise
- Establish regular bowel routine

Diet and fiber

- Fiber increases bulk/distension
  - Distention causes stool propulsion
  - Draws in fluid to make stools soft and easy to pass
  - Increasing fluid intake essential

- 20 - 35g of fiber/day
  - Effect may take weeks
  - Adverse effects: Bloating, flatulence

Medications

Medication	Maximal Recommended Dose	Comments
Bulk laxative		Increases colonic residue, stimulating peristalsis
Psyllium (Metamucil, Perdiem, Fiberall)	Titrate up to ~20 g	Natural fiber that undergoes bacterial degradation, which may contribute to bloating and flatus; should be taken with plenty of water to avoid intestinal obstruction; allergic reactions such as anaphylaxis and asthma are rare
Methylcellulose (Citrucel)	Titrate up to ~20 g	Semisynthetic cellulose fiber that is relatively resistant to colonic bacterial degradation
Polycarbophil (Fibercon, Equalactin, Konsyl)	Titrate up to ~20 g	Synthetic fiber of polymer of acrylic acid, resistant to bacterial degradation
Osmotic laxative		Draws water into the intestines along osmotic gradient
Saline laxatives		
Magnesium hydroxide (Phillips' Milk of Magnesia)	15–30 ml once or twice a day	A small percentage of magnesium is actively absorbed in the small intestines; hypermagnesemia can occur in patients with renal failure and in children
Magnesium citrate (Evac-Q-Mag)	150–300 ml as needed	
Sodium phosphate (Fleet Enema, Fleet Phospho-Soda, Visicol)	10–25 ml with 12 oz (360 ml) of water as needed	Hyperphosphatemia can occur in patients with renal insufficiency; commonly used for bowel preparation before colonoscopy
Poorly absorbed sugar		
Lactulose (Cephulac, Chronulac, Duphalac)	15–30 ml once or twice a day	Synthetic disaccharide consisting of galactose and fructose linked by bond resistant to disaccharidases; not absorbed by the small intestine; undergoes bacterial fermentation in the colon with formation of short-chain fatty acids; gas and bloating are common side effects
Sugar alcohols		
Sorbitol (Cystosol)	15–30 ml once or twice a day	Poorly absorbed by intestine; undergoes bacterial fermentation
Mannitol		
Polyethylene glycol and electrolytes (Colyte, GoLYTELY, NuLYTELY)	17–36 g once or twice a day	Organic polymers that are poorly absorbed and not metabolized by colonic bacteria and may therefore cause less bloating and cramping than other poorly absorbed sugars[40]; can be mixed with noncarbonated beverages
Polyethylene glycol 3350 (Miralax)	17–36 g once or twice a day	Does not include electrolytes and is packaged for more regular use

Medications

Stimulant laxative		Stimulates intestinal motility or secretion
Anthraquinones Cascara sagrada (Colamin, Sagrada-lax) Senna (Senokot, Ex-Lax)	 325 mg (or 5 ml) daily 187 mg daily	Converted by colonic bacteria to their active form; may cause melanosis coli, a benign condition that is usually reversible within 12 months after the cessation of laxative use; no definitive association between anthraquinones and colon cancer or myenteric nerve damage has been established
Castor oil (Purge, Neoloid, Emulsoil)	15–30 ml daily	Hydrolyzed by lipase in the small intestine to ricinoleic acid, which inhibits intestinal water absorption, increases mucosal permeability, and stimulates motor function through the release of neurotransmitters from mucosal enterochromaffin cells; cramping and severe diarrhea are common
Diphenylmethane derivatives Bisacodyl (Dulcolax, Correctol) Sodium picosulfate (Lubrilax, Sur-lax)	 5–10 mg every night 5–15 mg every night	 Hydrolyzed by endogenous esterases; stimulates secretion and motility of small intestine and colon Hydrolized to its active form by colonic bacterial enzymes; affects only the colon
Stool softener Docusate sodium (Colace, Regulax SS, Surfak)	 100 mg twice a day	 Ionic detergents soften stool by allowing water to interact more effectively with solid stool; modest fluid secretion; efficacy for treatment is not well established
Mineral oil (Fleet Mineral Oil)	5–15 ml orally every night	An emollient providing lubrication for the passage of stool; long-term use can cause malabsorption of fat-soluble vitamins and anal seepage; lipoid pneumonia can occur in patients predisposed to aspiration of liquids

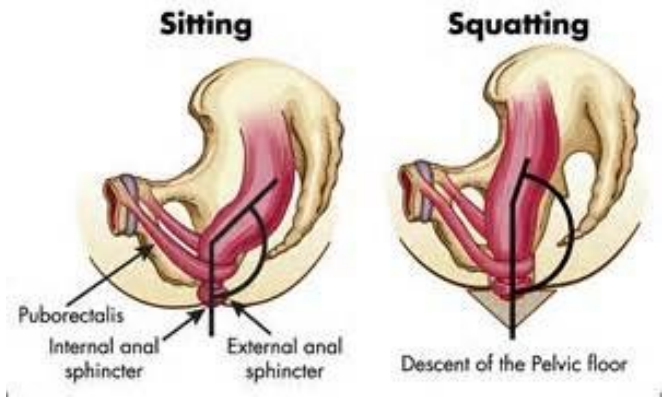
Medications

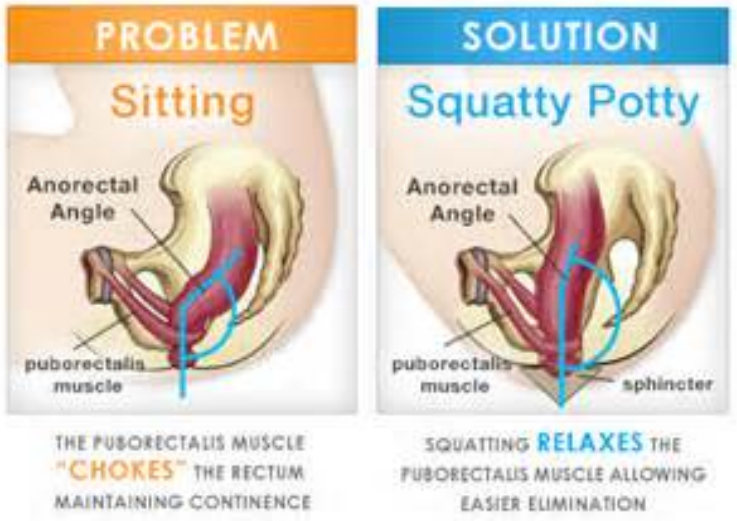
Medication	Maximal Recommended Dose	Comments
Rectal enema or suppository		
Phosphate enema (Fleet Enema)	120 ml daily	Initiates evacuation by distending the rectum, softening hard stool, and topically stimulating the colonic muscle to contract[41]; hyperphosphatemia and other electrolyte abnormalities can occur if the enema is retained
Mineral-oil–retention enema (Fleet Mineral Oil Enema)	100 ml daily	
Tap-water enema	500 ml daily	
Soapsuds enema	1500 ml daily	
Glycerin bisacodyl suppository	10 mg daily	
Cholinergic agent		
Bethanechol (Urecholine)	10 mg daily	Appears to be beneficial in patients with constipation due to tricyclic antidepressants[42]; intravenous neostigmine, a cholinesterase inhibitor, is effective in decompressing the colon in patients with acute colonic pseudo-obstruction[43] but has not been evaluated in patients with chronic constipation
Miscellaneous		
Colchicine (Colsalide)	0.6 mg 3 times a day	Data for both medications are limited,[44,45] and side effects are common; therefore, they are not recommended
Misoprostol (Cytotec)	600–2400 μg daily	
Prokinetic agent		
5-HT_4–receptor agonists*		
Cisapride (Propulsid)†	10–20 mg 4 times a day	Stimulation of 5-HT_4 receptors in the intestines induces peristalsis[46]; cisapride, a substituted benzamide, had variable results in treating constipation[47]; potentially lethal cardiac dysrhythmias led to its removal from the commercial market; tegaserod, a partial 5-HT_4 agonist, is an aminoguanidine indole derivative of serotonin that reduces pain and bloating, increases the frequency of bowel movements, and improves their consistency in women with constipation-predominant irritable bowel syndrome[48]
Tegaserod (Zelnorm)	6 mg twice a day	

Biofeedback

- Uses visual and auditory feedback on functioning of anal sphincter and pelvic floor muscles
- Trains patients to relax pelvic floor muscles
- Coordination of pelvic floor relaxation with abdominal maneuvers
- Performed with anorectal electromyography or manometry catheter or “fecom”
- Overall success rate of ~70%
- Benefits long-lasting

Squatty Potty





Surgery

- Indications
  - Tumors
  - Strictures
  - *Colonic inertia
  - Obstructed defecation
    - Rectocele repair
    - Pelvic floor repair

- Colonic inertia
  - Total colectomy/ileoproctostomy
  - Only as last resort
  - Ensure there is no total gut inertia

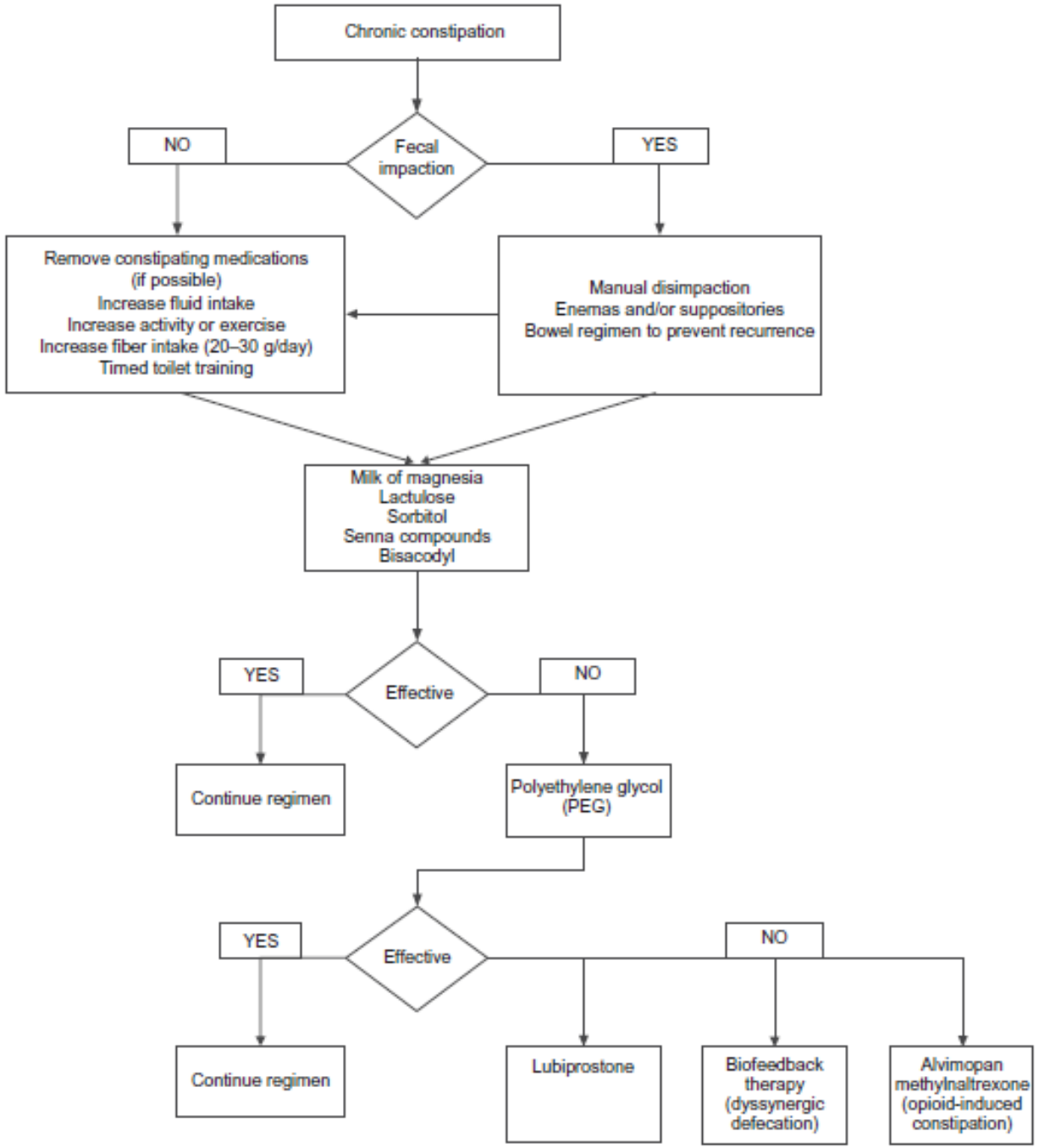
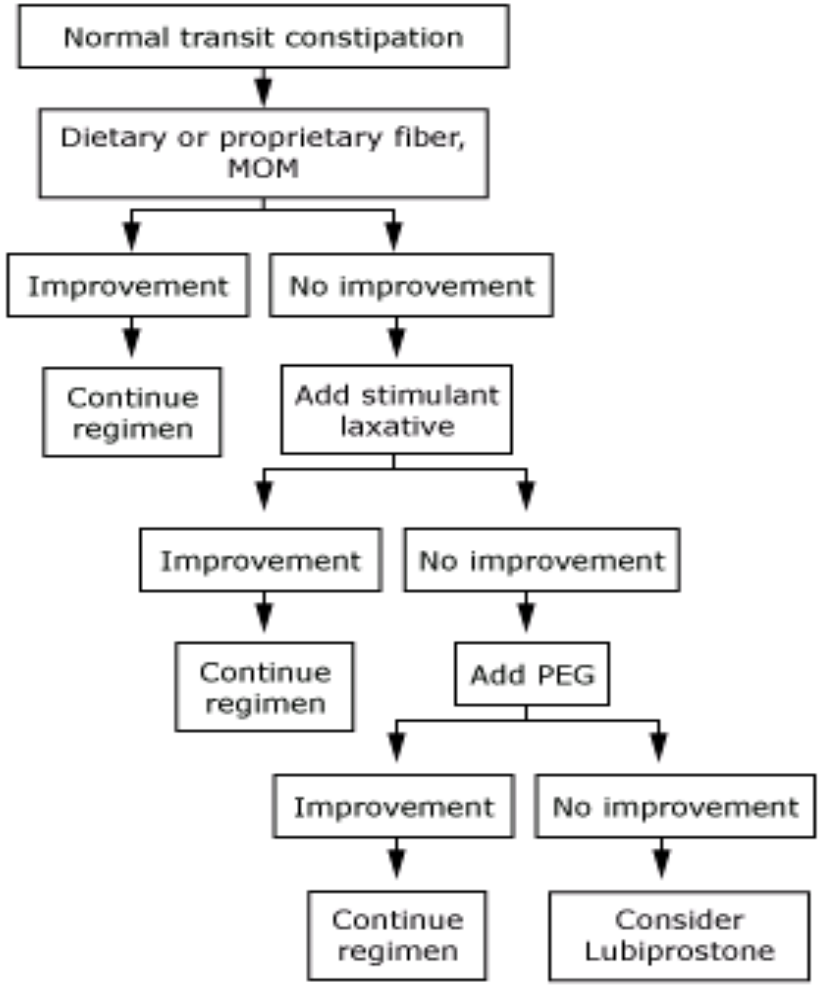


Figure 1 Treatment algorithm for the management of chronic constipation in the elderly.

Treatment algorithm for normal transit constipation



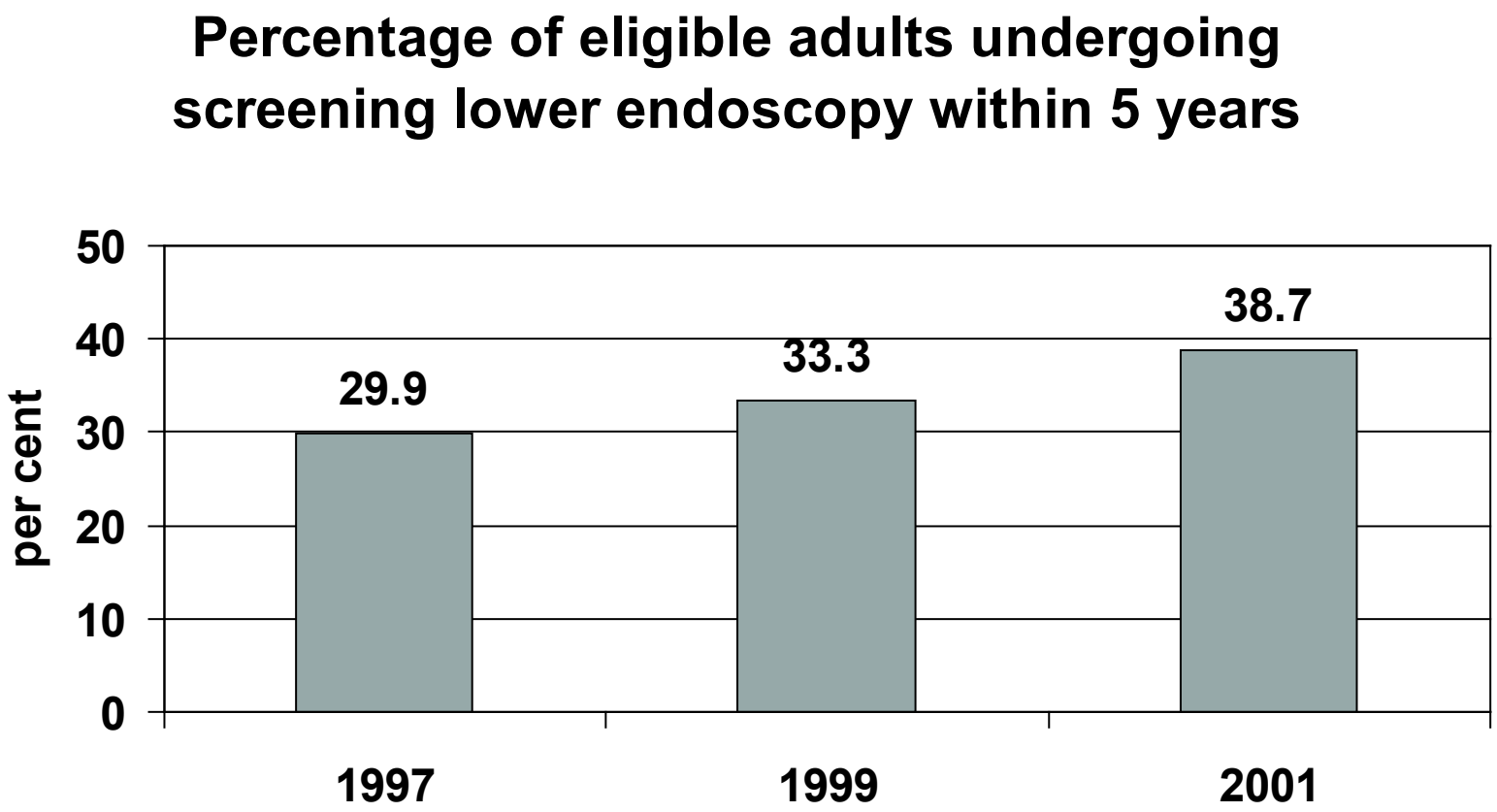
MOM: milk of magnesia; PEG: polyethylene glycol.
Courtesy of Arnold Wald, MD.

Part II

COLORECTAL CANCER SCREENING IN OLDER ADULTS

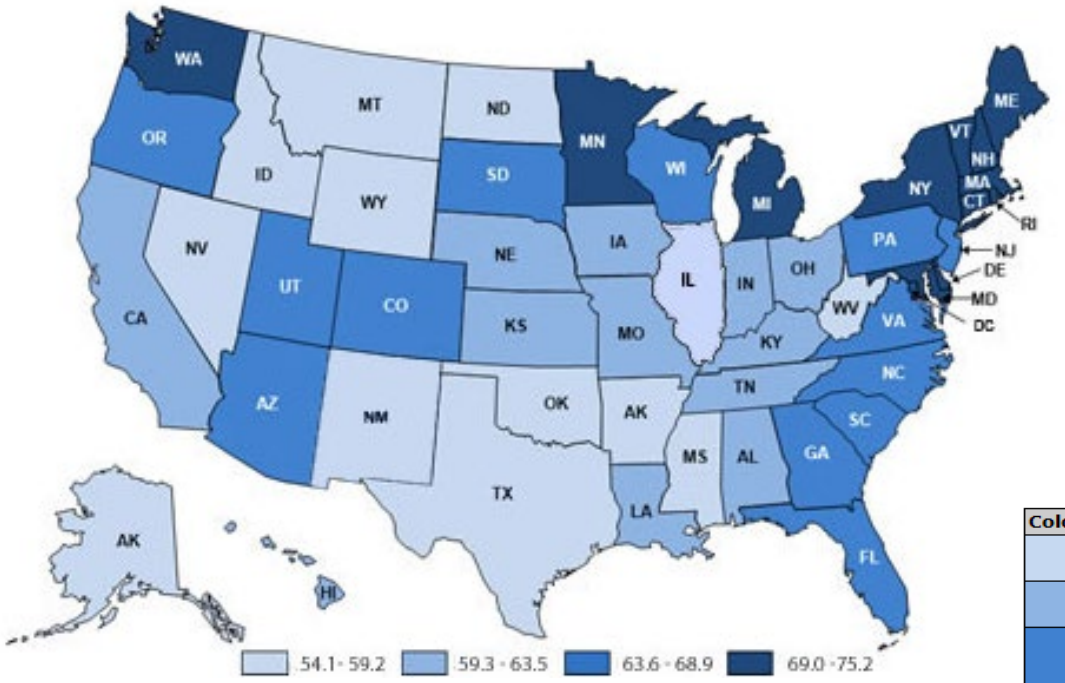
Screening Rates

CDC Behavioral Risk Factor Surveillance System



MMWR Morb Mortal Wkly Rep 2003 Mar 14;52(10):193-6.

Screening rates



Color on Map	Interval	States
	54.1 to 59.2	Alaska, Arkansas, Idaho, Illinois, Mississippi, Montana, Nevada, New Mexico, North Dakota, Oklahoma, Texas, West Virginia, and Wyoming
	59.3 to 63.5	Alabama, California, Hawaii, Indiana, Iowa, Kansas, Kentucky, Louisiana, Missouri, Nebraska, Ohio, and Tennessee
	63.6 to 68.9	Arizona, Colorado, Florida, Georgia, New Jersey, North Carolina, Oregon, Pennsylvania, South Carolina, South Dakota, Utah, Virginia, and Wisconsin
	69.0 to 75.2	Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Rhode Island, Vermont, and Washington

*"Up-to-date" means having a fecal occult blood test (FOBT) within one year, a sigmoidoscopy within five years and a FOBT within three years, or a colonoscopy within 10 years.
Source: Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2010.

Agencies

- American Cancer Society
- US Multi-Society Task Force on CRC
  - American Gastroenterological Association (AGA)
  - American Society for Gastrointestinal Endoscopy (ASGE)
  - American College of Gastroenterology (ACG)
- American College of Radiology
- US Preventive Services Task Force

Screening Tests

- Tests that detect adenomatous polyps and cancers
  - Flexible Sigmoidoscopy
  - Double Contrast Enema
  - Colonoscopy
  - CT Colonography

- Tests that primarily detect cancers
  - Fecal Occult Blood Testing
  - Fecal Immunohistochemistry
  - Stool DNA

USPSTF Recommendations -2008

Population	Recommendation	Grade (What's This?)
Adults, beginning at age 50 years and continuing until age 75 years	The USPSTF recommends screening for colorectal cancer using fecal occult blood testing, sigmoidoscopy, or colonoscopy in adults, beginning at age 50 years and continuing until age 75 years. The risks and benefits of these screening methods vary.	A
Adults age 76 to 85 years	The USPSTF recommends against routine screening for colorectal cancer in adults 76 to 85 years of age. There may be considerations that support colorectal cancer screening in an individual patient.	C
Adults older than age 85 years	The USPSTF recommends against screening for colorectal cancer in adults older than age 85 years.	D
Computed Tomographic Colonography and Fecal DNA testing as screening modalities	The USPSTF concludes that the evidence is insufficient to assess the benefits and harms of computed tomographic colonography and fecal DNA testing as screening modalities for colorectal cancer.	I

USPSTF Recommendations-2021

Population	Recommendation	Grade
Adults aged 50 to 75 years	The USPSTF recommends screening for colorectal cancer in all adults aged 50 to 75 years. See the "Practice Considerations" section and Table 1 for details about screening strategies.	A
Adults aged 45 to 49 years	The USPSTF recommends screening for colorectal cancer in adults aged 45 to 49 years. See the "Practice Considerations" section and Table 1 for details about screening strategies.	B
Adults aged 76 to 85 years	The USPSTF recommends that clinicians selectively offer screening for colorectal cancer in adults aged 76 to 85 years. Evidence indicates that the net benefit of screening all persons in this age group is small. In determining whether this service is appropriate in individual cases, patients and clinicians should consider the patient's overall health, prior screening history, and preferences.	C

Recommendation: Colorectal Cancer: Screening | United States Preventive Services Taskforce (uspreventiveservicestaskforce.org)

Screening Intervals

Table 1. Characteristics of Recommended Colorectal Cancer Screening Strategies

Screening method[a]	Frequency[b]	Evidence of efficacy	Other considerations
Stool-based tests			
High-sensitivity gFOBT	Every year	• Evidence from RCTs that gFOBT reduces colorectal cancer mortality • High-sensitivity versions (eg, Hemoccult SENSA) have superior test performance characteristics than older tests (eg, Hemoccult II), although there is still uncertainty about the precision of test sensitivity estimates. Given this uncertainty, it is unclear whether high-sensitivity gFOBT can detect as many cases of advanced adenomas and colorectal cancer as other stool-based tests	• Harms from screening with gFOBT arise from colonoscopy to follow up abnormal gFOBT results • Requires dietary restrictions and 3 stool samples • Requires good adherence over multiple rounds of testing • Does not require bowel preparation, anesthesia or sedation, or transportation to and from the screening examination (test is performed at home)
FIT	Every year	• Evidence from 1 large cohort study that screening with FIT reduces colorectal cancer mortality • Certain types of FIT have improved accuracy compared to gFOBT and HSgFOBT (20 µg hemoglobin per gram of feces threshold was used in the CISNET modeling)	• Harms from screening with FIT arise from colonoscopy to follow up abnormal FIT results • Can be done with a single stool sample • Requires good adherence over multiple rounds of testing • Does not require bowel preparation, anesthesia or sedation, or transportation to and from the screening examination (test is performed at home)
sDNA-FIT	Every 1 to 3[c] y	• Improved sensitivity compared with FIT per 1-time application of screening test • Specificity is lower than that of FIT, resulting in more false-positive results, more follow-up colonoscopies, and more associated adverse events per sDNA-FIT screening test compared with per FIT test • Modeling suggests that screening every 3 y does not provide a favorable (ie, efficient) balance of benefits and harms compared with other stool-based screening options (ie, annual FIT or sDNA-FIT every 1 or 2 y) • Insufficient evidence about appropriate longitudinal follow-up of abnormal findings after a negative follow-up colonoscopy • No direct evidence evaluating the effect of sDNA-FIT on colorectal cancer mortality	• Harms from screening with sDNA-FIT arise from colonoscopy to follow up abnormal sDNA-FIT results • Can be done with a single stool sample but involves collecting an entire bowel movement • Requires good adherence over multiple rounds of testing • Does not require bowel preparation, anesthesia or sedation, or transportation to and from the screening examination (test is performed at home)
Direct visualization tests			
Colonoscopy	Every 10 y	• Evidence from cohort studies that colonoscopy reduces colorectal cancer mortality • Harms from colonoscopy include bleeding and perforation, which both increase with age	• Screening and follow-up of positive results can be performed during the same examination • Requires less frequent screening • Requires bowel preparation, anesthesia or sedation, and transportation to and from the screening examination
CT colonography	Every 5 y	• Evidence available that CT colonography has reasonable accuracy to detect colorectal cancer and adenomas • No direct evidence evaluating effect of CT colonography on colorectal cancer mortality • Limited evidence about the potential benefits or harms of possible evaluation and treatment of incidental extracolonic findings, which are common. Extracolonic findings detected in 1.3% to 11.4% of examinations; <3% required medical or surgical treatment	• Additional harms from screening with CT colonography arise from colonoscopy to follow up abnormal CT colonography results • Requires bowel preparation • Does not require anesthesia or sedation or transportation to and from the screening examination
Flexible sigmoidoscopy	Every 5 y	• Evidence from RCTs that flexible sigmoidoscopy reduces colorectal cancer mortality • Risk of bleeding and perforation but less than risk with colonoscopy • Modeling suggests that it provides fewer life-years gained alone than when combined with FIT or in comparison to other strategies	• Additional harms may arise from colonoscopy to follow up abnormal flexible sigmoidoscopy results • Test availability has declined in the US but may be available in some communities where colonoscopy is less available
Flexible sigmoidoscopy with FIT	Flexible sigmoidoscopy every 10 y plus FIT every year	• Evidence from RCTs that flexible sigmoidoscopy + FIT reduces colorectal cancer mortality • Modeling suggests combination testing provides benefits similar to those of colonoscopy, with fewer complications • Risk of bleeding and perforation from flexible sigmoidoscopy but less than risk with colonoscopy	• Additional potential harms from colonoscopy to follow up abnormal flexible sigmoidoscopy or FIT results • Flexible sigmoidoscopy availability has declined in the US but may be available in some communities where colonoscopy is less available • Screening with FIT requires good adherence over multiple rounds of testing

Abbreviations: CISNET, Cancer Intervention and Surveillance Modeling Network; CT, computed tomography; FIT, fecal immunochemical test; gFOBT, guaiac fecal occult blood test; RCT, randomized clinical trial; sDNA-FIT, stool DNA test with fecal immunochemical test.

[a] To achieve the benefits of screening, abnormal results from stool-based tests, CT colonography, and flexible sigmoidoscopy should be followed up with colonoscopy.

[b] Applies to persons with negative findings (including hyperplastic polyps) and is not intended for persons in surveillance programs. Evidence of efficacy is not informative of screening frequency, with the exception of gFOBT and flexible sigmoidoscopy alone.

[c] As stated by the manufacturer.

Recommended Screening Intervals

- High-sensitivity gFOBT or FIT every year
- sDNA-FIT (Cologuard) every 1 to 3 years
- CT colonography every 5 years
- Flexible sigmoidoscopy every 5 years
- Flexible sigmoidoscopy every 10 years + FIT every year
- Colonoscopy screening every 10 years

JAMA May 18, 2021 Volume 325, Number 19

Harms of Screening and Early Intervention

- The harms of screening for colorectal cancer in adults ages 50 to 75 years are small.
- The rate of serious adverse events from colorectal cancer screening increases with age.
- Thus, the harms of screening for colorectal cancer in adults age 76 years and older are small to moderate.

http://www.uspreventiveservicestaskforce.org/Page/Document/draft-recommendation-statement38/colorectal-cancer-screening2

Magnitude of Net Benefit

- The USPSTF concludes **with high certainty** that screening for colorectal cancer in adults aged 50 to 75 years has **substantial net benefit**
- The USPSTF concludes with **moderate certainty** that screening for colorectal cancer in adults aged 45 to 49 years has **moderate net benefit**
- The USPSTF concludes with **moderate certainty** that screening for colorectal cancer in adults aged 76 to 85 years who have been previously screened has **small net benefit**.
- Adults who have never been screened for colorectal cancer are more likely to benefit.

Older Adults

- **For all screening modalities, starting screening at age 50 resulted in a balance between life-years gained and colonoscopy risks that was more favorable than commencing screening earlier.**
- **For individuals previously screened the gain in life-years associated with extending screening from age 75 years to 85 years was small in comparison to the risks of screening people in this decade.**
- **For previously unscreened, decisions about first-time screening in this age group should be made in the context of the individual's health status and competing risks, given that the benefit of screening is not seen in trials until at least 7 years later.**
- **For persons older than 85 years, competing causes of mortality preclude a mortality benefit that outweighs the harms.**

Whitlock E, Lin JS, Liles E, Beil TL, Fu R. Screening for colorectal cancer: a targeted systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med* 2008;149:638-58

ORIGINAL RESEARCH | Annals of Internal Medicine

Should Colorectal Cancer Screening Be Considered in Elderly Persons Without Previous Screening?

A Cost-Effectiveness Analysis

Frank van Hees, MSc; J. Dik F. Habbema, PhD; Reinier G. Meester, MSc; Iris Lansdorp-Vogelaar, PhD; Marjolein van Ballegooijen, MD, PhD*; and Ann G. Zauber, PhD*

- Using MiScan-Colon (Microsimulation Screening Analysis-Colon)
- Evaluated the effectiveness and costs of
  - Colonoscopy
  - Flexible sigmoidoscopy
  - FIT
- Persons older than 75 years without prior screening

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Should Colorectal Cancer Screening Be Considered in Elderly Persons Without Previous Screening?

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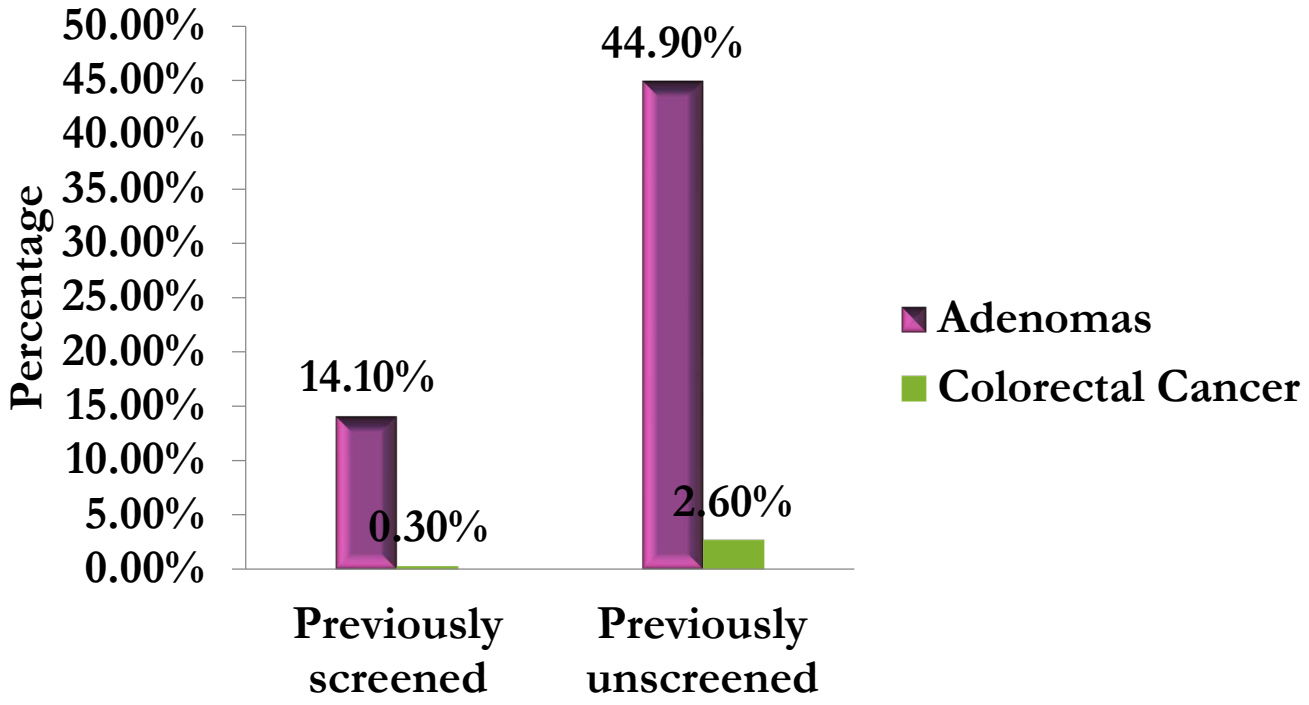
- Objectives:
  - to determine what ages CRC screening should be considered in unscreened elderly persons (76-90yrs)
  - to determine which test is indicated at each age
- Intervention: One-time Colonoscopy, FSIG, FIT
- Outcomes: QALYs gained, Costs, Cost/QALY
- 3 Cohorts based on Comorbidity
  - No, Moderate and Severe Comorbidity

Results

- CRC rate 10X more in previously unscreened
- Adenoma rate 3X more
- Life expectancy decreased rapidly with age >80
  - 9.7(females) 8.2(males) aged 80yrs
  - 4.9 (females) 4.1 (males) aged 90yrs

Adenoma/Cancer Rate



	Adenomas	Colorectal Cancer
Previously screened	14.1%	0.3%
Previously unscreened	44.9%	2.6%

Table 2. **Effectiveness of 1-Time Colonoscopy, Sigmoidoscopy, and FIT Screening in Elderly Persons Without Previous Screening With No Comorbid Conditions***

Screening Strategy, by Age	CRC Cases Prevented, *n*†	CRC Deaths Prevented, *n*	LYs Gained, *n*‡	Effect on Quality of Life, *QALYs*§					QALYs Gained, *n*‖
				Screening Tests	Diagnostic Colonoscopies	Surveillance Colonoscopies	Complications	LYs With CRC Care¶	
1-time colonoscopy									
76 y**	15.4	11.9	68.5	−5.5	0	−3.2	−0.6	+8.1	67.2
80 y	10.4	10.7	52.9	−5.5	0	−2.8	−0.7	+3.0	46.9
85 y	0.8	7.4	28.3	−5.5	0	−2.0	−0.9	−2.9	17.1
90 y	−7.7	4.5	12.3	−5.5	0	−1.4	−1.1	−6.1	−1.7
1-time sigmoidoscopy									
76 y	12.0	9.4	54.6	−2.7	−1.6	−2.2	−0.4	+6.2	53.9
80 y	8.2	8.7	43.1	−2.7	−1.7	−2.0	−0.5	+2.3	38.6
85 y	0.6	6.0	23.1	−2.7	−1.7	−1.4	−0.6	−2.3	14.3
90 y	−6.2	3.7	9.9	−2.7	−1.6	−1.0	−0.7	−4.9	−1.0
1-time FIT									
76 y	1.7	4.1	25.9	0	−0.4	−0.5	−0.1	−0.6	24.2
80 y	0.2	4.2	22.5	0	−0.4	−0.4	−0.1	−2.2	19.2
85 y	−2.8	3.4	13.8	0	−0.5	−0.4	−0.1	−3.8	9.0
90 y	−6.2	2.3	6.6	0	−0.5	−0.3	−0.2	−4.7	0.9

CRC = colorectal cancer; FIT = fecal immunochemical test; LY = life-year; QALY = quality-adjusted life-year.

* Results are based on a comparison with no screening, reported per 1000 persons, and discounted by 3% per year. Persons are classified as having no comorbid conditions if none of the following conditions are present: an ulcer, a history of acute myocardial infarction, rheumatologic disease, peripheral vascular disease, diabetes, paralysis, cerebrovascular disease, chronic obstructive pulmonary disease, congestive heart failure, moderate or severe liver disease, chronic renal failure, dementia, cirrhosis and chronic hepatitis, or AIDS.

† Negative values occur when the number of CRC cases prevented by screening is exceeded by the number of CRC cases overdiagnosed by screening.

‡ The effect of screening on quantity of life.

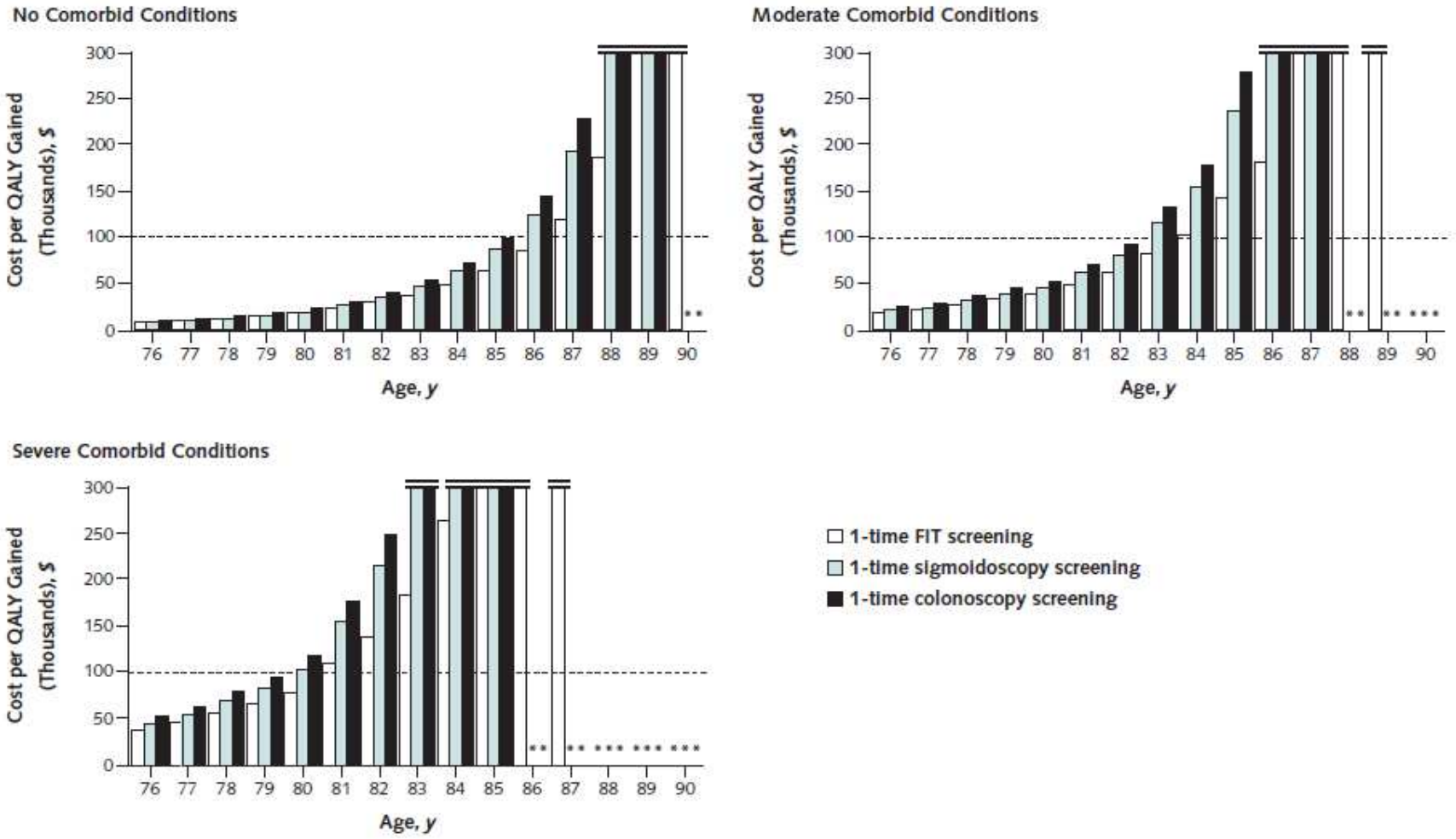
§ The effect of the screening test, diagnostic colonoscopies, surveillance colonoscopies, complications, and LYs with CRC care on quality of life. Values are derived by multiplying number(s) of events with the corresponding utility loss(es) per event stated in **Table 1.** For example, when applying the 1-time colonoscopy screening strategy, 1000 persons have a screening colonoscopy in each cohort. Because the utility loss per screening colonoscopy is 0.0055 QALYs, the total utility loss due to screening colonoscopies is 5.5 QALYs in each cohort.

‖ The effect of screening on quantity and quality of life incorporated in 1 measure (i.e., the net health benefit of screening), calculated by adding LYs gained and all effects on quality of life. Discrepancies between the columns may occur due to rounding.

¶ Screening results in a gain of quality of life by preventing LYs with CRC care and a loss of quality of life by adding LYs with CRC care. The net effect can be a gain of quality of life (positive value) or a loss of quality of life (negative value). As a result of the shift from preventing to overdiagnosing CRC with increasing age, the net effect on quality of life becomes less favorable with age. Whereas 1-time colonoscopy screening in unscreened elderly without comorbid conditions reduced the total number of LYs with CRC care for stage III or IV CRC at age 76 y (−14 LYs per 1000 persons), it increased this number of LYs at age 90 y (+16 LYs per 1000 persons).

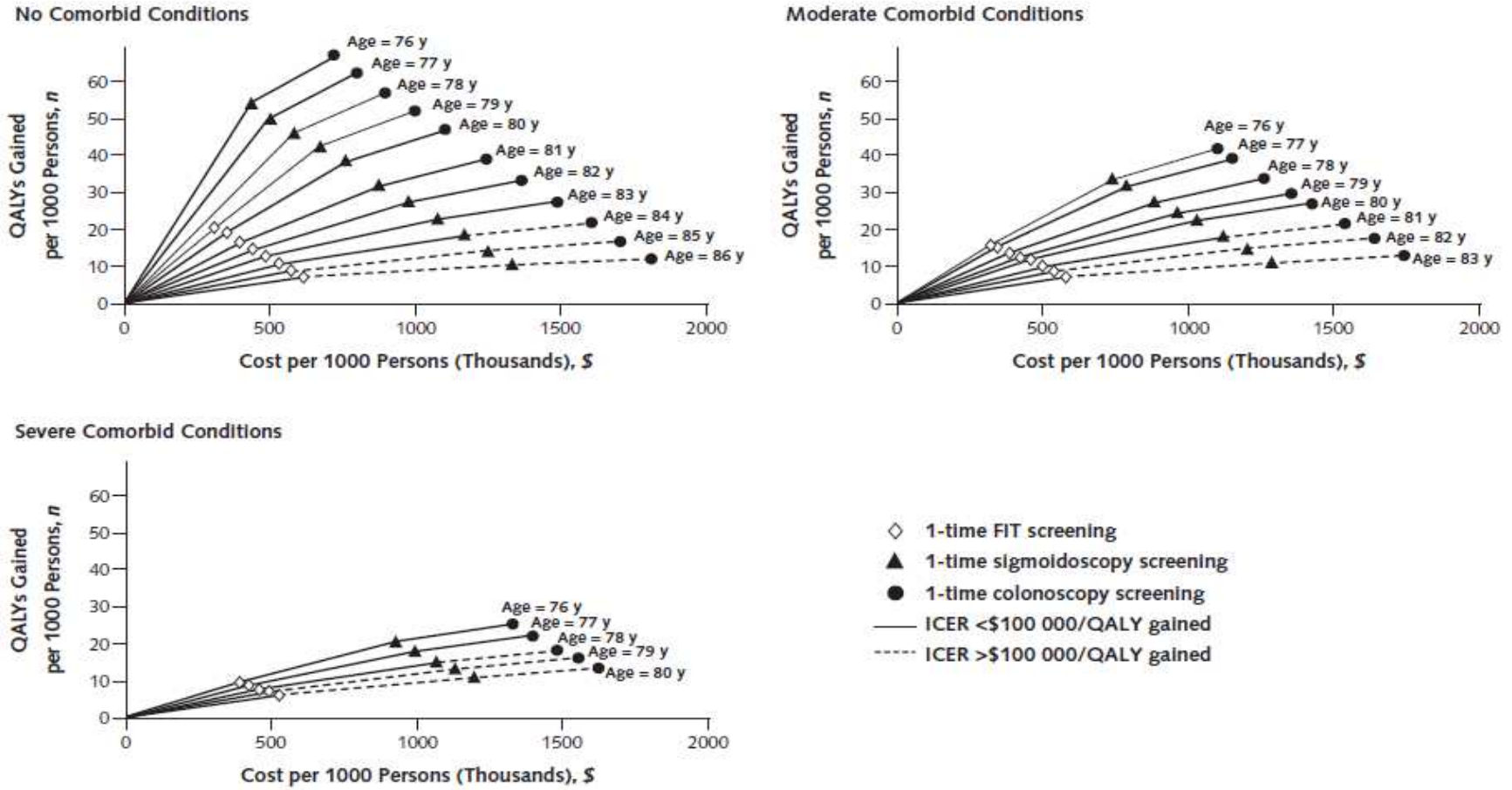
** More detailed results for this cohort are given in **Appendix Table 2** (available at www.annals.org).

Figure 1. **Cost-effectiveness of 1-time colonoscopy, sigmoidoscopy, and FIT screening compared with no screening in elderly persons without previous screening with no, moderate, and severe comorbid conditions.**



Results are presented per 1000 persons and discounted by 3% per year. Persons are classified as having moderate comorbid conditions if they have an ulcer, rheumatologic disease, peripheral vascular disease, diabetes, paralysis, cerebrovascular disease, or a history of acute myocardial infarction; severe comorbid conditions if they have chronic obstructive pulmonary disease, congestive heart failure, moderate or severe liver disease, chronic renal failure, dementia, cirrhosis and chronic hepatitis, or AIDS; and no comorbid conditions if none of these conditions are present. The dashed line indicates a willingness to pay per QALY gained of $100 000. Screening strategies costing less than $100 000 per QALY gained are considered cost-effective. Asterisks for missing screening strategies indicate that they were associated with a net health loss rather than a benefit (**Appendix Table 3** [available at www.annals.org] and **Table 2**). FIT = fecal immunochemical test; QALY = quality-adjusted life-year.

Figure 2. **The incremental cost-effectiveness of the efficient screening strategies in elderly persons without previous screening with no, moderate, and severe comorbid conditions.**



Results are presented per 1000 persons and discounted by 3% per year. Persons are classified as having moderate comorbid conditions if they have an ulcer, rheumatologic disease, peripheral vascular disease, diabetes, paralysis, cerebrovascular disease, or a history of acute myocardial infarction; severe comorbid conditions if they have chronic obstructive pulmonary disease, congestive heart failure, moderate or severe liver disease, chronic renal failure, dementia, cirrhosis and chronic hepatitis, or AIDS; and no comorbid conditions if none of these conditions are present. In elderly persons without previous screening with no, moderate, or severe comorbid conditions, none of the screening strategies are cost-effective from age 87, 84, and 81 years onward, respectively (**Figure 1**). For each age, the efficient screening strategies are connected by an efficiency frontier. A solid line indicates that the ICER of a screening strategy is <$100 000 per QALY gained, implying that the strategy is considered cost-effective. A dashed line indicates that the ICER of a screening strategy exceeds $100 000 per QALY gained, implying that the strategy is not considered cost-effective. FIT = fecal immunochemical test; ICER = incremental cost-effectiveness ratio; QALY = quality-adjusted life-year.

Summary

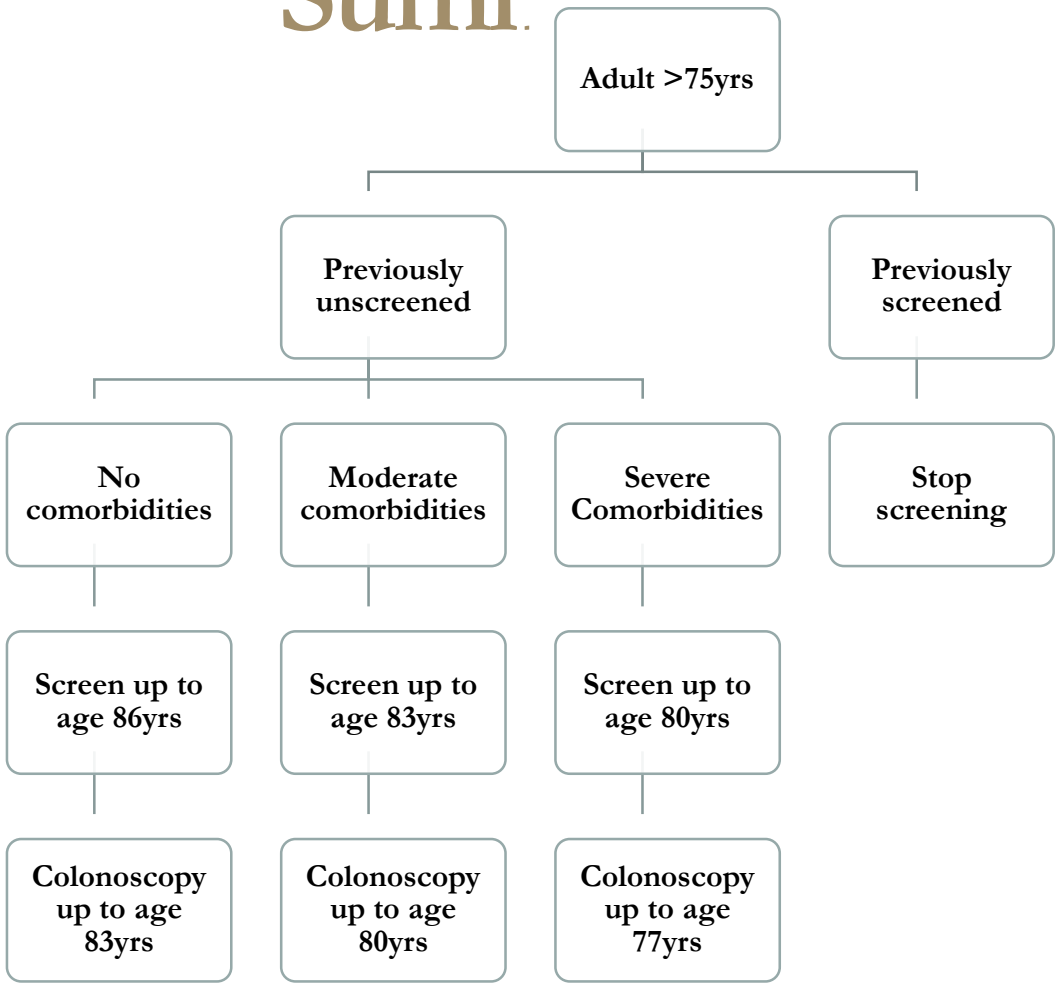
Table 4. **Results Summary of CRC Screening Indicated in Elderly Persons Without Previous Screening**

Comorbid Condition Level*	Age up to Which CRC Screening Should Be Considered, *y*	Screening Strategy Indicated, by Age										
		76 y	77 y	78 y	79 y	80 y	81 y	82 y	83 y	84 y	85 y	86 y
No comorbid conditions	86	COL	COL	COL	COL	COL	COL	COL	COL	SIG	FIT	FIT
Moderate comorbid conditions	83	COL	COL	COL	COL	COL	SIG	FIT	FIT			
Severe comorbid conditions	80	COL	COL	SIG	FIT	FIT						

COL = 1-time colonoscopy; CRC = colorectal cancer; FIT = 1-time fecal immunochemical test; SIG = 1-time sigmoidoscopy.

* Persons are classified as having moderate comorbid conditions if they have an ulcer, rheumatologic disease, peripheral vascular disease, diabetes, paralysis, cerebrovascular disease, or a history of acute myocardial infarction; severe comorbid conditions if they have chronic obstructive pulmonary disease, congestive heart failure, moderate or severe liver disease, chronic renal failure, dementia, cirrhosis and chronic hepatitis, or AIDS; and no comorbid conditions if none of these conditions are present.

Summ


Adult >75yrs
Previously unscreened
Previously screened
No comorbidities
Moderate comorbidities
Severe Comorbidities
Stop screening
Screen up to age 86yrs
Screen up to age 83yrs
Screen up to age 80yrs
Colonoscopy up to age 83yrs
Colonoscopy up to age 80yrs
Colonoscopy up to age 77yrs

Thank You

Questions?

Thank You

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